

CRATER LAKE
KLAMATH
REGIONAL AIRPORT

Master Plan

February 2021





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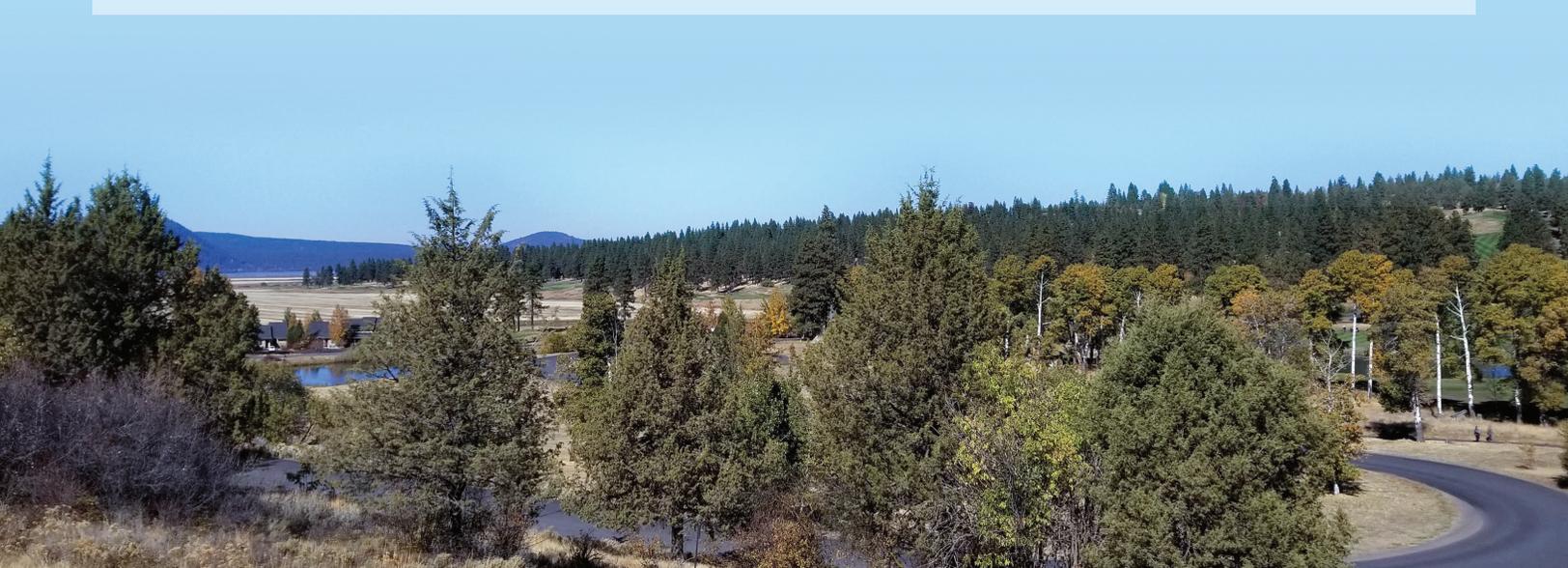
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Executive Summary



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.

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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.

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Chapter 1

Inventory



CRATER LAKE

KLAMATH REGIONAL

AIRPORT

Inventory

INTRODUCTION

This Inventory Chapter summarizes airport facilities, services, and existing conditions at Crater Lake – Klamath Regional Airport (LMT). This information is used to establish the basis for analyses and recommendations documented throughout the Master Plan. Inventory data was collected from LMT records, FAA published data, and interviews conducted as part of on-site visits to verify the status and condition of LMT facilities.

This Inventory Chapter includes:

- ▶ Airport Overview
- ▶ Airport Profile
- ▶ Airfield and Airspace
- ▶ Landside Facilities
- ▶ Airport Support and Tenant Facilities
- ▶ Meteorological Conditions
- ▶ Community Profile
- ▶ Environmental Overview
- ▶ Inventory Chapter Summary

AIRPORT OVERVIEW

LOCATION

Figure 1-1 depicts LMT location and vicinity. The City of Klamath Falls is in south-central Oregon, 15 miles north of the Oregon/California border. The City of Klamath Falls is the Klamath County seat and the commerce center for the Klamath Basin Region of south-central Oregon and north-central California. LMT is in south-central Klamath County, five miles south of downtown Klamath Falls.

U.S. Route 97 (Dalles-California Highway), State Highway 140 (Southside Expressway) and County Highway 875A (Washburn Way) are the major thoroughfares providing access to LMT. State Highway 39 (Klamath Falls-Malin Highway) flanks LMT on the east side. LMT is bounded on the north by the Southside Expressway, on the east by Homedale Road and the Burlington Northern Santa Fe Railroad (BNSF), on the west by the Union Pacific Railroad (UP) and to the south by the Lost River Diversion Channel.

Figure 1-1 : LMT Vicinity and Location



Sources: GIS Mapping.

GOVERNANCE

The City of Klamath Falls owns the Crater Lake – Klamath Regional Airport and administers sponsorship in accordance with Federal Aviation Administration (FAA) grant obligations. The City's airport administration includes an Airport Director responsible for overall management, in addition to a Business Manager and Operations Manager, with supporting maintenance/operations personnel. The Airport Director reports to the City Manager, who in turn reports to the City Council. LMT is its own department under the City of Klamath Falls.

HISTORY

In November 1928, Klamath voters approved a measure allowing the City to sell \$50,000 in bonds to fund the construction of an airport. LMT was developed in 1930 as a municipal airport with the construction of gravel runways. Services consisted of a single fixed base operator (FBO) that provided fuel to local pilots. In 1942, the U.S. Navy selected LMT as the site for a Naval Air Station. The Navy expanded the facility, including the construction of three paved runways. In 1946, at the end of World War II, the Naval base closed, and a portion of the airport facility was returned to the City of Klamath Falls under reversion as a municipal airport. The remaining land was turned over to the United States Department of the Interior, Bureau of Reclamation (USBR) for administrative offices and storage. In 1947, United Airlines became the first air carrier to provide scheduled passenger service.

In 1954, the USBR lands and a portion of the City's property interests were transferred to the United States Air Force (USAF) for a new Fighter Interceptor Complex. The USAF operated the base from 1954 to 1971. By 1956, Runway 14/32 was extended to 10,301 feet and widened to 150 feet, along with new taxiway systems and ramp areas. The airline passenger terminal building was completed in 1959.

In 1971, the Oregon Air National Guard (Oregon ANG) began its presence at LMT with the establishment of the 104th Tactical Control Squadron. The Oregon ANG assumed responsibility for Air Defense Alert from the US Air Force in 1981. The alert sovereignty ceased at LMT in 1994, with the remaining alert detachment transferred to the Oregon ANG. The Oregon ANG 173d Fighter Wing, which is a reserve component of the USAF, was activated at LMT in 1996. LMT serves as the only F-15 training facility in the United States. In 2002, the US Forest Service established the Klamath Air Tanker Base (KATB) on the northeast side of LMT to support regional aerial firefighting. The new KATB replaces the original facility constructed in the 1990s on the northwest side of LMT.

Over the years, LMT has evolved to support commercial and general aviation users, based operators, and military tactical functions under the national air defense system.

AIRPORT PROFILE

FACILITY CLASSIFICATIONS

Table 1-1 summarizes LMT service and facility classifications. LMT accommodates commercial, general aviation, and military aviation activity. LMT is classified as a primary commercial service (non-hub) facility in the most recent version of the National Plan of Integrated Airport Systems (NPIAS) by the FAA and a commercial service airport by the Oregon Department of Aviation (ODA). It is certified under FAA Part 139 to serve scheduled transport aircraft with 30-plus passenger seats although no scheduled air carrier service has been provided since 2017 and LMT is operated as general aviation airport. Although not formally a joint-use or shared-use facility, LMT operates under unique arrangements with respect to accommodating civilian and military facilities and aeronautical activities.

The City of Klamath Falls has a formal Airport Joint Use Agreement (AJUA) with the United States of America and the State of Oregon. The agreement provides for the delineation of responsibility for operation and maintenance of the flying facilities jointly used in common with others at LMT, and establishes the Air Force's reasonable share, proportional to such use, of the cost of operating and maintaining such jointly used flying facilities.

Table 1-1 : LMT Facility Services

Airport Attributes	Description
Ownership Classifications	
Airport Sponsor (Owner)	City of Klamath Falls, Oregon
Airport Property	1,251± Acres (Fee Ownership); 60-Acre Offsite Wetland Mitigation Site
FAA NPIAS Airport Classification	Primary Commercial Service (Non-Hub), Site Number: 19481
FAA Part 139 Certification / ARFF Index	Part 139 Class II (Certified May 1973) / FAA ARFF Index A
State of Oregon Airport Category	Category 1 (Commercial Service)
Facilities	
Airport Traffic Control Tower (ATCT)	Level 1 Contract Tower
On-Airport Navigational Aids	VORTAC (High Levell), ILS, RNAV (GPS), Green/White Beacon
Weather Observational Aids	Automated Surface Weather Observation Service (ASOS)
	Runway Visual Range (RVR)
Aeronautical Communications	Remote Communications Outlet (RCO – Mc Minnville Radio)
	Radar Approach Control – RAPCON (Inactive Facility Status)

Note: See Glossary for definitions and acronyms.

Sources: FAA publications and airport records, August 2018.

AERONAUTICAL ACTIVITY

LMT, based on FAA aircraft operational records, is the 9th busiest airport in the State of Oregon. In 2017/2018, LMT recorded 48,500 total annual aircraft operations (31,600 civilian and 16,900 military) and 117 total based aircraft (85 civilian and 32 military).

Approximately 90 percent of the civilian traffic is fixed-wing aircraft, and 10 percent helicopter. This 2017/2018 operational data is consistent with LMT historical activity levels recorded since 1995 and serves as the current-year activity baseline of civilian and military activity for the Master Plan. The following documents LMT activity by major civilian and military user:

Commercial Activity (Civilian)

Airline Activity

Scheduled airline service was most recently provided by Horizon (Q-200 aircraft), United Express (EMB-Brasilia 120 aircraft), and PenAir (Saab 340 aircraft), operating 30 to 37-seat twin turboprop aircraft, with daily service to Portland International Airport (PDX). Since 2000, annual enplanements consistently ranged between 9,000 and 30,000 passengers, and 2,500 to 3,500 annual aircraft operations. The LMT airline passenger catchment area extends from Southern Oregon to Northern California, including Klamath, Lake, and the northern portions of Siskiyou and Modoc Counties. This catchment area has 82,000 residents and generates around 153,000 annual inbound and outbound market passengers. Scheduled airline service was discontinued at LMT in 2017 due to air carrier bankruptcy; however, the City is aggressively pursuing replacement airline service to a west coast destination.

Air Cargo Activity

FedEx (operated by Empire) and UPS (operated by Ameriflight) provide scheduled air cargo flights using single and twin-turboprop aircraft. Occasionally, independent air cargo operators provide courier and freight service for specialized cargo transports. In 2017/2018, air cargo flights totaled 1,000 aircraft operations and 1.5 million total pounds of inbound and outbound cargo (freight, packages, mail).

General Aviation Activity (Civilian)

Fixed Base Operator (FBO) and Based Aircraft Pilot Tenants: The Fixed Base Operator (FBO) and aircraft pilots account for nearly 9,000 annual operations and 75 based aircraft. The FBO provides pilot and aircraft services, including fuel (Jet-A and 100LL Avgas), on-demand passenger charter, emergency air ambulance, aircraft/powerplant maintenance repair for piston and turbine aircraft, hangar storage, and aircraft tie-down parking.

Aircraft Operation: The number of aircraft takeoffs and landings, classified as *local* for aircraft operating from the same airport and *itinerant* for aircraft operating to or from a different airport.

Based Aircraft: Aircraft stored in hangars or on tie-downs as part of a rental or lease agreement; excludes temporary visiting aircraft or aircraft registered at another airport.

Historical Airline Service Schedule:

Horizon: 1979 – 2008

United: 2008 – 2014

PenAir: 2016 – 2017

*Other air carriers provided services in 1980s and 1990s.

US Forest Service (USFS) Activity

In 2017, the US Forest Service Klamath Air Tanker Base (KATB) supported 37 different air tanker aircraft; these tankers flew nearly 220 flights. The primary users are the USFS Regions 5 and 6 (covering Washington, Oregon, and northern California), the Oregon Department of Forestry (ODF), the Bureau of Land Management (BLM), and the California Department of Forestry and Protection (CalFire). During the fire season, which typically extends from June to October, the KATB accommodates USFS-operated and contract aircraft, along with various permanent and part-time support personnel. The KATB bases one Aero Commander (2-engine turboprop) at LMT. The largest USFS air tanker transport aircraft operating at LMT are the Lockheed C-130Q Hercules (4-engine turboprop) and the Bae Avro RJ-85 (4-engine jet). The USFS has expressed interest in accommodating the DC-10-30 transport (4-engine heavy jet) at LMT.

Agricultural Spray Activity

The agricultural spray operators use specialized single-engine turbo-prop aircraft equipped with field-spraying applicators. The ag-spray operators base two aircraft at LMT and conduct 900 annual operations.

General Aviation Flight Training

Civilian flight school training is provided by Pelican Aviation and Precision Aviation, with a combined 7 based flight training aircraft (6 fixed-wing and 1 helicopter) and 16,000 annual aircraft operations. Pelican Aviation provides fixed-wing pilot instruction and training. Precision Aviation offers helicopter and fixed-wing pilot instruction and an accredited flight training program affiliated with the Klamath Community College.

Military Activity

Oregon Air National Guard Activity

The Oregon Air National Guard (Oregon ANG) 173d Fighter Wing operates 32 based F-15 C/D tactical fighter jets that average 16,000 to 20,000 annual aircraft operations. The Oregon ANG typically schedules two daily aircraft training exercises Monday through Friday, normally between 9:00 am and 11:00 am (involving 12 aircraft) and 1:00 pm and 3:00 pm (involving 8 aircraft). Weekend exercises typically occur once to twice per month. Night training exercises are conducted once to twice a month.

Other Military Activity

Military flights also entail aircraft support and combat training exercises, including the Sentry Eagle event which generally occurs biannually involving 50 fighter and transport military aircraft. Other military activities include the Adversary Air Squadron (ADAIR), a private contract arrangement involving Alca fighter jets which conduct oppositional combat force training with the Oregon ANG F-15s and are expected to conduct 2,500 to 5,000 annual operations at LMT. Combined, the other military aircraft activity accounts for 1,350 annual fixed-wing and helicopter operations (excluding ADAIR which is counted as civilian).

AIRFIELD AND AIRSPACE

This section summarizes LMT facility assets and infrastructure conditions. The airfield facilities include the runway, taxiway, and navigational systems directly used to support aeronautical activities. **Figure 1-2** depicts the airfield facilities and runway configuration.

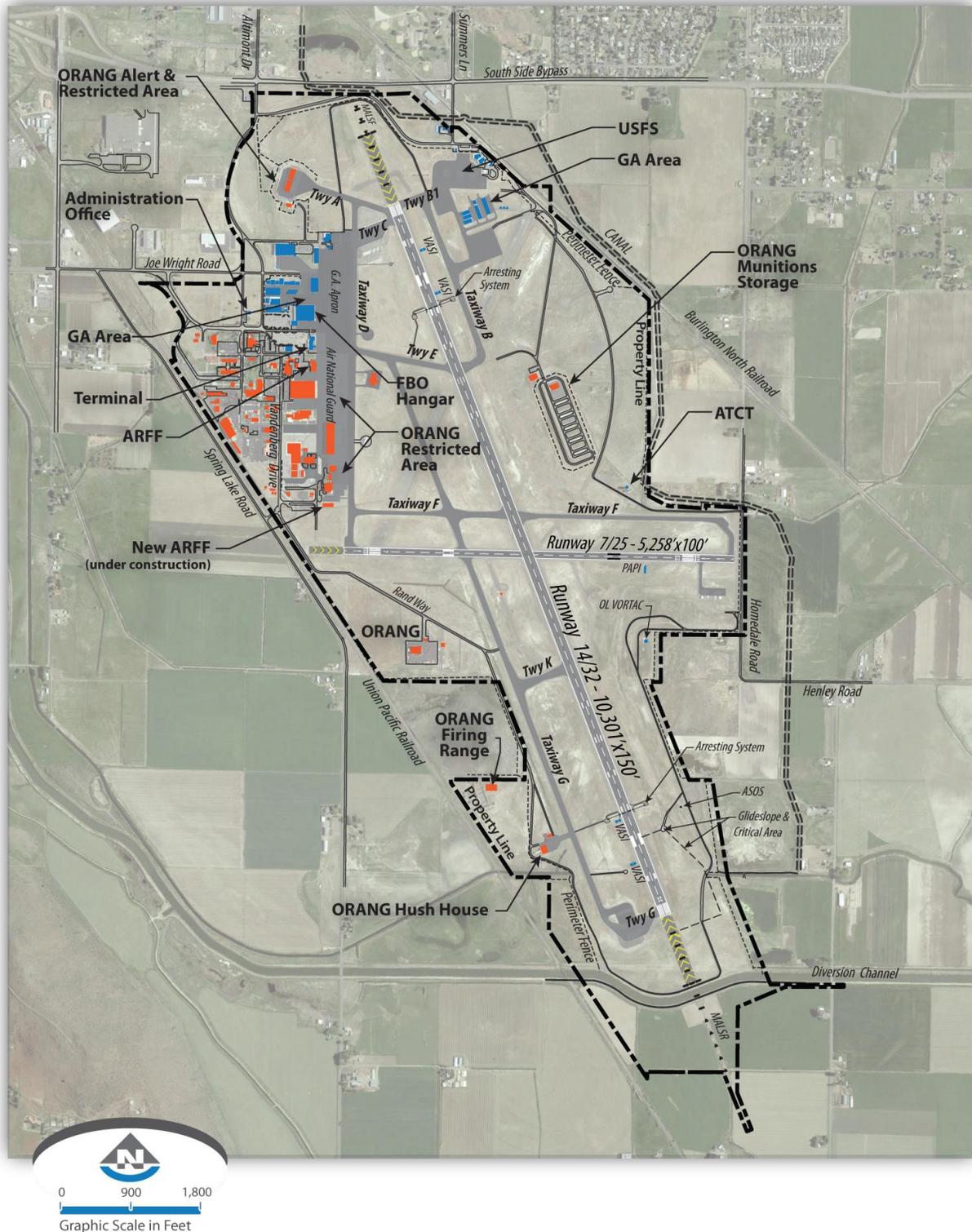
Airside: Facilities that are accessible to aircraft, such as runways and taxiways.

PROPERTY INTERESTS

The LMT property is owned in fee by the City of Klamath Falls and totals approximately 1,251 acres. The LMT property also includes an additional 60-acre offsite wetland mitigation area located along Lake Ewauna. As follows, portions of the 1,251-acre LMT property are controlled under various civilian and military joint use agreements and subordinated lease and easement arrangements.

- ▶ 325 Acres± (26 percent) = City-Airport Property (Landside Civilian Areas)
- ▶ 525 Acres± (42 percent) = Joint Use Property between City and Military (Airfield Areas)
- ▶ 400 Acres± (32 percent) = Military Use Property (313 Acres Oregon ANG Leased)

Figure 1-2 : Existing Airport Layout and Facilities



Source: GIS Mapping with LMT Airport Data and FAA Published 5010 and Airport/Facility Directory Information.

AIRFIELD

Runway System

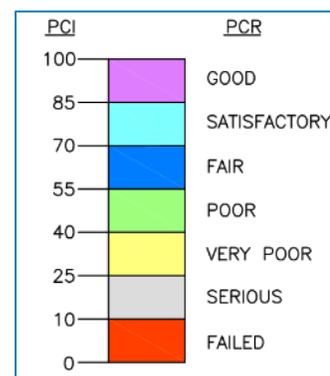
Table 1-2 summarizes the runway infrastructure, facilities, visual navigation aids, and equipment by runway end. The airfield has two runways that intersect at midfield. The primary Runway 14/32 is 10,302' x 150' and has precision instrument capabilities, paved overruns, and arresting gear equipment for military aircraft use. Runway 14/32 is the second longest runway in Oregon. The crosswind Runway 7/25 is 5,258' x 100', with displaced landing thresholds and is FAA-programmed as a future non-precision instrument runway. Nearly 85 percent of the aircraft traffic uses runway 14/32 and 15 percent uses Runway 7/25. Runway 14 is the designated calm runway end for civilian and military traffic during light wind conditions. Runway 7/25 is not typically used by the Oregon ANG.

Taxiway System

The taxiway system consists of 12 named taxiway segments totaling 25,700 linear feet. The taxiways are named A, B, B1, B2, B3, C, D, E, F, G, H, and K. All taxiways are within the air traffic control movement area. Most of the taxiways are 75 feet wide. Taxiway F is 75 feet wide between Runway 14/32 and Taxiway G. Between Taxiway G and Taxiway D, Taxiway F is 50 feet wide. Between Runway 14/32 and Runway End 25, Taxiway F is 50 feet wide. Taxiway H is 35 feet wide. The taxiway system supports civilian and military taxiing and maneuvering, except for a 2,000-linear foot section of Taxiway D which bypasses the Oregon ANG aircraft ramp. The section of Taxiway D that is adjacent to the Oregon ANG apron is restricted to military use only and is considered a taxilane. **Table 1-3** summarizes the taxiway system infrastructure and equipment capabilities

Pavement Condition

Pavement maintenance is a significant LMT capital investment. A *Pavement Evaluation/Maintenance Management Program* was conducted in 2016 and identified the existing and project Pavement Condition Index (PCI). The PCI is a visual pavement inspection method for recording pavement surface distress types, calculating severity levels, and identifying pavement improvement methods. The PCI rates pavements in numerical and color-code indexes to correspond with the severity of pavement distresses (see PCI color scale; 100=excellent to 0=failed), and types of pavement repairs anticipated.



The following delineates PCI per pavement systems:

- ▶ Runway 14/32 and 7/25 Systems
 - 2.85 million square feet (65 acres: 52 percent of total pavement area)
 - 2016 PCI Condition: Good to Fair
- ▶ Taxiway System
 - 1.77 million square feet (41 acres: 33 percent of total pavement area)
 - 2016 PCI Condition: Fair to Very Poor

- ▶ Apron/Ramp Systems
 - 810,000 million square feet (19 acres: 15 percent of total pavement area)
 - 2016 PCI Condition: Fair

The following shows the PCI rating as a percent of the total pavement area (excluding military exclusive use pavements).

- ▶ LMT Pavement Area = 5.4 million square feet (125 acres)
 - Good = 38 percent
 - Satisfactory to Fair = 45 percent
 - Poor to Failed = 17 percent

Table 1-2 : Airfield Systems

RUNWAY SYSTEM				
Facility Component	Runway 14/32		Runway 7/25	
	Runway End 14	Runway End 32	Runway End 7	Runway End 25
Runway Type	Primary		Crosswind	
Runway Length x Width	10,302' x 150'		5,258' x 100'	
Runway Shoulder Width (Per Side)	20' (Paved)		None	
Pavement Strength (1,000 Lbs.) (Aircraft Main GearType)	175,000 (Dual Gear - DWG) 315,000 (Dual Tandem Gear - DTWG) PCN 41 F / A / X / T		17,500 (Single Gear - S) 50,000 (Dual Gear - DWG) PCN 19 F / B / Y / U	
Pavement Surface Course	Asphalt-Concrete (Grooved)		Asphalt	
Pavement Markings	Precision		Basic-Visual	
Paved Runway Blast Pad (W x L)	150' x 200'	150' x 200'	None	None
Paved Runway Stopway (W x L)	150' x 1,002	150' x 1,000'	100' x 475'	None
Arresting Gear (Military Use Only)	Yes	Yes	None	None
Runway Displaced Threshold	None		306'	512'
Land and Hold Short (LASHO)	None		None	
In-Line Taxiway	None		None	
Distance Remaining Signs	Yes		Yes	
Runway Edge Lights	High Intensity (HIRL)		Medium Intensity (MIRL)	
Runway Lighting Aids	PAPI-4L	VASI-4L	None	PAPI-4L, REIL
Runway Approach Lighting	MALS-F	MALS-R	None	
Runway Visibility Range (RVR)	None	Yes	None	
Runway Instrument Approaches	RNAV, VOR/DME	ILS, RNAV, VOR/DME	Visual	Visual
Approach Minimums (Lowest)	3/4-Mile / 600'	1/2-Mile / 200'	None	None
	(A, B, C, D)	(A, B, C, D, E)	None	None

Note: See Glossary for Definitions and Acronyms.

Note: FAA developing feasibility for Runway 14 precision ILS procedure.

Note: Paved stopways and blast pads are not useable runway for takeoff and landing purposes.

Note: Arresting gear provides emergency aircraft stopping distance (not used for civilian purposes).

Source: Pavement strength data obtained from FAA Form 5010-1.

Table 1-3 : Taxiway System

TAXIWAY SYSTEM (DESIGNATIONS)				
Taxiway Segment	A	B	B1	B2
Type	Entrance/Connector	Partial Parallel	Entrance/Connector	Connector
Dimension (Length x Width)	530' x 75'	2,200' x 75'	300' x 75'	300' x 75'
Taxiway Design Group (TDG)	5	5	5	5
Paved Shoulder Width	50' (One Side)	30'	30' (One Side)	30'
Pavement Surface Course	Asphalt	Asphalt	Asphalt	Asphalt
Edge Lighting	Medium (MITL)	Medium (MITL)	Medium (MITL)	Medium (MITL)
Pavement Classification (PCN)	39	37	37	37
Runway-Taxiway Separation	--	400'	--	--
Runway Hold Short Line	290'	Not Applicable	290'	290'
Taxiway Signs	Yes	Yes	Yes	Yes
Use: Civilian / Military	Civilian Section	Civilian and Military	Civilian and Military	Civilian and Military
Taxiway Segment	B3	C	D (North End)	D (South End)
Type	Exit/Connector	Entrance/Connector	Conector	Entrance/Conector
Dimension (Length x Width)	300' x 75'	535' x 75'	2,050' x 75'	550' x 75'
Taxiway Design Group (TDG)	5	5	5	5
Paved Shoulder Width	30'	50'	40' to 50' (One Side)	None
Pavement Surface Course	Asphalt	Asphalt/Concrete	Asphalt	Asphalt
Edge Lighting	Medium (MITL)	Medium (MITL)	Medium (MITL)	Medium (MITL)
Pavement Classification (PCN)	37	43	39	39
Runway-Taxiway Separation	--	--	--	--
Runway Hold Short Line	290'	290'	None	260'
Taxiway Signs	Yes	Yes	Yes	Yes
Use: Civilian / Military	Civilian and Military	Civilian and Military	Civilian and Military	Civilian and Military
Taxiway Segment	E	F	G	K
Type	Exit/Connector	Full Parallel	Partial Parallel	Exit
Dimension (Length x Width)	1,300' x 75'	5,450' x 50'/75'	8,870' x 75'	680' x 75'
Taxiway Design Group (TDG)	5	3 / 4 / 5	5	5
Paved Shoulder Width	20'	None	10 (Varies)	20'
Pavement Surface Course	Asphalt	Asphalt	Asphalt/Concrete	Asphalt
Edge Lighting	Medium (MITL)	Medium (MITL)	Medium (MITL)	Medium (MITL)
Pavement Classification (PCN)	39	13	39	39
Runway-Taxiway Separation	N/A	525'	785'	N/A
Runway Hold Short Line	365'	240' to 260'	285' to 290'	290'
Taxiway Signs	Yes	Yes	Yes	Yes
Use: Civilian / Military	Civilian and Military	Civilian and Military	Civilian and Military	Civilian and Military

Note: Table does not include taxiway and taxilane systems used for military exclusive-use or agricultural operators (Taxiway H).

Note: Taxiway segment lengths determined from LMT ALP drawing.

Source: Pavement strength estimated from 2016 LMT Pavement Evaluation/Maintenance Management Plan.

AIRSPACE AND AIRPORT TRAFFIC CONTROL

Airspace

Figure 1-3 shows the aeronautical chart for the surrounding LMT airspace and navigational system. The airspace surrounding LMT is Class D, Class E, and Class G, which have different pilot communication, entry, and aircraft separation requirements. Multiple Military Operating Areas (MOAs) are established east and southeast of LMT; these are designated airspace boundaries used to contain military aircraft exercises.

Navigational Aid Stations

The following are the primary navigational aids located at LMT:

- ▶ VORTAC Station
- ▶ Instrument Landing System (ILS) – Runway 32

The LMT VORTAC Station is southeast of the intersection of Runways 14/32 and 7/25; it provides multiple high and low-level airway routes for civilian and military use, Distance Measuring Equipment (DME) capabilities, and supports instrument approach and missed approach procedures. The LMT VORTAC involves a 1,000-foot and 1,200-foot buffer radius to protect encroachment from various structures. As confirmed by the FAA Minimal Operational Network (MON), the LMT VORTAC is not programmed to be phased out.

Airport Traffic Control Services

The Airport Traffic Control Tower (ATCT) controls radio communications and directs civilian and military traffic within a 5.4-mile radius of the airfield and 2,500 feet above LMT. During ATCT operating hours the airspace is Class D (tower communication) and reverts to Class E (pilot self-advisories) during non-operating ATCT hours. The Radar Approach Control (RAPCON) facility, which provides traffic advisories and sequencing services to aircraft operating within 30 miles of the airfield, is inactive; but expected by the Oregon ANG to become operational in the near future.

Figure 1-3 : Airspace Structure



Source: Vector Map, Visual Flight Rule (VFR) Aeronautical Sectional Chart, Obtained August 2018.

Airspace Traffic Patterns

The LMT traffic pattern altitude is 4,900 feet mean sea level for light piston/turbine aircraft and 5,400 feet mean sea level for heavy turbine aircraft. Nearly 80 percent of the military traffic arrivals and departures are to the east and southeast. The Oregon ANG has internal, unpublished procedures for noise mitigation over populated areas, requiring aircraft to climb steeper and turn early when departing Runway 32. Runway 14, due to proximity to the landside terminal areas, is the designated runway end for civilian and military traffic during calm wind conditions. Runway 7/25 is used predominately for flight training and agricultural-spray operations, but not typically used by the Oregon ANG.

INSTRUMENT APPROACH PROCEDURES

Table 1-4 identifies the instrument approach procedures by type, allowable FAA aircraft categories, lowest approach minimums, and civilian/military operator use.

LMT has 8 instrument approach procedures (5 civilian and 3 military exclusive use). The military aircraft are installed with ultra-high frequency navigation to support dedicated instrument approach procedures.

The Runway 32 end has a precision Instrument Landing System (ILS) which provides the lowest approach minimums. LMT has published instrument departure procedures for Runways 14 and 32 with radar services required and specific aircraft performance climb gradient requirements to maintain obstacle clearance and communications during instrument conditions.

Approach Minimums: The lowest forward visibility or descent altitude when executing an instrument procedure.

Precision: Provides horizontal and vertical instrument approach guidance.

Non-Precision: Provides only horizontal instrument approach guidance.

Visual: No published instrument approach procedure to the airport or runway end.

Table 1-4 : Instrument Approach Procedures

Runway End	Instrument Procedure	Procedure Type	FAA Aircraft Categories	Minimum Descent Altitude (Feet AGL)	Visibility Minimums (Statute Mile and RVR)	Military Use Only
14	RNAV (GPS)-LPV	Non-Precision	A,B,C,D	544'	3/4-Mile	No
	VOR/DME	Non-Precision	A,B,C,D,E	769'	3/4-Mile	No
	HI-TACAN	Non-Precision	C,D,E	769' (800')	2-Miles	Yes
	ILS	Undergoing FAA Feasibility				
32	ILS	Precision	A,B,C,D	200'	2400 RVR 1800 RVR (FD/HUD)	No
	VOR/DME	Non-Precision	A,B,C,D,E	465'	2400 RVR	No
	RNAV (GPS)-LPV	Non-Precision	A,B,C,D	292'	2400 RVR	No
	HI-ILS	Precision	C,D,E	200' (200')	1/2-Mile (2400 RVR)	Yes
	HI-TACAN	Non-Precision	C,D,E	445' (500')	4500 RVR	Yes

Note: See Glossary for Definitions and Acronyms.

Note: FAA conducting Runway 14 precision ILS feasibility to determine military and civilian functionality.

Source: FAA published procedures obtained 08-2018 | FAA instrument procedure website.

LANDSIDE FACILITIES

LMT civilian landside facilities, used to support commercial and general aviation, are located on the west and east portion of the airfield. Combined, the civilian landside occupies 70 acres and contains 33 aircraft hangar buildings totaling nearly 193,000 square feet and offering 57 hangar spaces.

Landside: Facilities that support airside operations, but are not part of the aircraft movement area, such as terminal buildings, hangars, aprons, access roads, and parking facilities.

Figure 1-4 identifies the west side civilian landside area, which occupies 40 acres and includes support facilities for commercial and general aviation operators (buildings, ramps, hangars, auto parking, aircraft wash rack, rental car wash facility and fuel storage). **Figure 1-5** identifies the eastside civilian landside area, which occupies 30 acres and includes support facilities for general aviation hangar tenants and the US Forest Service (buildings, ramps, hangars, auto parking, and fuel storage).

Figure 1-4 : Westside Civilian Landside Area

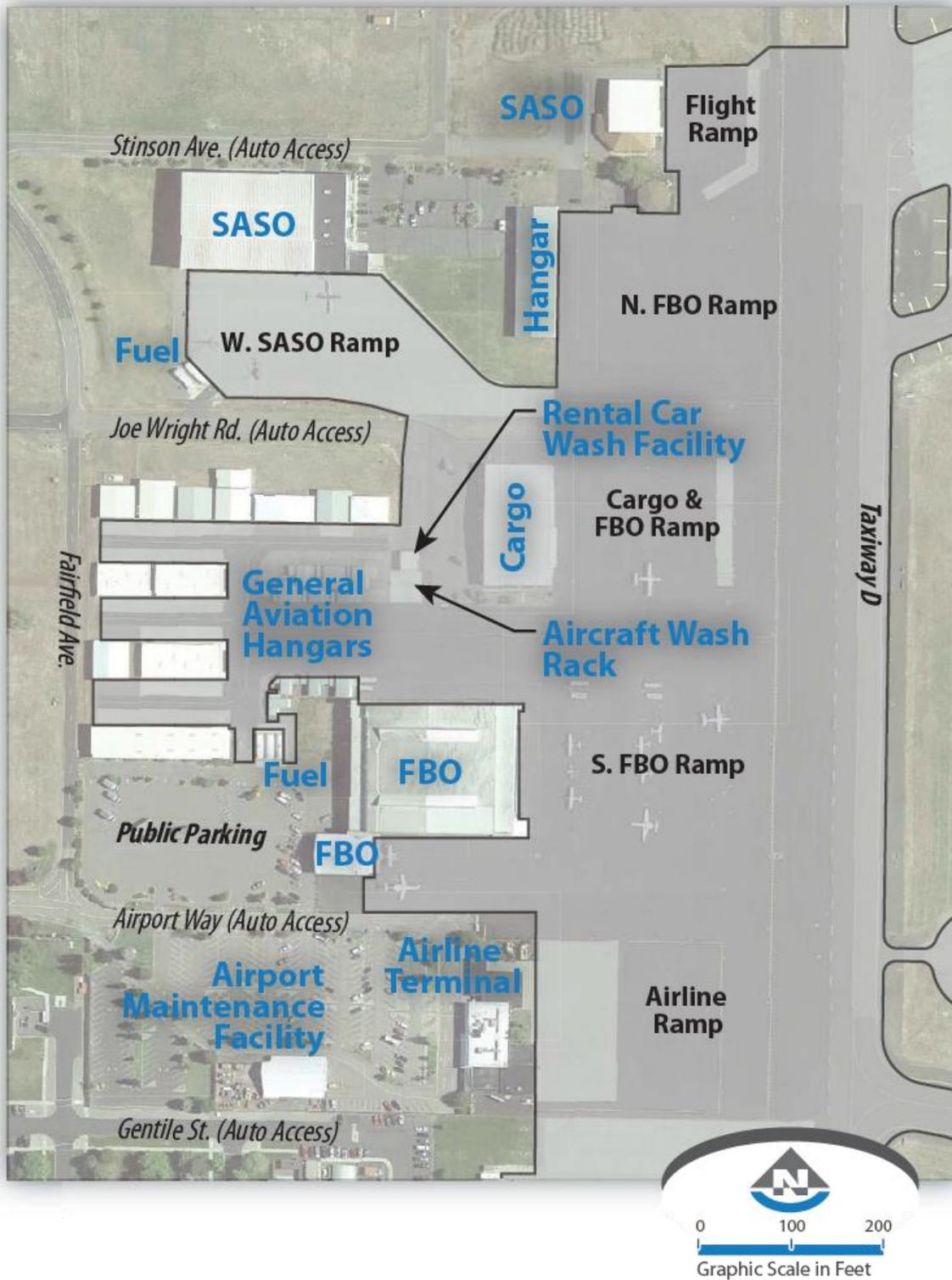
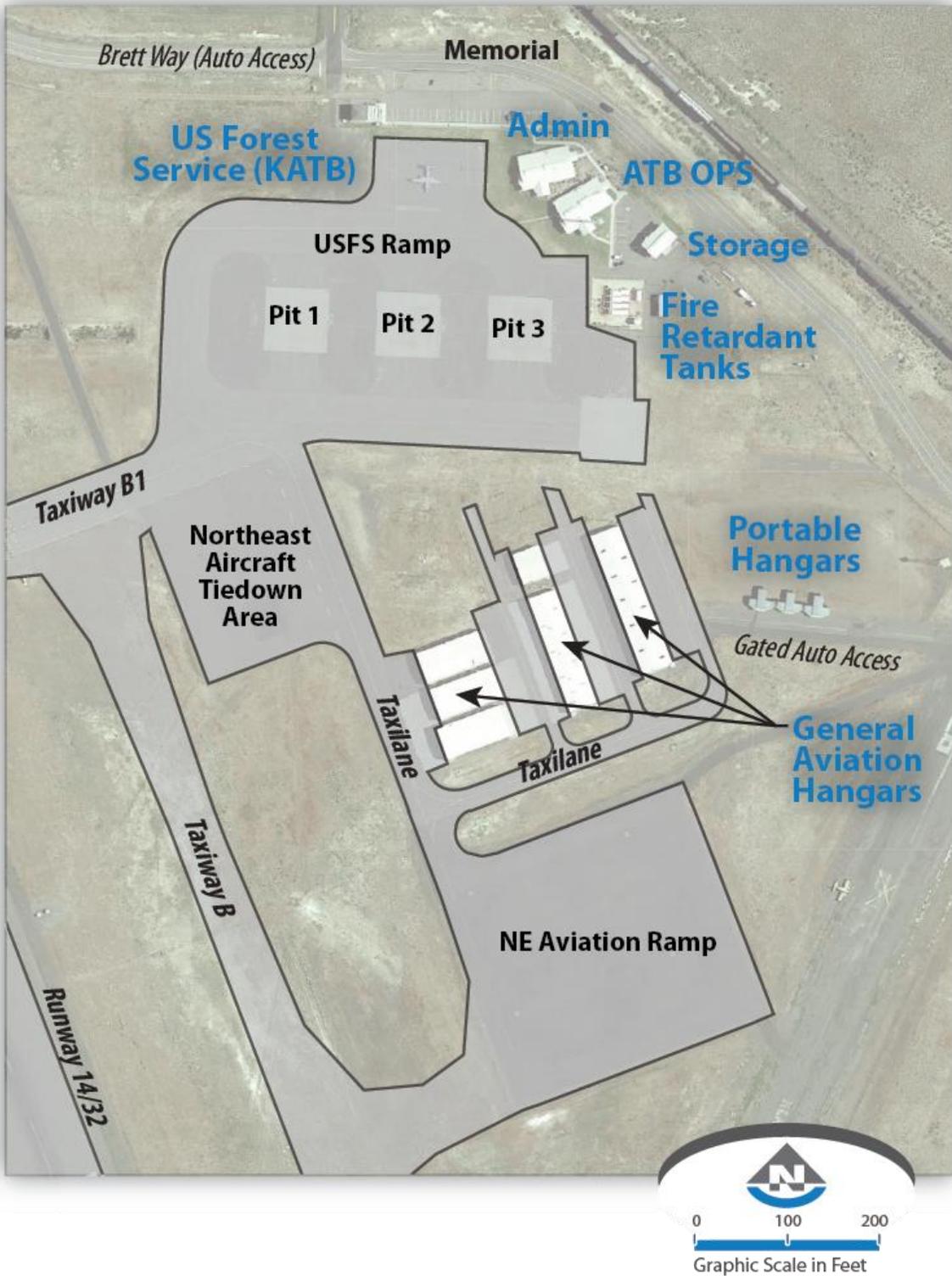


Figure 1-5 : Eastside Civilian Landside Area



AIRLINE TERMINAL AREA

The airline terminal complex (building, aircraft ramp, and auto parking/circulation) occupies six acres and is located south of the fixed base operator hangar and north of the Oregon ANG ramp.

Airline Passenger Terminal Building

Constructed in 1959, the two-story passenger terminal building is 15,107 total square feet (11,300 first floor and 3,807 second floor), built from glue laminated-timber exterior and masonry bearing walls with internal steel support columns. The lower floor includes passenger processing areas for airline, security, and leased tenant spaces. A restaurant is on the second floor and rental car facilities are downstairs. The building has one passenger departure lounge and two walk-out gates. The terminal building interior was renovated in 2002 to address security requirements resulting from the September 11, 2001 terrorist attacks. The building is in good structural and mechanical condition.

Airline Aircraft Apron

The airline ramp area is approximately 90,000 square feet with two marked aircraft parking positions to accommodate regional turboprops or small regional jets. A physical and electronic barrier separates the airline ramp from the Oregon ANG ramp. The ramp also provides parking access and maneuvering areas for airline ground support equipment.

Airline Vehicle Parking and Access Circulation

The airline terminal building is accessed from the west via Joe Wright Road and Airport Way and from the north via Summers Lane, Brett Way and Altamont Drive. The connection with Joe Wright Road was realigned in 1997. Both airport entrance routes require railroad crossings. The west access via the South Side Bypass results in crossing the Union Pacific Railroad tracks two times. The north access results in crossing the Burlington Northern Santa Fe Railroad track once.

From the 1,500-foot single-lane, one-way terminal-loop road, vehicles can access the three-lane terminal building curbside or park in the short or long-term parking lots. The rental car parking spaces are within the public parking lot. This route also provides gated vehicle access to the airline ramp and FBO hangar. The main terminal building parking lot provides 250 parking spaces; an additional parking lot was constructed in 2002 to provide 190 overflow parking spaces.

GENERAL AVIATION FACILITIES

The general aviation apron totals 781,500 square feet with 62 marked fixed-wing aircraft parking tie-down positions. Certain ramp areas are tenant leased, and not available for public parking. The marked parking positions are not distinguished for fixed wing or helicopter aircraft types.

Apron: West Side Ramp Areas

The westside general aviation ramp totals 505,000 contiguous square feet, with four separate aircraft ramp areas and 54 marked aircraft parking tie-down positions.

- ▶ South FBO = 165,000 SF | 40 parking positions (includes tenant leased area)
- ▶ Cargo/FBO = 130,000 SF | 10 parking positions (includes tenant leased area)
- ▶ North FBO = 100,000 SF | No marked (used for overflow and large aircraft parking)
- ▶ West SASO = 65,000 SF | No marked positions (tenant use)
- ▶ SASO/Flight School = 45,000 SF | 4 marked parking positions (tenant use)

Apron: East Side Ramp Areas

The eastside general aviation ramp is comprised of four parking ramp areas totaling 276,500 square feet and 8 marked parking tie-down positions.

- ▶ NE GA Tiedown Area = 45,000 SF | 3 marked parking positions
- ▶ NE Aviation Ramp = 136,500 SF | Large parking ramp with no marked positions
- ▶ US Forest Service = 60,000 SF | 3 marked parking positions (tenant use area)
- ▶ Ag Spray = 35,000 SF | 2 marked parking positions (tenant use area)

AIRPORT SUPPORT AND TENANT FACILITIES

The following section describes aeronautical facilities supporting tenant operations (FBO and SASO) and airport support. The Oregon ANG, as a significant operational tenant operating under an Airport Joint Use Agreement (AJUA) with the City of Klamath Falls, contributes in supporting both military and civilian aeronautical services, including the ATCT, Airport Rescue and Firefighting (ARFF), and airfield maintenance and snow removal.

Fixed Base Operator (FBO): Provides full-service pilot and aircraft aeronautical support and amenities.

Specialized Aviation Service Operators (SASO): Provides unique, or single-service aviation support or provisions.

ADMINISTRATION BUILDING

The single-level LMT administrative office building (1,680 square feet) is located northeast of the intersection of Arnold Avenue and Airport Way. Vehicle parking is provided in a single row of ten spaces on the east side of Arnold Avenue. The building, which was converted from a former military storage garage, is in fair to poor condition.

MAINTENANCE BUILDING

The LMT maintenance building (5,000 square feet) is located along the southern portion of the airline terminal parking lot. This building has opposing dual entry/exit doorways that do not provide direct access to the secured airfield area. The building is used to provide covered storage for airport vehicles and machinery and storage space for parts along with a workshop area. Additional exterior machinery and equipment parking is provided on the west end of the building. The building is in good condition but provides limited space for operations and personnel and no space for airfield snow removal equipment.

OREGON ANG FACILITIES

The Oregon ANG 173d Fighter Wing is located on the LMT and has significant tenant facilities and operations. The Oregon ANG occupies approximately 400 acres and includes approximately 70 Oregon ANG buildings totaling nearly 500,000 square feet. The Oregon ANG areas include: 1) Command and Support - Cantonment Area; 2) Munitions Storage; 3) Combat Arms and Training Maintenance Range (CATM)/Firing Range; and 4) Aircraft Operations/Air Traffic Control Squadron (ATCS). The AJUA specifies the conditions and amount that Oregon ANG contributes for shared use of LMT property and services. The AJUA expires on September 30, 2022 and the Oregon ANG lease expires on June 30, 2095. The military conducts planning for Oregon ANG facility and land use needs, as this LMT Master Plan is not responsible for planning within Oregon ANG leased areas.

AIRPORT TRAFFIC CONTROL TOWER (ATCT)

The ATCT is located 1,500 feet northeast of the intersection of Runways 14/32 and 7/25, within the air operations area. The ATCT facilities consist of a tower-shaft and base buildings, vehicle parking, dedicated access road, and security gate. The ATCT vehicle access connects with Homedale Road via a controlled-access gate. The ATCT cab floor height is approximately 68 feet above ground (4,154 MSL) and the radio antennas are located on top of the cab to a maximum height of 95 feet above ground level. The ATCT cab elevation provides uninterrupted controller line-of-sight to the runway ends, with some line-of-sight limitations within the Oregon ANG aircraft parking areas. The ATCT is operated by Oregon ANG and staffed by military and civilian-contract controllers. The ATCT building, constructed in 1999, is in good condition and sufficiently serves civilian and military traffic.

AIRCRAFT RESCUE AND FIREFIGHTING (ARFF)

A new Oregon ANG Aircraft Rescue and Firefighting (ARFF) station is located along the southside cantonment area. The replacement ARFF provides 24-hour emergency response, with equipment and personnel capabilities for meeting FAA ARFF Index A, which is required during civilian scheduled airline flights operating 30 or more passenger seats. The ARFF facilities provide sufficient operating capabilities for civilian traffic.

AIR CARGO FACILITIES

Air cargo facilities occupy 2.0 acres and consist of a storage building-hangar, aircraft ramp, and vehicle parking. FedEx leases a flightline building-hangar (19,000 square feet) for storage and processing. Both FedEx and UPS access the apron to process cargo directly from the aircraft to the delivery vehicles, and then sort facility. The air cargo aircraft parking area is about 35,000 square feet, with space to accommodate two to three parked aircraft, and delivery truck maneuvering space to load and unload cargo directly at the aircraft parking position.

US FOREST SERVICE FACILITIES

The US Forest Service (USFS) leases approximately 12 acres for the Klamath Airtanker Base (KATB), one of three USFS large aircraft tanker bases in Oregon. The KATB operates dedicated USFS facilities including administrative/support buildings, air tanker loading and refueling pads with three large tanker “pull through” pits, one back-in tanker pad, and retardant storage tanks.

AGRICULTURAL-SPRAY FACILITIES

The agricultural spray facilities occupy 4 acres located at a dedicated staging site south of the Runway 25 end. The spray application facilities include a ramp with two concrete aircraft loading pads, covered storage awnings, a Jet-A fuel tank, and ancillary storage tank facilities. Vehicle access is provided via secured access.

GENERAL AVIATION (GA) AIRCRAFT HANGAR FACILITIES

The aircraft hangar storage areas total nearly 193,000 square feet and comprise 33 hangar buildings and 57 separate units. Approximately 80 to 90 percent of the based aircraft are stored in hangars with the remainder on apron tie-down parking. The hangars consist of common hangars (76,300 square feet = 40 percent) and individual T-hangars/Box hangars (116,300 square feet = 60 percent). The hangar ground lease area is controlled by LMT, under lease to tenants and private users with hangar ownership and rental arrangements. The westside hangar area is 17 acres and the eastside hangar area is 3 acres.

AIRCRAFT FUEL FACILITIES

Table 1-5 summarizes the fuel services provided at LMT. The bulk fuel storage for civilian consumption includes 3 tanks totaling 36,000 gallons: 24,000 gallons for Jet-A (turbine aircraft) and 12,000 gallons for Avgas (piston aircraft). Fuel is dispensed by FBO truck, as there is no self-fueling available for public use. The FBO is considering installing self-fueling tanks and facility on the FBO ramp. Century North has privately owned and operated fuel tanks and delivery systems. The fuel is not available for public use. LMT has established operational requirements for privately owned, non-public fuel storage and delivery in the Airport minimum standards, Section 6D.

Table 1-5 : LMT Fuel Storage and Dispensing Facilities

Fuel Operator	Fuel Tank Storage (Gallons)	Fuel Type	Tank Type
FBO Century Aviation	12,000	Jet-A	Aboveground Storage – No Dispensing
	12,000	Jet-A	Aboveground Storage – No Dispensing
	12,000	100LL Avgas	Aboveground Storage – No Dispensing
	5,000	Jet-A	Fuel Dispensing Truck
	3,000	Jet-A	Fuel Dispensing Truck
	2,000	Jet-A	Fuel Dispensing Truck
	1,600	100LL Avgas	Fuel Dispensing Truck
	1,000	100LL Avgas	Fuel Dispensing Truck
Agricultural Operator (Exclusive Use)	12,000	Jet-A	Aboveground
Century North (Exclusive Use)	20,000	Jet-A	Aboveground
	20,000	100LL Avgas	Aboveground

Source: LMT Airport (Stormwater Pollution Prevention Plan (SWPPP), Obtained October, 2018.)

WASH RACK FACILITIES

Located east of the air cargo building, a 750 square foot enclosed wash rack functions as a rental car wash facility. The adjacent concrete ramp inside the secured fence is the designated aircraft wash rack.

METEOROLOGICAL CONDITIONS

CLIMATE

Table 1-6 summarizes the climatic weather characteristics for the LMT region. Meteorological conditions such as winds, temperature, cloud conditions, and precipitation types affect aircraft performance and influence aeronautical activities.

Table 1-6 : Climatic Data Summary

Climate Event	Climate Description	Value
Temperature	Mean Annual	47° F
	Mean Month Maximum (Month)	83° F (July)
	Extreme High Temperature (Month)	100° F (August)
Precipitation	Mean Annual Rainfall	12.8 Inches
	Annual Rainfall Days More Than 0.10-Inch	86 Days
	Annual Mean Snowfall	40.1 Inches
	Monthly Maximum Snowfall	38.4 Inches
Sky Conditions	Visual Flight Rule (VFR) Conditions	89.5% Observations
	Instrument Flight Rule (IFR) Conditions	4.1% Observations
	Low Instrument Flight Rule (IFR) Conditions	1.6% Observations
	Annual Days with Fog	52 Days
	Annual Days with Thunderstorms	14 Days
	Prevailing Wind Direction (From)	Northwest NW
	Average Prevailing Wind Speed (Kts)	6 Knots

Source: National Weather Service (NWS), Climatic Meteorological Summary, Klamath Falls Station (2007-2016).

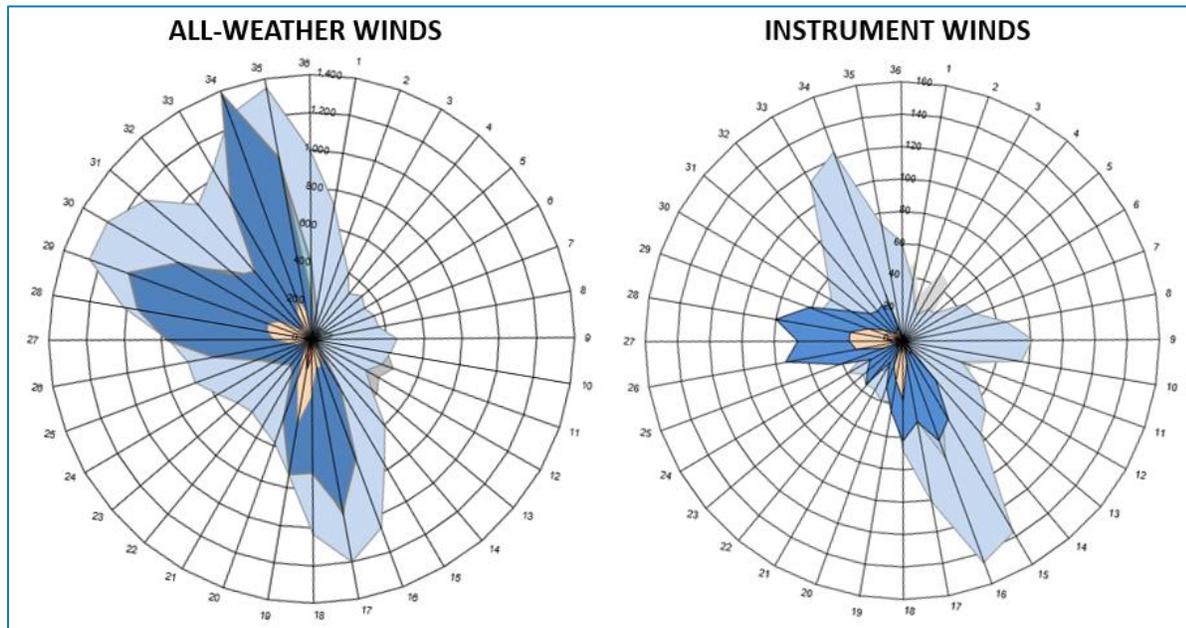
WIND PATTERNS AND CROSSWIND CONDITIONS

Figure 1-6 plots the prevailing 10-year wind pattern observations for all-weather and instrument wind conditions. Wind patterns are an important meteorological factor in assessing runway utilization and for determining runway design requirements in accordance with FAA aircraft category standards. The prevailing winds and peak-gusts are predominately from the west-northwest. Annually, calm to light winds (0-11 knots) occur 82 percent of the time, with strong winds (11-20 knots) occurring 15 percent of the time, and gusty winds (greater than 20 knots) occurring 1 percent of the time.

Table 1-7 lists the percent crosswind components for all-weather, instrument, and visual conditions for the 10.5, 13.0, 16.0, and 20.0 knot crosswind velocities.

Crosswind coverage is the component of wind speed and relative direction blowing at right angles to the runway; the FAA's desirable threshold for adequate crosswind runway coverage is 95 percent at 10.5 knots. This means that a small piston-engine aircraft should be able to land on a runway greater than 95 percent of the time without exceeding the aircraft's crosswind component as crosswinds tend to affect smaller aircraft more severely than larger aircraft. Because Runway 14/32 does not achieve 95 percent crosswind coverage at 10.5 knots for all-weather, instrument, and visual wind conditions, a crosswind runway is required for design and operational purposes.

Figure 1-6 : Wind Dispersion Charts (All-Weather and Instrument Conditions)



Source: FAA Airports GIS Wind Rose Data (<https://airports-gis.faa.gov/windRose>), Klamath Weather Station.

Table 1-7 : Runway Crosswind Component (Percent Coverage)

Runway (Wind Component / Aircraft Accommodated)	10.5-Knot Component	13-Knot Component	16-Knot Component	20-Knot Component
	Piston	Turboprops & Small Jets	Turboprop & Large Jets	Large Jet Transports
ALL-WEATHER WIND DATA OBSERVATIONS (PERCENT COVERAGE)				
Runway 14-32	93.8%	96.5%	98.8%	99.7%
Runway 7-25	90.1%	93.9%	97.4%	99.1%
Runway 14-32 & Runway 7-25 Combined	99.0%	99.6%	99.9%	100.0%
INSTRUMENT (IFR) WIND DATA OBSERVATIONS (PERCENT COVERAGE)				
Runway 14-32	94.6%	96.7%	98.7%	99.6%
Runway 7-25	94.7%	96.7%	98.6%	99.6%
Runway 14-32 & Runway 7-25 Combined	99.1%	99.7%	99.9%	100.0%
VISUAL (VFR) WIND DATA OBSERVATIONS (PERCENT COVERAGE)				
Runway 14-32	93.8%	96.5%	98.8%	99.7%
Runway 7-25	90.1%	94.0%	97.5%	99.1%
Runway 14-32 & Runway 7-25 Combined	99.0%	99.7%	99.9%	100.0%

Notes:

1. Red text indicates less than 95 percent FAA crosswind coverage threshold.
2. Percent crosswind component computed using FAA windrose calculator program.
3. True runway bearings (Rwy 14/32 = 158 True | Rwy 7/25 = 90 True)
4. Wind Observation Period: 2007 to 2016 (All-Weather = 102,488 | IFR = 11,104 | VFR = 91,472)

Source: FAA Airports GIS Wind Rose Data (<https://airports-gis.faa.gov/windRose>), Klamath Weather Station.

AIRPORT UTILITIES (CIVILIAN AREAS)

Utilities and providers serving on-airport civilian areas are described below:

- ▶ **Electric Power (PacifiCorp):** Power utility lines are underground, except for a segment along Spring Lake Road. LMT eastside is supplied by Hornet Substation South of Keller Road and West of Hwy 39; via Summers Lane. LMT westside is supplied by substation North of Laverne Avenue; west of Washburn Way via Joe Wright Road.
 - *Noted Factors:* No known electrical deficiencies. LMT eastside power is the most distant circuit from the Hornet Substation; future development with high power loads may require upgrades to the transformers, conductors, or substation.
- ▶ **Water (City of Klamath Falls):** LMT westside is served by a 16-inch ductile iron main along Joe Right Road. LMT eastside is served by a 12-inch PVC main along from the Southside Expressway near Summers Lane, then along Brett Way and paralleling the railroad right of way to the air traffic control tower. An 8-inch PVC main continues east and then south along Homedale Road to the Agriculture Operations area near Homedale Road/Henley Road intersection.
 - *Noted Factors:* Future development within the LMT westside/eastside general aviation areas and business park west of LMT may require main or service extensions.
- ▶ **Sanitary Sewer (City of Klamath Falls):** LMT westside sewage gravity drains to the Oregon ANG lift station and is pumped to the KFI lift station located at Altamont Drive and Southside Expressway. LMT eastside gravity drains via a 12-inch PVC main to the Wings Way lift station then is pumped to 18-inch gravity main on the Southside Expressway, then gravity drains to the KFI lift station.
 - *Noted Factors:* Future development within the northwest and northeast general aviation areas may require gravity main extensions.
- ▶ **Gas (Avista Utilities):** LMT eastside is supplied by 2-inch main via Summers Lane. LMT westside is supplied by 6-inch main via Washburn Way and Joe Wright Road. Gas mains are high pressure (60 pounds per square inch).
 - *Noted Factors:* Gas is not available southeast along Homedale Drive. The 2-inch main may not be adequate for high demand commercial or industrial use.
- ▶ **Trans Canada (Natural Gas Pipeline):** A 16-inch gas transmission pipeline and associated easement runs east-west along the northerly airport property, crossing Summers Lane and the Burlington Northern railroad, then continuing east.
 - *Noted Factors:* The pipeline is for transmission and not intended to serve future development at LMT.
- ▶ **Stormwater Systems (City of Klamath Falls):** Storm runoff drains to Klamath Irrigation District ditches, then to the Lost River Diversion Canal.
 - *Noted Factors:* No known deficiencies.

- ▶ **Solid Waste Removal (Waste Management):** Trash service is provided by Waste Management.
 - *Noted Factors:* No known deficiencies.
- ▶ **Communications (Hunter):** LMT westside communications infrastructure is stubbed to the intersection of Altamont Drive and Joe Wright Road. No communications service deficiencies to LMT northside.
 - *Noted Factors:* Future eastside communications could be extended via an easement along the northerly airport service road; or an alternative from Summers Lane, Brett Way and along the eastern airport service road.
- ▶ **Communications (Charter):** Fiber optic service runs to the LMT northside, north of the railroad on Summers lane.
 - *Noted Factors:* Future fiber optic service extension to the LMT boundary would require crossing under the railroad along the West side of Summers Lane.
- ▶ **Communications (Centurylink):** Fiber optic and phone service runs to the LMT westside building area via Altamont Drive or Joe Wright Road. Phone service is supplied to the US Forest Service.
 - *Noted Factors:* Century Link has existing conduit to the Forest Service via Summers Lane, which could extend fiber optic service within their existing conduits.

COMMUNITY PROFILE

SOCIOECONOMIC PROFILE

Socioeconomic data provides an understanding of commerce and demographic trends influencing the LMT regional area. Profile data was collected for Klamath County to quantify community development patterns and diversity.

Community Commerce Trends

The City and County economy are growing and diversifying and continuing to transition from a resource industry economy and further expand since the 2008 recession. Historically, the timber, agriculture, and fishing industries have been the principal economic resource industries in Klamath County. At present, the top Klamath County employment sectors are: 1) health care, 2) retail, and 3) government; combined, accounting for 40 percent of the workforce. Several of the largest Klamath County employers are direct LMT users, including: the Oregon ANG, Sky Lakes Medical Center, Oregon Institute of Technology (OIT) and Klamath County Community College (KCC).

The key commerce trends influencing the regional economy include:

- ▶ Developing a thriving entrepreneurial ecosystem poised to strengthen existing businesses and support the emergence of new business.
- ▶ Building a reputation as an emerging recreational destination.
- ▶ Hosting 125,000 annual visitors with strong California and growing Portland tourism base; summer hotel occupancy nearing capacity; focus is on winter and off-season shoulder periods.

- ▶ Investing in local infrastructure (\$1 billion in construction redevelopment in next five years)
- ▶ Establishing an aggressive marketing effort targeting entrepreneurial businesses and innovative industry.
- ▶ Providing competitive Business Enterprise Zone incentive packages.
- ▶ Focusing on accommodating specialized labor force and job retention.
- ▶ Focusing on college training and placement programs, including aviation.

Population Trends

Population is a key economic indicator. The following documents historical and projected population for Klamath County based on Woods & Poole Economic Data (2016).

- ▶ Klamath County Population (2018) = 66,800 residents
- ▶ Klamath County Population (2038) = 71,000 residents (+4,200, 5.8 percent Change, 0.3 percent CAGR)
- ▶ Urban Growth Boundary (2018) = 42,800 residents (64 percent of County)
- ▶ City of Klamath Population (2018) = 24,500 residents (37 percent of County)

Airport Economic Significance

On-airport business activities generate significant annual economic contributions, as measured by wages, spending, and sales. LMT employs approximately 1,180 workers (80 civilian and 1,100 military) with total economic impacts exceeding \$265 million annually. Civilian economic impacts are realized from airport staff and commercial tenant outputs, including direct and secondary spending impacts resulting from air cargo, FBO general services, the US Forest Service, agricultural spray operators, and flight training.

CITY / AIRPORT LAND USE AND ZONING

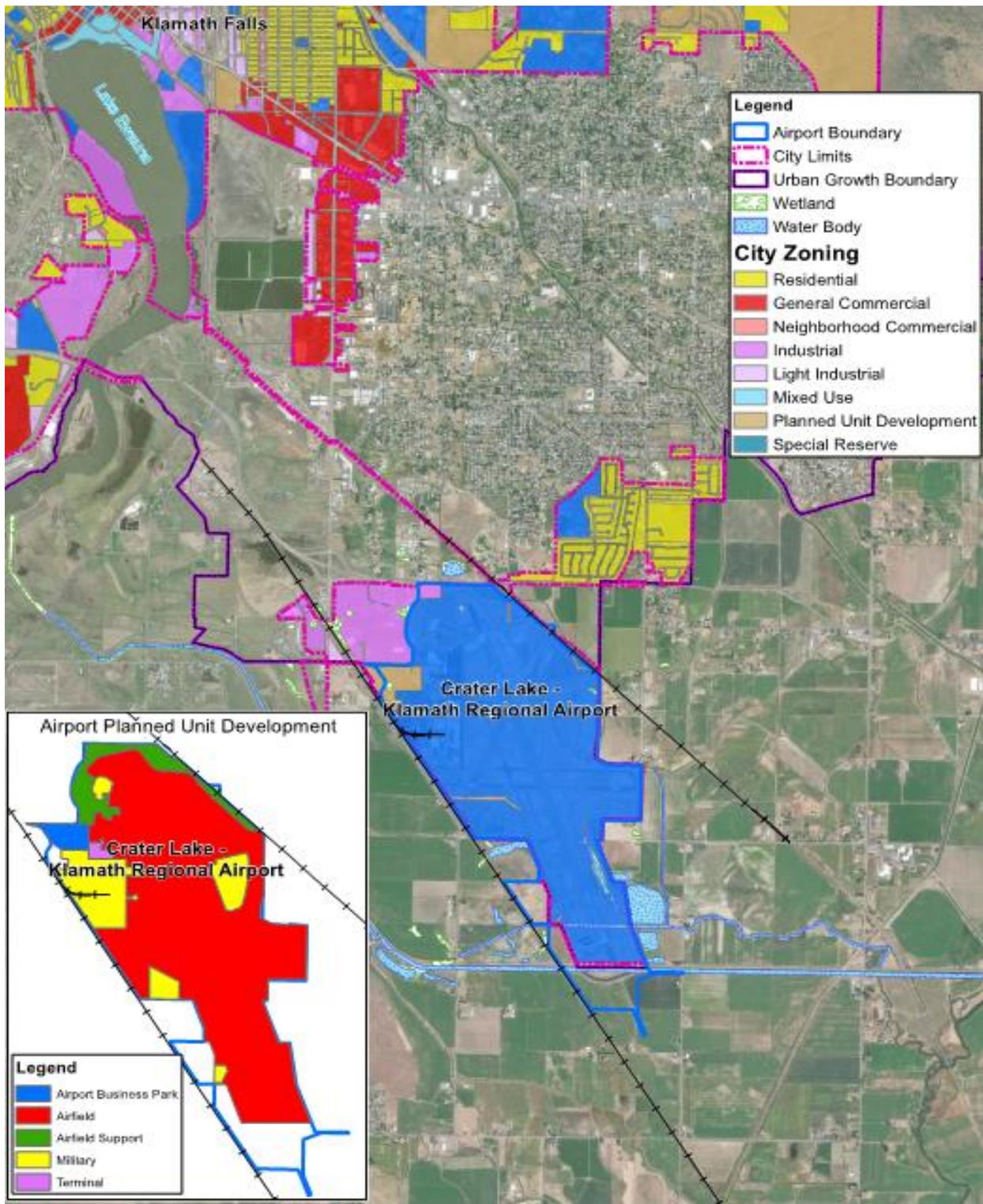
LMT is within the City of Klamath Falls' corporate boundary. LMT property is designated by the City as a Public Facility. The City of Klamath Falls has land use jurisdiction for the areas on LMT and immediately adjacent to LMT to the northwest and northeast. The City regulates land use development at LMT by way of the LMT Overlay Ordinance (Chapter 12) and the LMT Planned Use Development (PUD). **Figure 1-7** depicts the land use zoning for LMT and adjacent areas within the City's jurisdiction.

City LMT Overlay Ordinance (Civilian)

The City Land Use Development Code, Chapter 12, prescribes regulations in conformance with development standards, including LMT. The City has adopted an Airport Overlay Ordinance (Chapter 12, Sections 12.600 through 12.650), "Airport Safety and Hazard Preventions Overlay Zone" (ASHPO), which extends beyond LMT property. The ASHPO establishes and promotes standards prescribed for allowable and non-conforming uses within the following ASHPO boundaries and zones:

- ▶ LMT Noise Impact Boundary: Zones I, II, and III located within the 65 decibel and higher noise contour boundaries. The 2005 LMT Airport Master Plan land use guidelines support the ASHPO for LMT noise compatibility. ASHPO Ordinance Map, Page 53.
- ▶ Hazard Zone - LMT Imaginary Surfaces: Involves the Runway Protection Zone (RPZ) and 14 CFR Part 77 imaginary airspace surfaces (runway approach, transitional, conical, horizontal). The basis of the zones is the Airport Layout Plan (ALP) and airspace plan drawings from the 2005 Airport Master Plan. ASHPO Ordinance Map, Page 47.
- ▶ LMT Impact Area: Involves the LMT Direct Impact Area and LMT Secondary Impact Area associated with wetland areas. In addition, there are restrictions within the Runway Protection Zone (RPZ) and FAR Part 77 Approach Surface. ASHPO Ordinance Map, Page 50.
- ▶ Other: Potential future LMT land acquisition is identified for planning considerations near LMT. ASHPO Ordinance Map, Page 57.

Figure 1-7 : City LMT Land Use and Zoning



Source: City of Klamath Falls, December 2015.

Airport Planned Use Development (PUD)

An Airport Planned Unit Development (PUD) has been established for LMT, which specifies on-airport development standards within five land use designations:

- ▶ Airfield,
- ▶ Airfield Support,
- ▶ Terminal (airline complex),
- ▶ Airport Business Park, and
- ▶ Military.

The PUD is intended to provide planning and design flexibility for large site development tracts with common land uses and standards. The LMT Airport PUD specifies permitted and conditional uses for various development standards, including lot coverage, building setback/height, and auto access circulation.

County Airport Land Use Planning and Zoning

The County of Klamath has land use jurisdiction over the areas near LMT. **Figure 1-8** shows the land use zoning designations for LMT and adjacent areas. LMT is designated Public Facility. Lands to the east, west, and south are designated Exclusive Farm Use – Crop Land. Immediately north of LMT are existing residential uses. Several pockets of land north of LMT are designated for various types of commercial and industrial uses.

The Klamath County Comprehensive Plan, adopted in 2010, includes policies protecting LMT by regulating land uses within the airport environs through the County's Land Development Code. The Comprehensive Plan encourages commercial/industrial development around LMT and limiting encroachment of residential uses into the LMT critical areas. The policies of the Comprehensive Plan are based on the aeronautical data included in the 1976 LMT Airport Master Plan. The Klamath County Land Development Code includes two sections pertaining to LMT airport safety and noise areas:

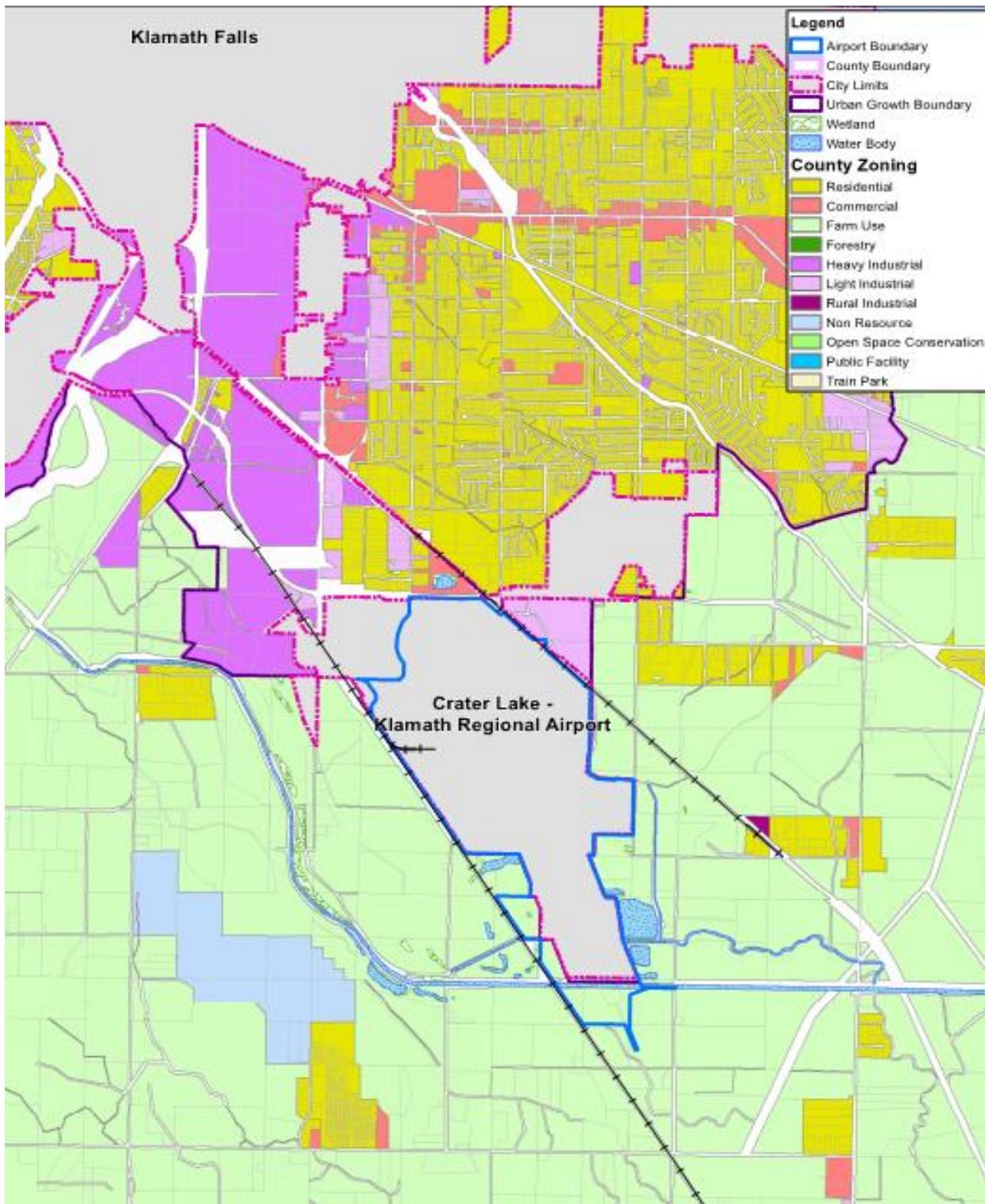
- ▶ Article 58, *Airport Safety Overlay*, defines LMT safety zones in accordance with 14 CFR Part 77, *Safe, Efficient Use and Preservation of the Navigable Airspace*. The zoning ordinance establishes height limitations as well as restrictions on certain types of land uses proposed within LMT safety zones. The safety ordinance reflects the aeronautical data provided in LMT Master Plan adopted by the City of Klamath Falls in 1988.
- ▶ Article 58.2, *Airport Noise Overlay*, establishes land use limitations and development standards for the areas within the LMT noise overlay zones. The overlay zones are based on the day/night average sound level (DNL) noise contours derived from the 1980 Noise Impact Boundary Study.

Military Airport Land Use

LMT land use standards are different for civilian and military aeronautical functions; civilian standards follow FAA guidance and the military standards follow Department of Defense standards. The military airspace surface dimensions and hazard zones generally extend further than the civilian zones. The City completed a Joint Land Use Study (JLUS) in 2016 and is in the second phase of the JLUS to assess potential compatibility issues and develop strategies in cooperation with the local jurisdictions, military, and other local partners. The JLUS will develop a Military Influence Area Overlay District (MIAOD) that will reflect the four major Military Influence Areas (MIA) areas:

- ▶ Airfield Safety,
- ▶ Vertical Obstruction Height,
- ▶ Aircraft Noise, and
- ▶ Military Safety Zones and Buffer Areas.

Figure 1-8 : Klamath County Zoning Map



Source: Klamath County Zoning Map: <http://klamathmap.houstoneng.net/>, Obtained August 30, 2018.

ENVIRONMENTAL OVERVIEW

The City prepared a brief environmental overview to identify and summarize the presence of known environmental resources and conditions on LMT or in its immediate vicinity, with the exception of areas leased to the Oregon ANG. Research for the environmental overview included a review of existing agency databases, previously developed environmental studies, resource management plans, and local inquiries. The environmental overview provides an initial screening of environmental resources that will be considered during the development of master plan alternatives.

While guided by the National Environmental Policy Act (NEPA) of 1969 and guidance set forth in FAA Order 1050.1F, *Policies and Procedures for Considering Environmental Impacts*, the environmental overview is not intended to serve as a substitute for a NEPA evaluation. Environmental studies necessary to achieve NEPA compliance will be conducted at a later date and as a separate project to support project engineering and necessary federal approvals.

Key resources and information identified during the preparation of the environmental overview include:

- ▶ Seven federally listed or candidate species were identified as potentially occurring on LMT, and one federally listed species, Applegate's milk vetch (*Astragalus applegatei*), was documented on site.
- ▶ Cultivated parcels adjacent to LMT likely include prime farmland and farmland of statewide importance.
- ▶ Hazardous materials are present or have been used and stored at LMT for civilian and military purposes.
- ▶ Six structures that are 50 years of age or older will require evaluation to determine their eligibility for the National Register of Historic Places (NRHP), and LMT as a whole may require evaluation to determine if it is a NRHP-eligible historic district pursuant to Section 106 of the National Historic Preservation Act.
- ▶ LMT is located above a perched aquifer, and groundwater has been encountered at depths of less than 4 feet below ground surface. (The presence of an elevated groundwater table must be considered during project engineering and design.)
- ▶ National Wetland Inventory (NWI) Maps indicate the presence of several on-site freshwater emergent wetlands and potential jurisdictional freshwater ponds immediately north and east of LMT.

Appendix B, *Environmental Overview*, summarizes known environmental resources, the associated regulatory context, and items that should be considered during the development of master plan projects and alternatives.

INVENTORY SUMMARY

The following summarizes the key inventory findings for LMT civilian services and facilities:

AIRFIELD

- ▶ Runway Systems: Runway 7/25 is classified as an FAA-eligible civilian crosswind runway.
- ▶ Taxiway System: The taxiway system provides a functional and efficient configuration. Taxiway areas require conformity with current FAA design standards and military operations.
- ▶ Pavement condition: The taxiway system is generally the most immediate need for pavement rehabilitation. Maintaining the extensive pavement infrastructure is a critical requirement.

LANDSIDE

- ▶ Terminal Building: The return of airline service would necessitate terminal building functions dedicated to accommodating the processing of air carrier passengers as the absence of airline service may provide options for other terminal building tenants and uses.

ACTIVITY

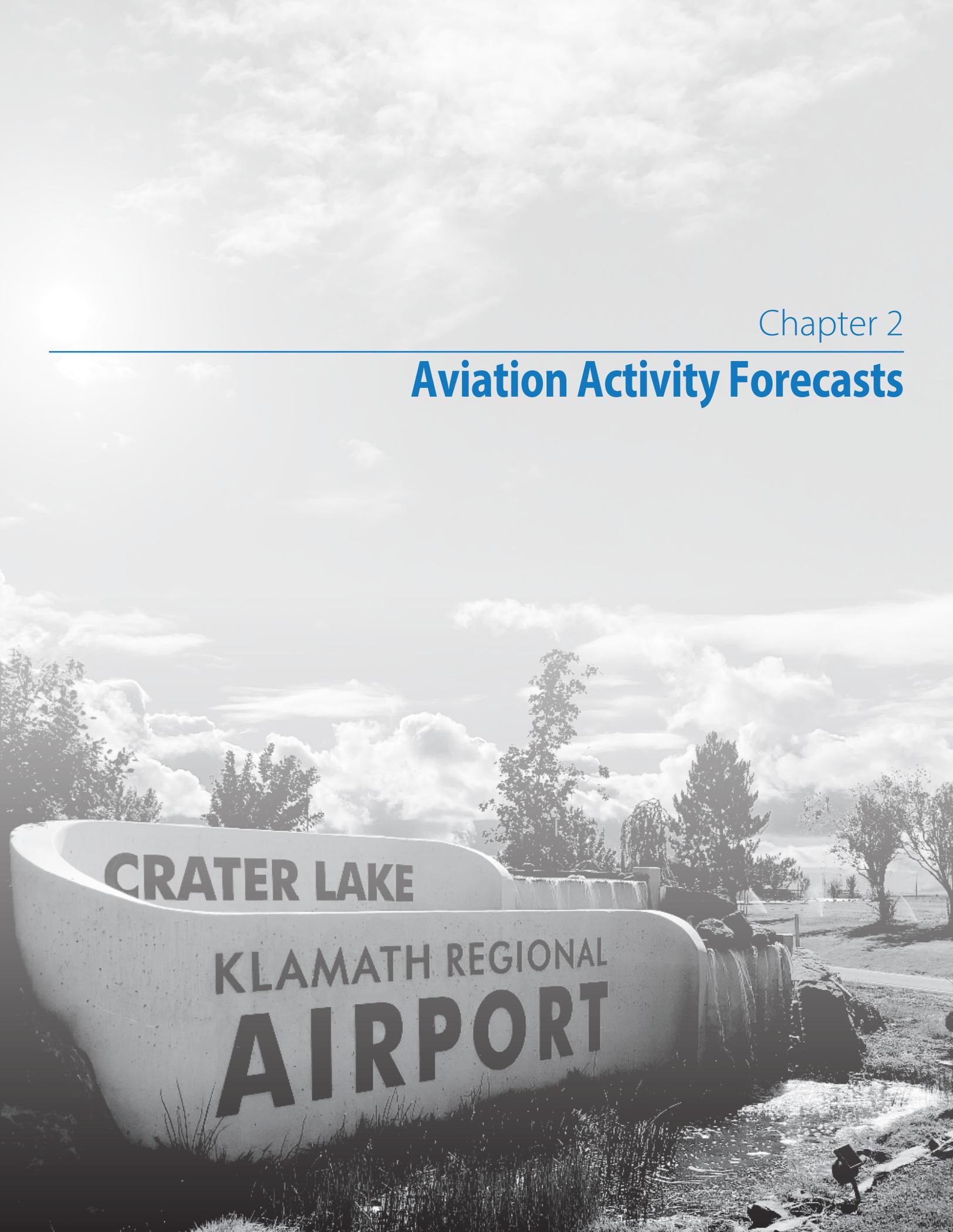
- ▶ Aircraft Operations: Civilian aircraft operations have been increasing since 2015. Flight training by fixed-wing and helicopters accounts for about 15,000 annual operations (nearly 50 percent of total civilian operations).
- ▶ Airline: Scheduled airline service is a high priority, and LMT is seeking airline and destination options. The Master Plan will be flexible, to identify airline and passenger needs based on actual conditions, perspective service, or as an opportunity condition.
- ▶ Air Cargo: Interviews with the cargo operators revealed no projected need for additional building or ramp space. Likewise, cargo operators expect to use the same aircraft types well into the future. The cargo operators project that they can accommodate increasing demand for dedicated cargo by nominally increasing the number of daily flights.

LAND USE AND PROPERTY

- ▶ Land Use: Airport land uses involve coordination between the City, County, and Oregon ANG.
- ▶ Property: The City controls approximately 240 acres of airport property for civilian development, largely within landside areas. Approximately 240 acres (20 percent) of the total LMT fee property ownership is controlled for civilian landside use. Approximately 45 percent of the 240 acres is already developed.

Chapter 2

Aviation Activity Forecasts



CRATER LAKE

KLAMATH REGIONAL
AIRPORT

Forecasts

INTRODUCTION

This chapter presents the aviation activity forecasts for the Crater Lake – Klamath Regional Airport (LMT). The aviation forecasts identify the 20-year aeronautical user demands. The forecasts are used to assess the type, timing, and allocation of future Airport infrastructure, equipment, and service needs in support of the Master Plan facility recommendations, alternatives, and project funding strategies.

FORECAST OVERVIEW

Table 2-1 summarizes the low and high forecast scenarios for the major aviation demand elements. Aviation activity is projected to steadily increase throughout the 20-year forecast period (2018-2038), in-step with Klamath Regional commerce. Although LMT activity is susceptible to economic downturns, the principal factors shaping the aviation demand forecasts are positive:

- ▶ The Klamath Region is steadily growing and emerging as a year-around recreational destination; LMT is expected to support expanding tourism.
- ▶ LMT traffic was negatively impacted by past economic downturns; however, LMT activity levels and forecast factors are trending upward.
- ▶ LMT airline service may resume, with most promising routes to Portland (PDX) or San Francisco (SFO).
- ▶ LMT scheduled air cargo service is stable and projected to increase in proportion with the Klamath Region commerce expansion.
- ▶ LMT general aviation growth is expected, largely through expanded Fixed Base Operator (FBO) and Special Aviation Service Organization (SASO) services including continued transition towards higher-performance turbine aircraft. Flight training and education programs at LMT are expected to grow in response to industry pilot-shortages.

Table 2-1 : LMT Forecast Activity

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 ACTIVITY (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	--	

Note: Totals subject to rounding.

Note: LMT Master Plan does not forecast military operations for the Oregon Air National Guard (Oregon ANG).

Source: Mead & Hunt, Inc. 2018.

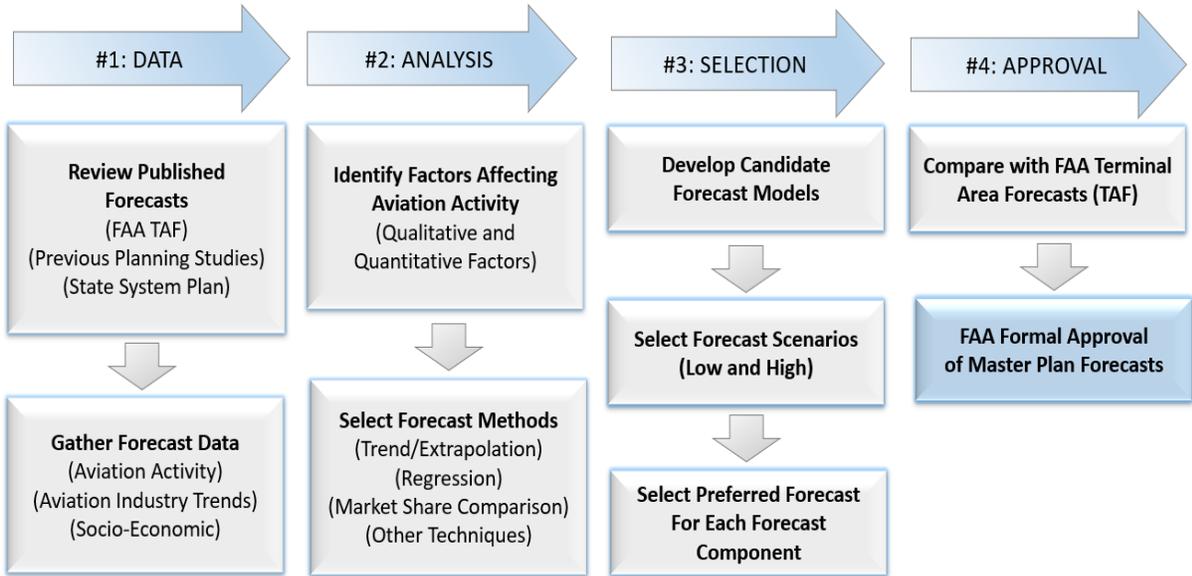
FORECAST APPROACH

The aviation demand forecast quantifies a realistic expectation of future aeronautical demand at LMT over the next 20 years, as substantiated from LMT factors and aviation industry trends. The LMT forecasts are prepared for the following civilian aviation demand components:

- #1 Airline (annual enplaned passengers and aircraft operations)
- #2 Air Cargo (annual freight tonnage and aircraft operations)
- #3 Aircraft Operations (aircraft type/mix, FAA design category, and operational peaking)
- #4 Based Aircraft (aircraft type and FAA design category)
- #5 Critical Aircraft (aircraft type, characteristics, and FAA design category).

As illustrated in **Figure 2-1**, the forecasts are prepared consistent with technical and procedural guidance from Federal Aviation Administration (FAA) Advisory Circular 150/5070-6B, *Airport Master Plans*. This process uses FAA data and methods to project aviation activity and to select a single preferred forecast for FAA approval. The FAA-approved forecasts are carried forward throughout the Master Plan.

Figure 2-1 : Airport Master Plan Forecast Process



Source: Mead & Hunt, Inc. 2018

Forecast Timeline

The LMT Master Plan forecasts cover a 20-year planning period (2018 to 2038) with 2018 as the existing baseline year. Forecasts are identified for three planning phases: the short-term (2019-2023); the mid-term (2024-2028); and the long-term (2029-2038). Forecasts reflect the FAA fiscal year from October to September unless otherwise noted.

Forecast Statistical Analysis

The LMT Master Plan forecasts follow FAA-acceptable statistical methods, including times-series trend, regression, comparative analysis, and market share techniques. Forecast projections are developed for a range of low (constrained) to high (unconstrained) demand scenarios. The forecast scenarios are supported by qualitative and quantitative factors to establish direct forecast causation, attain high statistical confidence, and sustainability. Factors are reported for each aviation demand element to reflect possible upward (+) and downward (-) influences on the 20-year demand and activity levels. The identification of these factors also helps determine the appropriate forecast methodology. The reported forecast values are rounded, with year-to-year total and net annual changes expressed in compounded annual growth rates (CAGR).

Unconstrained Forecast (High):

Leaning towards an unfettered demand, not overly influenced by constraining factors.

Constrained Forecast (Low):

Leaning towards factors restricting the projected demand and facility implementation.

Guard (Military) Operations

In accordance with FAA guidance, military activity is not projected as part of the Master Plan. The FAA Terminal Area Forecasts (TAF) recognizes military aircraft operations; however, the FAA does not provide a forecast projection of military activity. Military traffic accounts for 17,000 to 20,000 annual aircraft operations (35 percent of total operations) and 32 military based aircraft (27 percent of total based aircraft). Below are the civilian and military airport users:

Civilian Users/Tenants

- ▶ Commercial Operators (LMT air cargo and potential passenger air carrier)
- ▶ General Aviation and Fixed Base Operator – FBO (LMT Tenant)
- ▶ US Forest Service (LMT Tenant)
- ▶ Medical Flights (LMT Tenant)
- ▶ Agricultural Spray Service (LMT Tenant)
- ▶ Adversary Air (Oregon ANG private contract tactical training).

Military Users/Tenants

- ▶ Oregon ANG 173rd Fighter Wing (LMT Tenant)
- ▶ Other military armed services branch training and exercises conducted at LMT.

AVIATION FORECAST RESOURCES

Forecast data was collected from Airport records, user interviews/questionnaires, FAA data, Oregon DOT website data, Woods and Poole data for Klamath County, and aviation industry trade publications. Community and socioeconomic data were collected from Klamath County sources (see Appendix D *Forecast Supporting Data*). The following aviation resources were reviewed for historical and projected aeronautical activity and application to the Master Plan forecasts.

FAA Aerospace Forecasts (Fiscal Years 2018 to 2038)

The *FAA Aerospace Forecasts* provides aviation industry projections by aeronautical sector. The FAA prepares this document annually to identify the 20-year demands on the nationwide airport and airspace system. This FAA aerospace data is referenced throughout this chapter and used to identify general aviation industry activity patterns including industry trends, the direction of future demand, and challenges to growth.

FAA Terminal Area Forecasts (TAF)

The *FAA Terminal Area Forecasts* (TAF) serve as the baseline for historical and forecast Airport activity. The TAF is prepared annually by the FAA as the official forecast of aviation activity for airports included in the *FAA National Plan of Integrated Airport Systems (NPIAS)*. The TAF forecasts are developed in an unconstrained top-down manner, including activity for general aviation aircraft operations (itinerant and local activity) and total based aircraft. The TAF forecast methodology for individual airports is not published. Additionally, the TAF forecast may not reflect current airport activity as the TAF tends to lag by one year and does not consider local forecast drivers.

FAA Terminal Area Forecasts (TAF):

The official FAA record of historic and projected airport activity, as prepared annually by the FAA for all airports in the *National Plan of Integrated Airport Systems (NPIAS)*.

The following summarizes the FAA TAF trends for LMT:

Airline Enplaned Passengers (TAF 2018 to 2038)

Total 20-year annual passenger projection remains the same as the 2018 level of 8,323 enplaned (boarding) passengers.

Annual Aircraft Operations – Civilian (TAF 2018 to 2038)

Total 20-year increase in civilian operations is 2,167 (108 annual average), from 30,941 in 2018 to 33,108 in 2038, a 7 percent overall growth and a 0.3 percent annual growth rate.

Based Aircraft – Civilian (TAF 2018 to 2038)

Total 20-year increase of 39 based aircraft (2.0 annual average), from 85 in 2018 to 124 in 2038, a 46 percent overall growth and a 1.9 percent annual growth rate.

Military Activity (TAF 2018 to 2038)

The TAF 20-year military projections provide no change to the total of 16,955 military aircraft operations (9,307 itinerant and 7,648 local) and 32 military based aircraft recorded since 2017. The Oregon ANG planning studies—Installation Development Plan (IDP); Joint Land Use Study (JLUS); and Installation Complex Encroachment Management Action Plan (ICEMAP)—do not provide military aviation activity projections for LMT. Therefore, the Master Plan recognizes the FAA TAF as the official record of projected military activity at LMT.

FAA TAF REVIEW AND CONSISTENCY

The FAA reviews and approves Master Plan forecasts. The Master Plan forecasts are compared to the FAA TAF and are considered consistent if the forecasts differ by less than 10 percent in the five-year forecast period and 15 percent in the 10-year forecast period. The FAA evaluates forecast consistency on reasonable planning assumptions, current activity data, and appropriate forecast methods. A comparison between the Master Plan forecast and the TAF forecast is provided in the Forecast Summary Section below.

FORECAST COMPONENTS

COMPONENT #1: AIRLINE FORECAST

The airline forecast is quantified by annual passenger enplanements and annual aircraft operations. The airline passenger forecast directly influences terminal building space allocation, aircraft apron parking, and auto parking/access. The airline outlook forecast is premised on airline service being re-established in the next 1 to 3 years. The forecast provides an anticipated air service scenario based on market conditions, industry factors, and discussions with regional airlines.

Airline Outlook Forecast: A scenario-based forecast that is only realized if airline service is reestablished at LMT.

The airline outlook forecast recognizes that the return of scheduled airline service is not guaranteed; and, the longer the absence of airline service during times of economic prosperity, the more difficult it will be to regain scheduled airline service.

LMT Airline Historical Trends

Since 2000, three different carriers have served LMT and passenger enplanements have averaged 18,500 annually showing the ability to attract traveler demand under various airline operating models. The following describes airline market-based information used in developing the passenger enplanement forecasts. This background information provides a historical context of factors that could reasonably influence future passenger demand levels and the airline supply of services. Overall, this information helps substantiate the forecast methods and the range of forecast scenarios to provide an outlook if airline service returns to LMT.

Trends

- ▶ Since 1990, LMT passenger enplanements historically averaged 18,500 per year; typically ranging between 8,500 and 32,000, and very consistent from month-to-month.
- ▶ LMT airline service had been provided mainly to Portland (PDX) and San Francisco (SFO) with 2 to 4 daily flights. Previous airlines included Alaska Airlines/Horizon (through 2008), United Express (1986-1987; 1993-1997; 2008-2014); American Eagle (1987-1993); Reno Air (1994-1995); Pen Air (2016-2017) which declared bankruptcy. Passenger enplanements were highest from 1999 to 2008, during Alaska/Horizon service.
- ▶ The LMT airline catchment area generates 153,000 total inbound and outbound passengers per year. The LMT passenger retention is approximately 8 percent, equivalent to 12,240 passengers ($153,000 \times 8 \text{ percent} = 12,240 \text{ passengers}$), with 92 percent leakage to other commercial airports (Medford-MFR captures about 65 percent and Portland-PDX about 15 percent).
- ▶ LMT passenger and aircraft seat capacity has declined since the 2008 recession.

LMT Airline Catchment Area and Passenger Retention

The LMT true passenger market area, which includes Klamath County and Lake County, Oregon, and the northern portions of Siskiyou County and Modoc County, California, totals 153,000 per year or the equivalent of 210 origin and destination passengers daily each way (PDEW). Approximately 7 to 8 percent of the total passengers are captured by LMT, equivalent to 14.4 PDEW.

Industry Trends – Regional Airlines

The *FAA Aerospace Forecasts* show the regional airline sector has experienced nationwide market share contraction and shrinking aircraft capacity, resulting in declining passengers, seat capacity, and yields (fare paid per mile). The *FAA Aerospace Forecasts* projects a competitive and profitable regional airline industry, characterized by increasing air travel demand and stable airfares. Quantified by available aircraft seat miles and revenue passengers, the regional airlines are forecast by the *FAA Aerospace Forecasts* to expand between 1.8 to 2.2 percent annually over the next 20 years, assuming

Regional Airline: An air carrier providing service primarily via aircraft with 89 or less seats and whose routes serve mainly as feeders to the mainline carriers.

Commuter Operator: A company which operates airplanes designed to have no more than 60 passenger seats that provides scheduled passenger service of five or more round trip flights per week on at least one route according to published flight schedules.

continued growth of the national economy. The regional turboprop fleet will shrink by two-thirds in the short-term due to replacement of the smaller 50-seat regional jets with more fuel efficient 70 to 90-seat jets. The FAA projects a decline in the size and number of aircraft under 30 seats operated for rural regional markets, as turboprop and jet transport aircraft production has shifted to the over 40-seat market.

LMT Forecast Factors – Airline Service

Development of the forecast scenarios considered and incorporated the following factors and trends, which could influence the unconstrained aircraft operation forecasts.

Upward Factors (+)

- ▶ City of Klamath continues to aggressively pursue airline service.
- ▶ Klamath Basin commerce is growing about two percent per year.
- ▶ Klamath tourism is increasing attracting 900,000 annual visitors.
- ▶ Regional airlines are showing interest in the Klamath recreational/tourist passenger market.
- ▶ Potential passengers are coming from the northern California catchment area.
- ▶ Passengers may choose to use LMT because of extended drive and travel times to alternative airports during winter months. Approximate drive times are shown below:
 - Medford-MFR is the nearest small-hub commercial airport (80 miles; ±1.4-hour drive)
 - Portland-PDX is the nearest large-hub commercial airport (290 miles; ±5.2-hour drive)
 - San Francisco-SFO is the nearest international hub airport (365 miles; ±5.8-hour drive).

Downward Factors (-)

- ▶ Regional airline prorated service agreements with mainline carriers limit rural service.
- ▶ Regional airline industry is suffering from pilot shortages and flight cancellations.
- ▶ Regional airline industry is phasing-out aircraft fleets with less than 50-passenger seats.
- ▶ Mobilizing Transportation Security Administration (TSA) personnel is time-consuming.
- ▶ LMT is not a US DOT designated Essential Air Service (EAS) location or route.

LMT Airline Service Factors

- ▶ Possible LMT city-pair (hub airport) destinations are typically within 1,000 statutory miles.
- ▶ Connecting service was not considered due market demand and proximity to MFR.
- ▶ There is a challenge pairing LMT airline service (aircraft seat size, flight distance, and yields) with LMT passenger demand (load factors) in consideration of airline hub practices and pro-rated agreements between the mainline air carriers and the regional affiliates (Horizon and SkyWest).

LMT Forecast Scenarios - Airline Passenger

Figure 2-2 provides a graph and table of the historical and 20-year forecast of airline passenger enplanements at LMT. The airline passenger forecast is based on the analysis of potential reinstatement of airline service at LMT. The airline passenger forecast provides an outlook into how many potential enplanements will use LMT between 2018 to 2038 if airline service is reinstated. The first three years of service, forecasts beginning in 2019/2020, were graduated to reflect service introduction and/or a partial year of service.

The airline passenger forecast provides a low range and high range of potential future enplanements. These ranges are boundaries for the minimum and maximum potential enplanements at LMT if airline service is reinstated. Development of the forecast scenarios considered and incorporated the following factors, which could influence the airline passenger forecasts:

Low Scenario (Preferred): True Passenger Market Retention Growth Rate
15,500 by 2038

High Scenario: Enplanements per Population Growth Rate
30,600 by 2038

FAA TAF: Enplanement Projection – No Change
8,323 through 2038

Low Scenario (Preferred Forecast): This method forecasts passenger enplanements using the 7.0 to 8.0 percent LMT passenger retention applied to the 153,000 LMT airline passenger catchment area. The true passenger market share was increased to reflect population growth in Klamath County and applies the 0.5 percent annualized population growth rate throughout the 20-year planning period. This forecast methodology results in 15,500 enplaned passengers by 2038. The low scenario reflects a historically supported catchment of true passengers and is consistent with past LMT air service factors. This scenario represents the lower range of passenger enplanements representative of airline service and passenger demand during slower economic periods. The low scenario range reflects the return of scheduled airline service (airline operators, aircraft type, flight frequency, route-destination, and passenger demand levels) commensurate with historical activity levels within the past 10 years.

High Scenario: This forecast projects passenger enplanements based on the historic ratio of enplanements to Klamath County population, an historically reliable trend of population. This forecast results in 30,600 enplaned passengers by 2038. The high scenario range reflects passenger levels during economic prosperity, such as the current period for Klamath Region. This projects airline service (airline operators, aircraft type, flight frequency, route-destination, and passenger demand levels) equivalent to a longer historical period during the past 20 years.

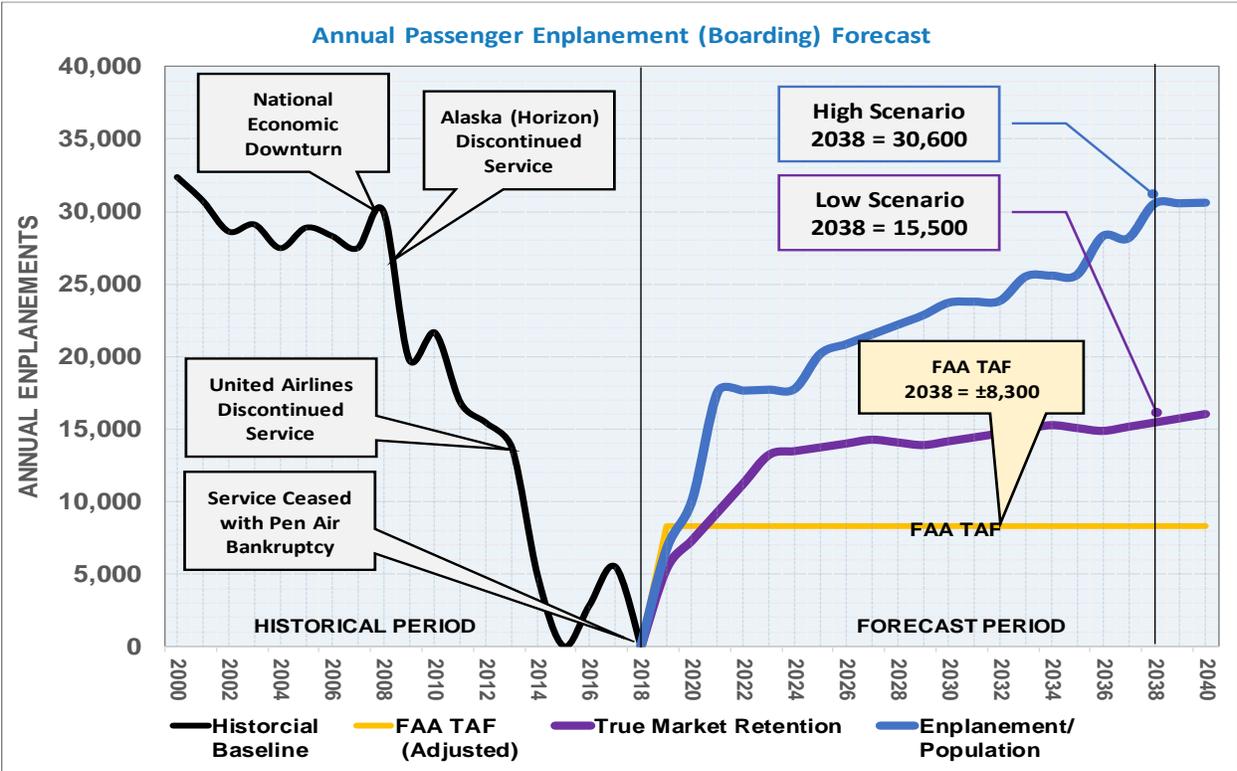
Preferred Forecast Summary and Reasonableness (Low Scenario): The 2038 forecast includes a range between 15,500 and 30,600 enplanements with the low forecast scenario preferred. Under the low scenario, airline service is reestablished with enplanement volumes anticipated to reflect historic levels and increase commensurate with regional commerce expansion and regional population growth. Additionally, the low scenario is reasonable with the LMT Airline Catchment Area retention. The ability of LMT to attract

a larger or broader segment of the passengers within the catchment area market would be the largest influence on attracting an air carrier provider, upward load factors, and future Airport passenger levels. The low forecast scenario exceeds the FAA TAF.

Also, a legislative rulemaking change providing LMT entry into the Essential Air Service (EAS) subsidy program could have a profound affect in regaining air service, even though EAS airports served by a single carrier can be susceptible to changing airline practices. Common with national trends, future air service challenges might involve the transition to larger aircraft (more passenger seats) and the balancing of competitive airfares to support airline operating yields under a climate of increasing airline costs, as well as incentivizing air travelers not to use alternate commercial airports.

Essential Air Service (EAS): A USDOT subsidized program to maintain a minimal level of scheduled air service for eligible small communities; generally accomplished with two daily round trips with 30 to 50-seat aircraft or additional frequencies with aircraft with 9-seat or fewer - usually to a large or medium-hub airport.

Figure 2-2 : Airline Enplanement Forecast



Airline Enplanements - Forecast Scenarios				
Year	Historical Baseline	FAA TAF (Adjusted)	Low Scenario	High Scenario
			True Market Retention	Enplanement/Population
2018	0	0	0	0
2019	-	8,323	5,400	6,800
2023	-	8,323	13,300	17,800
2028	-	8,323	14,100	22,200
2033	-	8,323	15,100	25,600
2038	-	8,323	15,500	30,600
2040	-	8,323	16,100	30,700
20-Year Change	-	0	15,500	30,600
20-Year Average	-	0.0	775	1,530
20-Year % Change	-	0.0%	117%	172%
% CAGR	-	0.0%	1.0%	3.7%

Source: Mead & Hunt, Inc. 2018

Table 2-2 summarizes airline service activity projections commensurate with the preferred passenger enplanement forecast. The activity reflects scheduled airline service and does not include non-scheduled operators offering on-demand or air taxi service.

Table 2-2 : Forecast Airline Service Outlook Summary

AIRLINE SERVICE SUMMARY - SCHEDULED SERVICE						
Year (Fiscal)	Annual Airline Passengers			Annual Airline Aircraft Operations		
	Enplaned	Deplaned	Total	Air Carrier	Commuter	Total
2000	32,407	32,407	64,814	--	--	--
2005	28,912	28,912	57,824	--	--	--
2010	21,670	21,670	43,340	--	--	2,730
2015	0	0	0	--	--	0
2016	2,818	2,818	5,636	--	--	306
2017	5,505	5,505	11,010	--	--	898
2018	0	0	0	--	--	0
2019	5,400	5,400	10,800	--	1,040	1,040
2023	13,300	13,300	26,600	--	1,248	1,248
2028	14,100	14,100	28,200	--	2,184	2,184
2033	15,100	15,100	30,200	--	2,184	2,184
2038	15,500	15,500	31,000	--	2,496	2,496
2040	16,100	16,100	32,200	--	2,496	2,184
CAGR (00-17)	-16.2%	-16.2%	-16.2%	--	--	
CAGR (17-37)	5.3%	5.3%	5.5%	--	--	
Year	Airline	Aircraft Type	Aircraft Model	Aircraft Seats	Average Daily Departures	Average Load Factor
2000	Horizon	Turboprop	Q-200	37	2 to 4	50% to 75%
2005	Horizon	Turboprop	Q-200	37	2 to 4	50% to 75%
2010	Horizon	Turboprop	Q-200	37	2 to 4	50% to 75%
2015	--	--	--	--	--	--
2016	--	--	--	--	--	--
2017	PenAir	Turboprop	Saab 340	32	2 to 3	30% to 40%
2019	--	--	--	--	--	--
2023	Regional	Turboprop/Jet	--	32 to 76	2 to 4	50% to 75%
2028	Regional	Turboprop/Jet	--	32 to 76	2 to 4	50% to 75%
2033	Regional	Turboprop/Jet	--	32 to 76	2 to 4	50% to 75%
2038	Regional	Jet	--	32 to 76	2 to 4	50% to 75%
2040	Regional	Jet	--	32 to 76	2 to 4	50% to 75%

Note: Passengers = Enplanements and Deplanements, Operations = Takeoffs and Landings

Note: Load Factor = Seats / Passengers. Load Factor includes Enplaning and Deplaning Passengers

Source: Mead & Hunt, Inc. 2018.

COMPONENT #2: AIR CARGO

The air cargo forecast is quantified by annual freight tonnage and aircraft operations. The air cargo forecast directly influences the planning of landside building area, aircraft parking allocation, delivery vehicle access, and auto parking.

LMT Historical Trends

The two air cargo operators, FedEx (operated by Empire) and UPS (operated by Ameriflight), are integrated cargo operators using aircraft for air cargo shipments. Combined, the two cargo operators transport 1.5 million pounds annually by air, with 63 percent shipped inbound and 37 percent shipped outbound. On average, FedEx accounts for 75 percent and UPS accounts for 25 percent of the total air cargo pounds. Since 2010, the air cargo total pounds and market share have exhibited stability.

Industry Trends - Air Cargo

The *FAA Aerospace Forecasts* reports a maturation of the domestic air cargo market, having increased 0.2 percent annually over the last 10 years. The most notable air cargo industry changes have been caused by global economic contraction, a shift from air-to-truck modes, higher fuel costs, more stringent Transportation Security Administration (TSA) air cargo security regulations, and the decline in mail caused by electronic substitutes. Per FAA forecasts, all-cargo revenue ton mile growth is expected through increased rates paid for shipment of air cargo and not through expanded tonnage. The FAA forecasts a 1.2 to 2.0 percent annual revenue ton mile increase over the next 20 years.

LMT Forecast Factors – Air Cargo Service

The following are upward and downward forecast factors considered as part of formulating the forecast methodology and projections in developing the low and high forecast scenarios:

Upward Factors (+)

- ▶ LMT air cargo market and service are exhibiting consistency.
- ▶ Klamath commerce is growing about two percent annually.
- ▶ FedEx and UPS are expected to continue serving the LMT air cargo market.
- ▶ LMT inbound cargo is expected to grow in proportion to outbound cargo.
- ▶ Larger turboprop air cargo transport aircraft (Beechcraft 1900, Embraer 120, ATR 42/72) are anticipated to supplement LMT peak-season air cargo volumes.

Downward Factors (-)

- ▶ Trucks are expected to compensate for fluctuations in annualized air cargo volumes and shipments.
- ▶ A return of airline service and air carrier belly cargo could lower FedEx and UPS air volumes.

LMT Forecast Scenarios – Air Cargo

Future cargo volumes are expected to coincide with local commerce growth. Klamath County's commerce is growing between 1 and 2 percent annually and is moving from producer-based market to a consumer-based market. Air cargo is traditionally correlated with gross domestic product patterns. The air cargo operators responded to a survey and their responses indicate they do not anticipate significant changes to future activity or route logistics.

Frequency of air cargo flights and delivery schedules are expected to remain similar to current levels. In addition, neither cargo operator anticipates aircraft cargo volumes would regularly exceed the usable payload of the dedicated turboprop aircraft currently being operated. As an industry standard practice, when total cargo sort volumes increase, trucks rather than aircraft are commonly used to accommodate fluctuating volumes. Inbound air cargo will likely be attributed to retail, while outbound air cargo would be associated more with industries with low-inventory and high-value components.

The air cargo forecast is based on the analysis of nine years of air cargo data, from 2010 to 2018. This period reflects the extent of available air cargo data records. Both UPS and FedEx have reported seeing longer peak season air cargo volumes. As reported by UPS and FedEx, inbound cargo and outbound cargo will both grow; this is attributed to the growth of commerce and a stronger consumer market than producer market in Klamath County.

Figure 2-3 provides a graph and table of the historical and 20-year forecast of air cargo pounds at LMT. The following describes the forecast scenarios under consideration:

Low Scenario (Preferred): Total Retail Sales (in 2018 dollars) Growth Rate
1.7 Million Pounds by 2038

High Scenario: Gross Regional Product (GRP) Growth Rate
1.9 Million Pounds by 2038

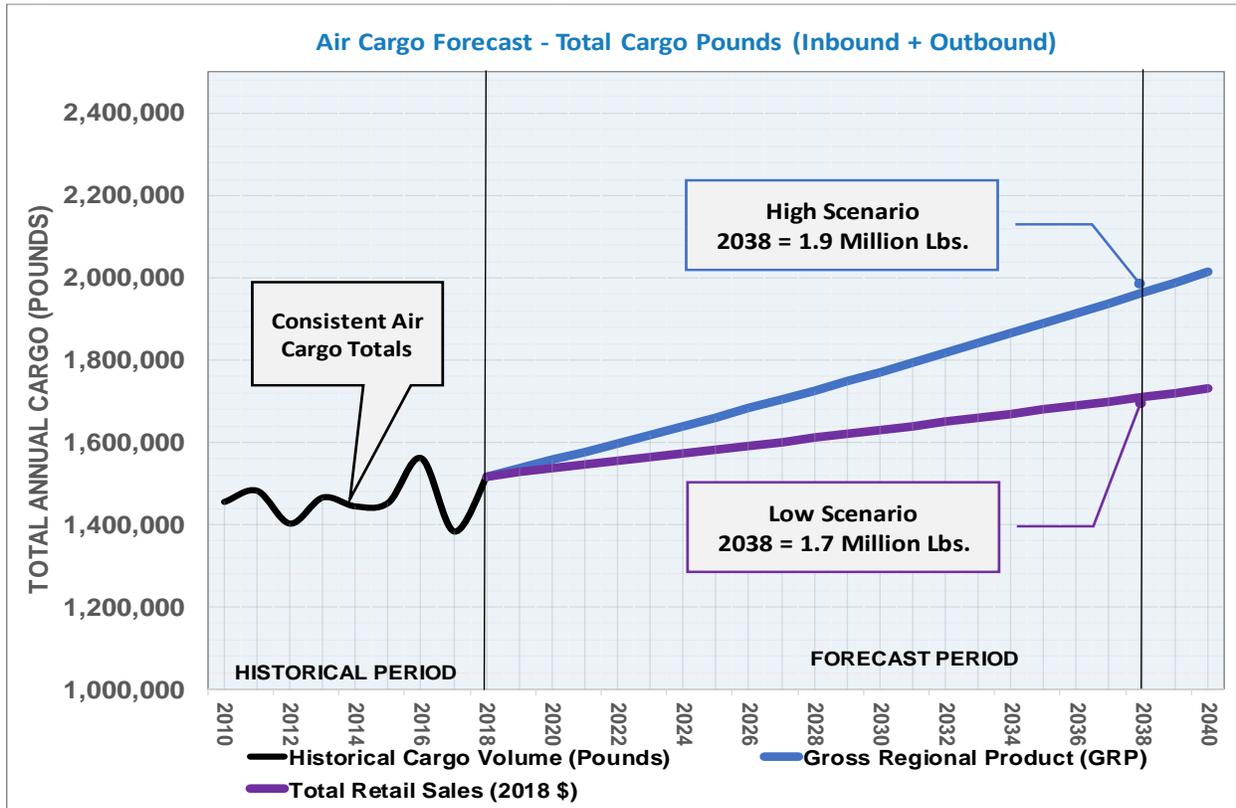
FAA TAF: TAF Does Not Provide Air Cargo Forecasts

Low Scenario (Preferred): This forecast is based on the total retail sales (TRS) in Klamath County between 2018 to 2038 using an annualized 0.6 percent Woods & Poole projection. This results in 1.7 million pounds of total air cargo by 2038. For forecast purposes, this 12.6 percent total increase in cargo volume is split proportionately between inbound and outbound cargo. The low forecast scenario is consistent with the low growth rate of historical air cargo trends.

High Scenario: This forecast is based on gross regional product (GRP) in Klamath County between 2018 to 2038; using an annualized 1.3 annual percent Woods & Poole projection. This local growth towards medical and technology industries is expected to result in increased air cargo volumes. The high forecast scenario is consistent with a growth rate exceeding historical air cargo trends, but still consistent with nationwide air cargo industry trends.

Preferred Forecast Summary and Reasonableness (Low Scenario): Air cargo volumes are anticipated to increase commensurate with Klamath regional commerce expansion, especially in support of the emerging medical and technical business base. From the FedEx and UPS survey responses, air cargo logistics (routes, aircraft equipment type, yearly flight frequency) are not expected to change significantly during the 20-year forecast period to accommodate the expected growth of Klamath Region cargo/freight volumes. Therefore, the preferred low forecast scenario is reasonable in terms of air cargo service logistics. As typical in the air cargo industry, integrated shipping companies (FedEx and UPS) would commonly add daily flights for supplementing high-peak priority package volumes and use delivery trucks to supplement fluctuations in bulk cargo volumes during high volume seasonal periods. This is also true when aircraft cannot be dispatched due to weather or other operating conditions. While air cargo volumes are expected to grow beyond levels experienced in the past, the forecast growth is not expected to result in a significant change to air cargo service, flight logistics, air cargo infrastructure, or future facility improvements.

Figure 2-3 : (Exhibit & Table): Air Cargo Volume Forecast



Air Cargo - Forecast Scenarios			
Year	FAA TAF	Low Scenario	High Scenario
		Total Retail Sales (2018 \$)	Gross Regional Product (GRP)
2018	N/A	1,517,821	1,517,821
2019	N/A	1,526,800	1,537,400
2023	N/A	1,563,600	1,618,700
2028	N/A	1,610,900	1,726,300
2033	N/A	1,659,600	1,841,100
2038	N/A	1,709,800	1,963,600
2040	N/A	1,730,300	2,014,800
20-Year Change	N/A	191,979	445,779
20-Year Average	N/A	9,599.0	22,289.0
20-Year % Change	N/A	12.6%	29.4%
% CAGR	N/A	0.6%	1.3%

Source: Mead & Hunt, Inc. 2018

COMPONENT #3: CIVILIAN AIRCRAFT OPERATIONS AND PEAKING

The aircraft operations forecast is quantified by total annual civilian aircraft operations (takeoffs and landings). The forecast includes activity by both commercial operators and general aviation. The forecasts directly influence the planning of airfield infrastructure and facilities as well as to landside space allocation and access.

LMT Historical Trends

Aircraft operations involve only civilian aircraft operations, no military operations. LMT reported 31,600 civilian aircraft operations in 2018. Historically, operations have increased since 2012. Civilian itinerant and local operations are increasing, with local operations increasing the most.

Aircraft Operation: Aircraft operations, defined as either a takeoff or a landing, determine the year-by-year total number of annual operations.

Industry Trends – Commercial Operators

The commercial operations include activity by scheduled and non-scheduled aircraft operators for the transport of passengers and freight. The commercial users are tending to transition to larger and more complex aircraft, as evidenced by the industry trends identified for the airline and air cargo forecast components.

Commercial Operator: The carriage by aircraft in air commerce of persons or property by aircraft for compensation or hire.

Industry Trends - General Aviation

General aviation represents the largest and most significant segment of the national air transportation system, accounting for 96 percent of all civilian airports, 97 percent of all civilian aircraft, 75 percent of all airport operations, and over 65 percent of all certified pilots. With nearly 70 percent of all general aviation flying conducted for business purposes, it provides a transportation benefit for commerce within the Klamath Falls region, and throughout a vast portion of the country, including international. As described below, the Master Plan considers trends and forecast factors, by general aviation industry sector, as documented in various aeronautical reports and publications. A review of industry trends provides insight into drivers of past change and emerging forecast directions.

General Aviation: Activity by aircraft flown for private and business purposes, comprising recreational, sport, flight instruction, on-demand charter, tourism, and governmental.

Nationwide, the overall general aviation industry is experiencing prolonged slow growth, and an aircraft fleet continuing to undergo transition. In terms of aircraft production and flight hour utilization, the combined piston fleet is declining by 0.5 percent annually, while the combined turbine (turboprop and business jet) fleet is growing at 2.5 percent annually.

The single and multi-engine piston aircraft fleet is experiencing continued reduction/retirement, coupled with declining production of single and twin piston aircraft. Turboprop aircraft utilization is increasing, but with moderate single-turboprop production and stagnant twin-turboprop production. The business jet, helicopter, and experimental/light sport piston aircraft segments are seeing continued increases in aircraft utilization and production rates.

According to the FAA 2015 *General Aviation and Air Taxi Survey*, the general aviation industry is experiencing growth resulting from corporate aircraft utilization, fractional ownership programs, student and commercial pilot training, and growth of the experimental/sport aircraft segment. Factors impeding industry growth involve escalating aircraft operating costs (e.g. purchase price, rental, maintenance, fuel, insurance and taxes), an overall national decline in private pilot populations, more demanding pilot and aircraft regulatory requirements (pilot qualifications, Automatic Dependent Surveillance Broadcast (ADS-B)-equipped aircraft timeline), and competing interests for personal income and leisure time.

Forecast Factors

The following are upward and downward forecast factors considered as part of formulating the forecast methodology and projections in developing the low and high forecast scenarios:

Upward Factors (+)

- ▶ The Klamath regional economy is growing, and dependent on LMT aeronautical services.
- ▶ LMT offers facilities and services (ATCT, ARFF) for commercial and general aviation users.
- ▶ Air cargo (FedEx and UPS) is expected to continue similar express and freight services.
- ▶ US Forest Service activity is expected to increase, and transition to transport jet aircraft.
- ▶ Adversary Air is increasing Oregon ANG tactical training activity.
- ▶ Pelican Aviation anticipates increases in flight training and student pilots.
- ▶ Precision Aviation anticipates increases in flight training and student pilots.
- ▶ Agricultural aircraft operator activity is expected to remain and continue to grow.
- ▶ Nationwide turbine and helicopter fleet production and utilization are increasing.
- ▶ Nationwide light/experimental piston fleet production and utilization are increasing.

Downward Factors (-)

- ▶ General aviation industry piston fleet production and flight-hour utilizations are declining.
- ▶ Availability of hangar space is limited; aircraft owners are requesting larger hangar space.
- ▶ General aviation pilot population is in decline and the pilot population is aging.
- ▶ Aircraft attrition is caused by aging aircraft.
- ▶ General aviation operating costs and regulatory requirements are increasing.

Forecast Scenarios – Civilian Aircraft Operations

Figure 2-4 depicts the forecast of total annual operations over the 20-year forecast period. Aircraft activity was assessed by aircraft-type category, as each activity segment is characterized by unique industry influences and user factors. This operational segmentation allows a more comprehensive analysis for future commercial and general aviation activity levels. The following describes the forecast scenarios:

Low Scenario: LMT Historical Trend – Percent
32,700 annual operations by 2038

High Scenario (Preferred): LMT Historical Trend - Additives
38,000 annual operations by 2038

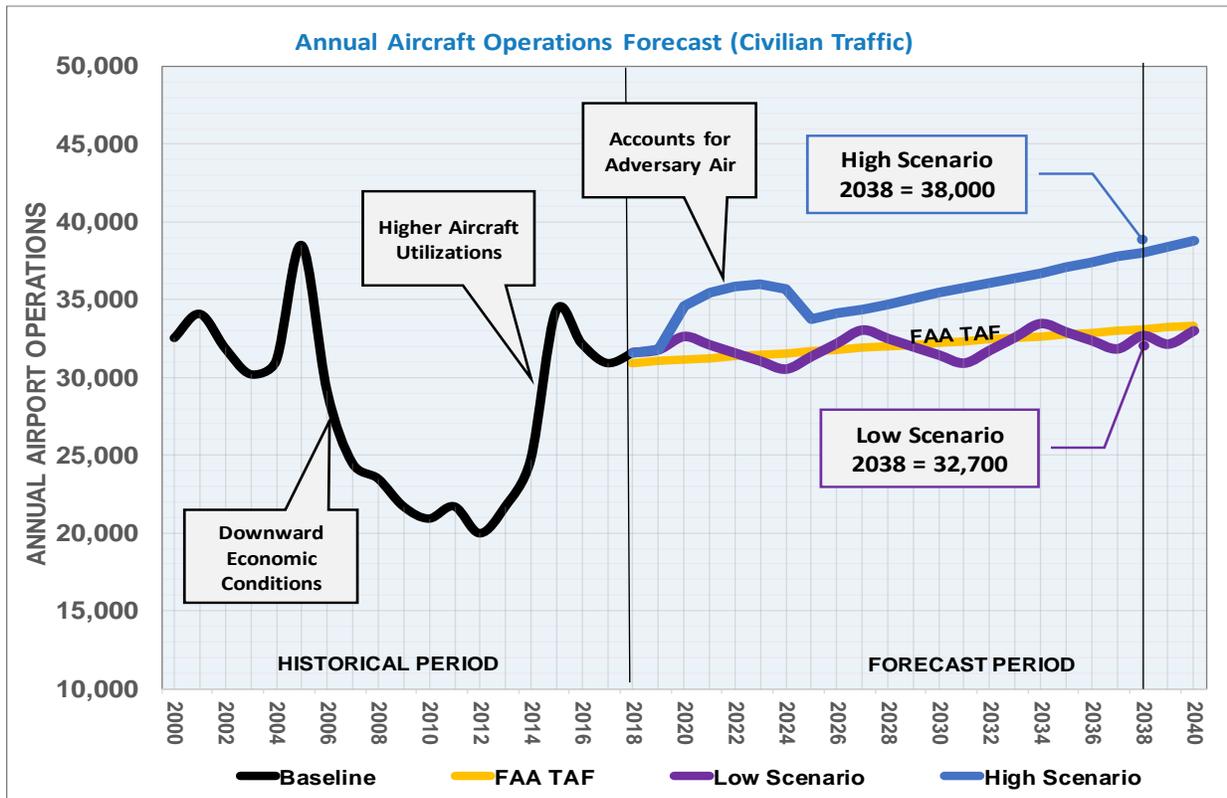
FAA TAF: Operations Projection
33,108 annual operations by 2038

Low Scenario: This forecast approach uses a 15-year historical traffic trend to project future aircraft operations. This results in 32,700 operations by 2038, an annualized 0.3 percent growth rate. This forecast approach was dismissed from further consideration because it does not reflect the key upward operational factors (flight training, Adversary Air, FBO service improvements) expected beyond 2019.

High Scenario (Preferred): This forecast approach uses a 5-year historical civilian traffic trend adjusted to reflect the upward trendline of civilian operations experienced from 2012 to 2018. This forecast results in 38,000 operations by 2038, an annualized 0.9 percent annual growth. In addition, this forecast has been adjusted to reflect Adversary Air activity (Adversary Air provides military training support starting in 2019 and forecast through 2023 and is expected to generate an additional 2,500 to 5,000 LMT annual civilian operations).

Preferred Forecast Summary and Reasonableness (High Scenario): The high forecast scenario closely aligns with the LMT forecast factors and continued Klamath region economic expansion. LMT aircraft operations show stability, and sustainable growth. In addition, the high forecast scenario is consistent with recent historical trends and FAA industry utilization forecasts; projecting civilian operations will return to historical LMT levels, including a transition towards turbine aircraft which have a higher operational utilization than piston aircraft. The high forecast scenario exceeds the 2018 FAA TAF.

Figure 2-4 : Total Annual Aircraft Operations (Civilian)



Aircraft Operations - Forecast Scenarios				
Year	Baseline	FAA TAF	Low Scenario	High Scenario
			Trend - Percents	Trend - Additives
2018	31,600	30,941	31,600	31,600
2019	-	31,356	31,800	31,700
2023	-	31,462	31,100	36,000
2028	-	31,999	32,600	34,600
2033	-	32,546	32,700	36,300
2038	-	33,108	32,700	38,000
2040	-	33,338	33,100	38,800
20-Year Change	-	2,167	1,100	6,400
20-Year Average	-	108.4	55.0	320.0
20-Year % Change	-	7.0%	3.5%	20.3%
% CAGR	-	0.3%	0.2%	0.9%

Source: Mead & Hunt, Inc. 2018
 Aircraft Operational Peaking – Preferred Forecast Scenario

Table 2-3 summarizes the peaking activity forecast for the preferred 20-year operational forecast scenario, including a breakdown of traffic by peak periods. Aircraft operational forecasts are used to assess Airport capacity needs, level of service, and space allocation requirements for airspace, airfield, and terminal purposes as determined by various operational peaking components.

Table 2-3 : Aircraft Operational Peaking (Civilian)

AIRCRAFT OPERATIONAL PEAKING (CIVILIAN)					
Operational Peaking Components	Calculation Factor	2018	Forecast Demand Activity		
			2019	2038	20-Yr. Change
Annual Operational Activity (Civilian)					
Total Annual Operations	--	31,600	31,800	38,000	6,200
Itinerant	60%	18,960	19,080	22,800	3,720
Local	40%	12,640	12,720	15,200	2,480
Visual (VFR)	90%	28,282	28,461	34,010	5,549
Instrument (IFR)	10%	3,160	3,180	3,800	620
Daytime	96%	30,336	30,528	36,480	5,952
Nighttime	4%	1,264	1,272	1,520	248
Touch & Go	15%	4,740	4,770	5,700	930
Flight Training	15%	4,740	4,770	5,700	930
Runway Operational Activity					
Runway 14/32	88%	27,808	27,984	33,440	5,456
Runway 7/25	12%	3,792	3,816	4,560	744
Monthly Operational Activity					
Peak Month	15.0%	4,740	4,770	5,700	930
Average Week	Avg. Day/7	677	681	814	133
Average Day - Operations	365 Days	87	87	104	17
Average Day - Flights	Ops/2	43	44	52	8
Average Day Peak Month	30.5 Days	156	157	188	31
Hourly Operational Activity					
Peak Hour	12%	10.4	10.5	12.5	2.0
Peak Hour - Itinerant	60%	6.2	6.3	7.5	1.2
Peak Hour - Local	40%	4.2	4.2	5.0	0.8
Peak Hour - Instrument (IFR)	20%	2.1	2.1	2.5	0.4
Peak Hour - Visual (VFR)	80%	8.3	8.4	10.0	1.6

Source: Mead & Hunt, Inc. 2018

Peak activity levels are derived from annual aircraft operations, broken-down by month, day, and hour periods. According to FAA Advisory Circular 150/5060-5 *Airport Capacity and Delay* guidance, the average-day-peak-month (ADPM) is used to define an airport's busy period to avoid constructing facilities that will rarely be used. The ADPM peaking percentages, or calculation factors are substantiated from Airport traffic records which show the percent ratios are planned to remain consistent throughout the 20-year forecast period.

COMPONENT #4: BASED AIRCRAFT

The based aircraft forecast is quantified by total civilian aircraft stored at LMT as part of a lease or parking rental-term agreement. The forecast includes total based aircraft by aircraft type (piston, turboprop, jet, helicopter) and engine number (single, twin). The forecast directly influences the planning of landside facilities, space allocation, property assets, and access.

Trends

Since 2008, there have been two reasons for based aircraft declines: the national recession and aircraft reporting inconsistency. In terms of based aircraft demand, all hangars are currently occupied. The hangar waitlist is eight aircraft, with two owners ready to base their aircraft at LMT when hangar space becomes available.

Existing Based Aircraft

LMT reports 117 total aircraft, of which 85 are civilian based fixed-wing and helicopter aircraft and 32 are military based aircraft. The 85 civilian based aircraft are comprised of:

- ▶ Piston - 69
 - Single Engine Piston - 67
 - Twin-Engine Piston - 2
- ▶ Turbine Turboprop - 8
 - Single Engine Turboprop - 6
 - Twin-Engine Turboprop - 2
- ▶ Helicopter - 1
 - Helicopter (Piston) - 1
 - Helicopter (Turbine) - 0
- ▶ Turbine Jet - 9
 - Small-Cabin Business Jet - 4
 - Large-Cabin Business Jet - 5
(2 Falcon 50 jets based in December 2018)

Century Aviation (FBO) owns and operates the following turbine aircraft (turboprop/business jet):

- ▶ 5 - Falcon 50 (ARC B/C-II)
- ▶ 1 - Falcon 900 (ARC B/C-II)
- ▶ 1 - Hawker 800XP (ARC B-II)
- ▶ 1 - Lear 55 (ARC C-I)
- ▶ 1 - Lear 35 (ARC D-I)
- ▶ 1 - Turbo Commander (ARC B-II).

FAA TAF Indexed Based Aircraft

The FAA TAF indicates 140 total based aircraft, this includes 32 military aircraft listed as *other*. Historically, the FAA TAF appears to have included military aircraft as part of the total based aircraft and this has tended to overstate the number of actual civilian based aircraft. For this reason, the FAA TAF has been indexed to the current 85 civilian based aircraft, while applying the same FAA TAF forecast growth rate of 2.0 aircraft per year.

Forecast Factors

Assessment of the based aircraft activity is by aircraft-type category, unique operator, and industry factors that influence each segment. The following are upward and downward forecast factors considered as part of formulating the forecast methodology and projections in developing the low and high forecast scenarios:

Upward Factors (+)

- ▶ LMT hangar waiting list is averaging two to eight new based aircraft owners.
- ▶ Flight training and college flight training programs are showing potential expansion.
- ▶ Flight training operators are anticipating based aircraft increases.
- ▶ High California taxation and airport rental rates make LMT attractive.
- ▶ Klamath region has a heightened aviation presence resulting from the Oregon ANG.
- ▶ Klamath Region has favorable flying and weather conditions.

Downward Factors (-)

- ▶ Aircraft attrition due to aging aircraft owners, pilot populations, and sales of aging aircraft affect the number of based aircraft.
- ▶ Self-service fuel dispensing is not available.
- ▶ Rising aircraft ownership and operating cost are occurring.
- ▶ Expanding FAA regulations are affecting pilot and aircraft certification.

Forecast Scenarios – Based Aircraft

Figure 2-5 summarizes the 20-year total based aircraft forecast.

Low Scenario: FAA Aerospace Forecast Industry Growth Rates
79 Based Aircraft by 2038

High Scenario (Preferred): LMT Hangar Waiting List/Construction Schedule
102 Based Aircraft by 2038

FAA TAF: Based Aircraft Projection (179 Based Aircraft by 2038)

FAA TAF (Indexed): Based Aircraft Projection (124 Based Aircraft by 2038)

Low Scenario: This forecast approach uses the FAA 20-year fleet growth rates applied to separate aircraft categories (single piston, multi piston, turboprop, jet, helicopter) as derived from the *FAA Aerospace Forecasts* (Table 28). The annual growth rates are: -1.0 percent for single engine piston, -0.4 percent for multi-engine piston, 1.7 percent for single turboprop, 1.7 percent for multi turboprop, 2.2 percent for light/small cabin business jets, 2.2 percent for medium/large cabin business jets, and 1.5 percent for helicopters. In addition, aircraft production rates published by the General Aviation Manufacturing Association (GAMA) were reviewed to provide an understanding of delivery trends for specific fixed-wing and helicopter aircraft models. Accordingly, this scenario reflects the following LMT forecast factors:

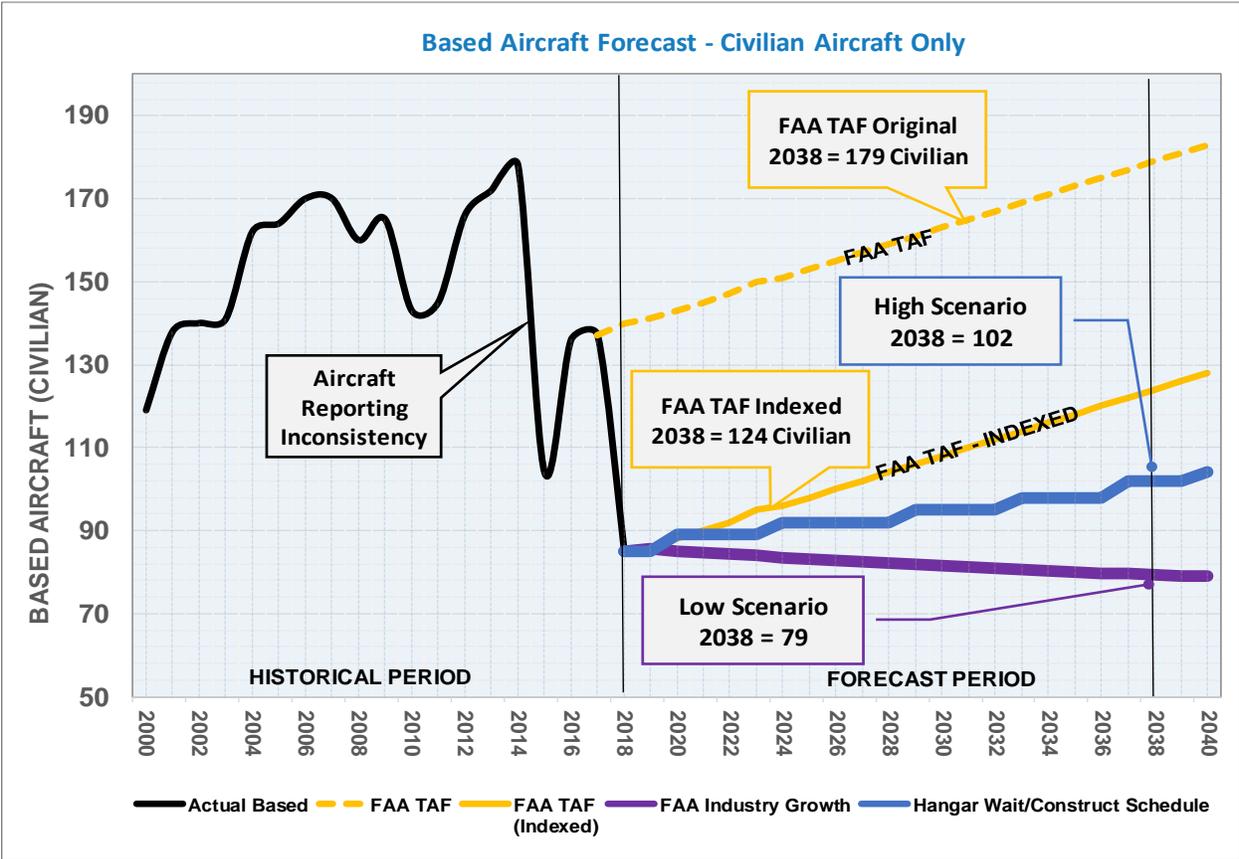
- ▶ Aircraft and pilot attrition will outpace new based aircraft.
- ▶ There is a decline of general aviation piston aircraft and utilization.
- ▶ Less than eight of the hangar waiting list would be realized.
- ▶ Flight training would expand significantly for college flight programs.

High Scenario (Preferred): This forecast approach applies the historic trend of two to eight pilots on the LMT hangar wait list and projects the trend to 2038. This forecast assumes LMT will have between two to eight pilots on the hangar wait-list, be able to accommodate pilots who want hangars, and that pilots will base their aircraft at LMT. The 20-year growth rate is 1.3 percent. This forecast approach assumes that influences on LMT will have minimal negative impact and assumes that influences change to be positive as previously stated in the medium forecast section. This forecast also assumes the following:

- ▶ Hangar ownership and construction arrangements will be resolved; new hangar development will proceed, eventually accommodate the waiting-list demand, and incentivize others.
- ▶ Based aircraft sales, due to attrition, will be retained at LMT.
- ▶ FBO plans to base two large-cabin business jets at LMT.
- ▶ Flight training and college aviation program expansion will result in additional based aircraft.
- ▶ Higher performance aircraft may be based at LMT due to higher California taxation and rental rates.

Preferred Forecast Summary and Reasonableness (High Scenario): The high forecast scenario more closely aligns with the LMT forecast factors and hangar waiting list/construction demand. In addition, the high forecast scenario is consistent with a growing Klamath region and economy. Therefore, the civilian based aircraft will likely fluctuate over the 20-year planning period, but not substantially. Similar to aircraft operations, the high forecast scenario resembles the transition towards turbine aircraft, which now exceed piston aircraft production. The high forecast scenario exceeds the FAA TAF.

Figure 2-5 : (Exhibit & Table): Based Aircraft Forecast



Based Aircraft - Forecast Scenarios					
Year	Actual Based	FAA TAF	FAA TAF (Indexed)	Low Scenario	High Scenario
				FAA Industry Growth	Hangar Wait/Construct Schedule
2018	85	140	85	85	85
2019	-	141	86	86	85
2023	-	150	95	84	94
2028	-	159	104	82	94
2033	-	169	114	81	100
2038	-	179	124	79	102
2040	-	183	128	79	104
20-Year Change	-	39	39	-6	17
20-Year Average	-	2.0	2.0	-0.3	0.9
20-Year % Change	-	27.9%	45.9%	-6.7%	20.0%
% CAGR	-	1.2%	1.9%	-0.3%	0.9%

Source: Mead & Hunt, Inc. 2018

Based Aircraft Forecast Mix

Table 2-4 summarizes the 20-year mix of based aircraft forecast by aircraft type for the preferred forecast scenario. The mix forecast was prepared using input from LMT user and tenant survey responses and is representative of FAA Aerospace Forecasts on the general aviation industry and fleet production. The forecast reflects the transition towards higher performance aircraft, including helicopters.

Based Aircraft Mix Forecast Factors:

- ▶ LMT revolving hangar waiting list remains between two and eight aircraft.
- ▶ FBO plans to base two additional large-cabin business jets at LMT.
- ▶ General aviation aircraft are transitioning from piston to turbine aircraft.
- ▶ Hangar construction schedule is based on reasonable cost/financing schedules.

Table 2-4 : Based Aircraft – By Aircraft Type

Based Aircraft By Type - Preferred Forecast (High Scenario)					
Year	Piston	Turboprop	Jet	Helicopter	TOTAL
2018	69	8	7	1	85
2019	69	8	7	1	85
2023	75	9	9	1	94
2028	75	9	9	1	94
2033	79	10	9	2	100
2038	79	12	9	2	102
2040	81	12	9	2	104
20-Year Change	10	4	2	1	17
20-Year Average	0.5	0.2	0.1	0.05	0.85
20-Year % Change	14.5%	50.0%	28.6%	100.0%	20.0%
% CAGR	0.7%	2.0%	1.3%	3.5%	0.9%

Note: Two Dassault Falcon 50 jets were based at LMT in December 2018 but were not recognized as 2018 table activity.

Source: Mead & Hunt, Inc. 2018.

COMPONENT #5: CRITICAL AIRCRAFT

This section describes the LMT critical aircraft forecast as derived from the operational fleet mix forecast. The critical aircraft classification is assigned to each runway based on aircraft dimensional and performance characteristics to determine the applicable FAA standards to plan safe and efficient airport facilities.

Below are the critical aircraft classifications as defined by FAA Advisory Circular 150/5300-13, *Airport Design*:

- ▶ AAC – Aircraft Approach Category: alphabetic letter designating approach speed (knots)
- ▶ ADG – Airplane Design Group: a roman numeral designating wingspan and tail height (feet)
- ▶ TDG – Taxiway Design Group: number and alphabetic letter designating wheel configuration.

Unique LMT Critical Aircraft Factors

The critical aircraft designation for LMT considers unique tenant/user factors which have operational implications extending from local to national significance. Over the years, LMT infrastructure and services have been strategically developed to support LMT users and tenants with unique operational needs. Two of LMT's primary users are the US Forest Service (USFS) and the Oregon Air National Guard (Oregon ANG); their needs include the operation of large transport aircraft (up to the DC-10-30 jet transport).

Critical Aircraft: As defined by FAA Advisory Circular 150/5000-17, *Critical Aircraft and Regular Use Determination*, the Airport's most demanding aircraft, or grouping of aircraft category, as determined from aircraft approach speed, wingspan, and weight, regularly using the airport for 500 annual operations; excluding touch and go operations.

The LMT unique critical aircraft factors include the following:

- ▶ USFS Klamath Air Tanker Base (contract aircraft operations)
- ▶ Oregon ANG and Military Training Missions/Exercises (fighter and transport aircraft). LMT serves as the only F-15 fighter training facility in the United States.
- ▶ Large-cabin business jets operated for on-demand medical and charter flights (FAR Part 135)
- ▶ Private fighter aircraft operating under military contract (tactical jet fighter training aircraft)
- ▶ State of Oregon's Resilience Plan (LMT is a Tier 1 facility for first responders)

Critical Aircraft Planning Determinations

The following section describes the critical aircraft forecast for LMT, primary Runway 14/32, and crosswind Runway 7/25. The critical aircraft is the most demanding combination of similar aircraft currently using, or forecast to use, LMT with reference to FAA aircraft classifications for the Airport Reference Code (ARC) and Runway Design Code (RDC). The critical aircraft for primary Runway 14/32 also serves as LMT's critical aircraft.

Figure 2-6 depicts LMT's most demanding group of similar critical aircraft by user and FAA ARC aircraft classification (AAC and ADG). These turbine aircraft highlight the unique critical aircraft demands at LMT as supported by the airfield infrastructure, including a 10,300-foot runway.

Airport Reference Code (ARC): An airport designation defined by FAA Advisory Circular (AC) 150/5300-13A, *Airport Design*, used for planning and design only and does not limit the aircraft that may be able to operate safely on the airport. The AC defines the **Runway Design Code (RDC)** as the code signifying the design standards to which the runway is to be built.

Figure 2-6 : LMT Similar/Critical Aircraft Users and Types – Turbine Aircraft

US Forest Service	Military	General Aviation
Transport Aerial Tankers	Cargo/Fuel Transports	Large Cabin Jets
DC-10-30 ARC D-IV 	KC-10 ARC D-IV 	Falcon 900/50 Series ARC B/C-II 
MD-87 ARC C-III 	C-17 ARC D-IV 	Gulfstream 500 Series ARC D-III 
Avro 85 ARC C-III 	KC-135 ARC D-IV 	
C-130 ARC C-IV 	KC-130 ARC C-IV 	

Source Categories: FAA TFMSC, LMT ATC Tower Input, LMT Master Plan User Surveys, Airport Staff Report

Primary Runway 14/32 Critical Aircraft (Existing/Future)

The DC-10-30, which supports LMT civilian and military aviation missions, is the most demanding aircraft at LMT and has been the critical aircraft used for airfield design since the 1993 LMT Master Plan. The most demanding jet transport aircraft operating at LMT (AAC C/D and ADG III/IV) with similar/critical characteristics to the DC-10-30 include:

- ▶ DC-10-30 (Contract US Forest Service Very Large Air Tanker)
- ▶ KC-10 Extender (Military Heavy Transport/Aerial Refueling)
- ▶ C-17 Globemaster (Heavy Military Transport)
- ▶ KC-135 Stratotanker (Heavy Military Transport)
- ▶ C-130/J/Q Hercules (Large USFS Air Tanker)
- ▶ C-130 Hercules (Military Transport).
- ▶ Heavy transport aircraft are over 300,000 pounds maximum takeoff weight
- ▶ Large transport aircraft are over 150,000 pounds maximum takeoff weight.

Table 2-5 lists the existing (2017/2018) and forecast (2038) activity for the most demanding turbine aircraft at LMT by standard FAA aircraft classification. Activity has been categorized by civilian and military operations; LMT military operations are not forecast as part of the LMT Master Plan or by the Oregon ANG. Runway 14/32 currently has 42,800 annual operations (24,500 civilian and 18,300 military) and handles 90 percent of 48,500 total airport operations. As indicated in **Table 2-5**, existing activity by the most demanding turbine aircraft totals over 19,000 annual operations or 40 percent of the LMT traffic operating on Runway 14/32.

FAA guidance requires 500 operations by the most demanding aircraft type or grouping of aircraft with similar characteristics. The following is the AAC and ADG determination for LMT and Runway 14/32 based on existing and future activity levels, and LMT unique factors:

Table 2-5 : LMT Aircraft Traffic Mix (Total and Most Demanding Turbine Aircraft)

TRAFFIC MIX - TOTAL AIRPORT OPERATIONS										
Annual Operations	Aircraft Approach Speed (AAS)				AAS	Airplane Design Group (ADG)				ADG
	A	B	C	D	Total	I	II	III	IV	Total
Total - Existing (2018)	22,280	7,760	922	17,538	48,500	44,973	9,982	364	136	55,455
Civilian Operations	22,280	7,760	866	886	31,792	44,973	9,982	352	46	55,353
Military Operations	0	0	56	16,652	16,708	0	0	12	90	102
Total - Future (2038)	22,138	7,760	1,265	17,337	48,500	45,584	8,873	689	184	55,455
Civilian Operations	22,138	7,760	1,209	691	31,798	45,584	8,873	677	94	55,228
Military Operations	0	0	56	16,646	16,702	0	0	12	90	102

TRAFFIC MIX - MOST DEMANDING TURBINE AIRCRAFT OPERATIONS										
Annual Operations	Aircraft Approach Speed (AAS)				AAS	Airplane Design Group (ADG)				ADG
	A	B	C	D	Total	I	II	III	IV	Total
Total - Existing (2018)	0	574	922	17,538	19,034	17,446	1,088	364	136	19,034
Civilian Operations	0	574	866	886	2,326	840	1,088	352	46	2,326
Military Operations	0	0	56	16,652	16,708	16,606	0	12	90	16,708
Total - Future (2038)	0	850	1,265	17,337	19,452	16,840	1,739	689	184	19,452
Civilian Operations	0	850	1,209	691	2,750	240	1,739	677	94	2,750
Military Operations	0	0	56	16,646	16,702	16,600	0	12	90	16,702

Note: Turbine Aircraft (defined): jet and turboprop engine aircraft using kerosene-based fuels.

Note: Military aircraft activity was not forecasted as part of the LMT Master Plan; however, military traffic is expected to increase throughout the 20-year LMT forecast period.

Note: The 2017/2018 activity includes 600 annual operations by Adversary Air aircraft (D-I). The contract is not anticipated to extend beyond 2023 at LMT. The 2019 Adversary Air activity is expected to total 4,500 annual operations.

Source: FAA TFMSC, LMT ATC Tower Input, LMT Master Plan User Surveys, Airport Staff Report.

Existing Critical Aircraft Designation: D-III

AAC D Representative Aircraft: F-15 C/D / L-159 Civilian Fighter

ADG III Representative Aircraft: Avro RJ-85 / MD-80 Series / B-737 Series

AAC Determination (Existing): There were 17,538 total operations (886 civilian) by AAC D aircraft in 2017/2018. This exceeds the FAA regular use threshold; therefore, the AAC D is justified.

ADG Determination (Existing): There were a combined 500 total operations (398 civilian) by ADG III and IV aircraft in 2017/2018. This exceeds the FAA regular use threshold; therefore, the ADG III is justified.

Future Critical Aircraft Designation: D-IV

AAC D Representative Aircraft: DC-10-30 Military Transport / Civilian US Forest Service Tanker

ADG IV Representative Aircraft: DC-10-30 Military Transport / Civilian US Forest Service Tanker

AAC Determination (Future): There are forecast to be 17,337 total operations (691 civilian) by AAC D aircraft in 2038. This exceeds the FAA regular use threshold; therefore, the AAC D is justified.

ADG Determination (Future): There are forecast to be 184 total operations (94 civilian) by ADG IV aircraft in 2038. While this does not meet the FAA regular use threshold, it is recommended that ADG IV design standards be maintained for planning purposes for the following reasons:

US Forest Service (USFS): LMT plays a critical role in fire support services for the USFS as wildfires are a growing problem in the mountain west. The USFS manages nearly 60 percent of all Oregon fires, which is significantly higher than Washington at 18 percent and California at 19 percent. The U.S. Department of the Interior reports that for the period from 1985 to 2018, the total acres burned has increased at four percent annually and the suppression costs have increased at eight percent annually. This trend is not expected to reverse in the immediate future; therefore, it is vital that the capabilities at existing support facilities like LMT are maintained. The USFS is retiring older turboprop and jet tanker aircraft (DC-7, MD-87, and Avro RJ85) from their contract fleet and is replacing them with the C-130 (C-IV), DC-10-30 (D-IV), and eventually the Boeing 737 (C-III). The USFS has inquired about operating the Boeing 747 supertanker (D-V) at LMT. Discussions with the USFS indicate that the facilities recently made available at LMT, including improved Taxiway B access to the USFS ramp and large east-side apron, make it highly likely that LMT will see increasing activity by these large jet tanker aircraft. In summary, based on USFS fleet logistics, the ADG IV transport aircraft (DC-10-30, C-130) is the most demanding aircraft group at LMT.

Guard/Military: LMT plays a critical role in military support services for the Oregon ANG. Oregon does not have any military bases, so federal facilities like the Guard base at LMT are vital for State military and emergency response. LMT is a Guard base for fighter training and military readiness exercises, which involves operations by large/heavy transport aircraft including the KC-10 Extender Air Tanker (D-IV), C-17 Globemaster (D-IV), and KC-135 Stratotanker (D-IV). Similarly, the military KC-46A Pegasus (D-IV Boeing 767 model) is programmed to replace the KC-135 Stratotanker (D-IV). LMT activity by large/heavy transports averages 100 to 200 annual operations, depending on training exercise events hosted at LMT. Oregon ANG forecasts are not available to project military traffic levels at LMT; however, Airport Staff expects military traffic to moderately increase throughout the 20-year LMT planning period. In addition, LMT has been notified that the C-17 Globemaster (D-IV) would be the expected military aircraft to support Tier

1 Resilience Plan logistics for Klamath Falls. In summary, based on military and state emergency response needs, the ADG IV transport aircraft (KC-10, C-17, KC-135) is the most demanding aircraft group at LMT.

Other: LMT is used by other large aircraft, including AAC C/D large-cabin business jets (Gulfstream 300/400/500 Series, Bombardier Global Express), and as a Boeing test site for the Boeing 737 (C-III). The FBO (Century Aviation) recently purchased a large hangar at LMT with the intentions of basing a Gulfstream 400 Series (D-II) and Gulfstream 500 Series (D-III) business jet to support domestic and international medical and charter flights.

Figure 2-7 depicts the performance and dimensional characteristics of the critical aircraft (DC-10) for the Airport and primary Runway 14/32. The DC-10-30 is a tri-jet transport aircraft operated at LMT under contract for the USFS and is also used for military aerial refueling and troop transports.

Figure 2-7 : Primary Runway / Airport Critical Aircraft



Note: Aircraft dimensions and performances vary per model configuration.
 Source: Aircraft Manufacturer Website, FAA Aircraft Database Spreadsheet (Obtained August 2018).
 While there are not 500 ADG IV operations, LMT tenants (USFS and the Oregon ANG) have indicated that ADG IV facilities are vital to their mission at LMT. Therefore, for future airport planning purposes, the primary Runway 14/32 and associated taxiway system should continue to comply with FAA D-IV and TDG-5 standards to accommodate large/heavy transport aircraft (representative of the DC-10-30 critical aircraft) with an AAC approach speed less than 166 knots, an ADG aircraft wingspan up to 171 feet, and a tail height less than 60 feet.

Crosswind Runway 7/25 Critical Aircraft (Existing/Future)

The critical aircraft for crosswind Runway 7/25 is the Beechcraft King Air, which has an ARC B-II and TDG 2 classification. The King Air Series, as represented by the King Air 350/1900 models, is a popular twin-turboprop plane in production, and commonly used for business, corporate, and commercial transport purposes.

Runway 7/25 handles 5,500 annual operations, which is approximately 10 percent of total airport operations. FAA Advisory Circular 150/5000-17 guidance requires 500 operations by the most demanding aircraft type or grouping of aircraft with similar characteristics. The turbine aircraft, similar to the King Air Series, conduct 1,500 annual operations on the crosswind runway, including 1,360 operations by Part 135 operators and 980 operations by 'large' aircraft with a maximum takeoff weight greater than 12,500 pounds. These turbine aircraft operate on the crosswind runway for commercial and business/corporate transport purposes, including charter passengers, scheduled air cargo freight, on-demand medical air lift, USFS, and agricultural users. Therefore, the King Air Series is the representative aircraft group for the activity taking place on the crosswind runway. Below are turbine (turboprop and jets) aircraft with similar characteristics to the King Air critical aircraft and operating on Runway 7/25; documented by aircraft type/model, ARC, user and crosswind runway activity [annual operations]:

- ▶ King Air Series (B-II) Large Twin Turboprop: General Aviation Transient [80 Operations]
- ▶ Pilatus PC-12 (A-II) Single Turboprop: Medical Air Lift [60 Operations *]
- ▶ Air Tractor AT-402B (A-II) Large Single Turboprop: Based Agriculture [700 Operations *]
- ▶ Cessna Caravan 208 (A-II) Single Turboprop: Air Cargo [225 Operations *]
- ▶ Beechcraft 99 (B-I) Twin Turboprop: Air Cargo [150 Operations *]
- ▶ ST-2 Grumman (B-II) Large Twin Turboprop: USFS [50 Operations *]
- ▶ Air Tractor AT-802F Fire Boss (B-II) Large Single Turboprop: USFS [60 Operations *]
- ▶ Aero Commander 500 Turbo Series (B-II) Twin Piston: USFS [40 Operations *]
- ▶ Business Jets - Based and Transient General Aviation Users [50 Operations *]
- ▶ Falcon 50 (ARC B/C-II) Twin-Engine Jet: FBO Charter/Medical Flights
- ▶ Falcon 900 (ARC B/C-II) Tri-Engine Jet: FBO Charter/Medical Flights
- ▶ Hawker 800XP (ARC B-II) Twin-Engine Jet: FBO Charter/Medical Flights
- ▶ Turbo Commander (ARC B-II) Twin-Turboprop: FBO Charter/Medical Flights
- ▶ Other Transient General Aviation Users [100± Operations *].

Note: Large turboprop aircraft are over 12,500 pounds maximum takeoff weight

Note: * Denotes Part 135 Certificated Operator

Combined, the above turbine aircraft with similar characteristics to the King Air account for 1,500 annual regular use operations on Runway 7/25 (activity information obtained from 2018 LMT Tenant/User Surveys and 2019 Crosswind Testimonial Letters). Business jets are the largest aircraft operating on the crosswind runway, but they do not conduct 500 annual regular use operations.

The military does not conduct normal landing or takeoff operations on the Crosswind Runway 7/25, unless required for emergency purposes. Also, as a future forecast scenario, the crosswind runway could once again accommodate regional airline passenger aircraft, including the twin-turboprops comparable to the King Air Series.

The following is the AAC and ADG determination for the Runway 7/25 based on existing and future activity levels and LMT unique factors:

AAC Determination (Existing/Future): There were 1,206 total civilian operations by AAC B aircraft in 2017/2018; that number is projected to reach 1,600 total civilian operations in 2038. This exceeds the FAA regular use threshold; therefore, the AAC B is justified.

ADG Determination (Existing/Future): There were 1,236 total civilian operations by ADG II aircraft in 2017/2018; that number is projected to reach 1,450 total civilian operations by 2038. This exceeds the FAA regular use threshold; therefore, the ADG Category II is justified.

For future planning purposes, the crosswind runway should comply with FAA B-II (large aircraft) and TDG-2 standards to accommodate large turboprop aircraft (representative of the King Air 350/1900 Series) with an AAC approach speed less than 121 knots, an ADG aircraft wingspan less than 79 feet, and a tail height up to 29 feet. The crosswind Runway 7/25, which is aligned with the strong, gusty-wind conditions from the west, is required to meet a minimum FAA 10.5-knot crosswind coverage. It should be noted the previous LMT 2005 Master Plan identified the crosswind Runway 7/25 as an ARC B-III classification based on the Alaska/Horizon Airlines 37-seat Bombardier Q-200 twin-turboprop aircraft used for scheduled airline service. **Figure 2-8** depicts the performance and dimensional characteristics of the representative critical aircraft (Beechcraft King Air 350/1900) for the crosswind Runway 7/25.

Figure 2-8 : Crosswind Runway Critical Aircraft



Aircraft Design Characteristics:	
Aircraft:	Beechcraft King Air 350/1900
Aircraft Type:	Twin Engine Turboprop
FAA ARC/TDG:	B-II; TDG 2
Approach Speed:	113 Knots
Wingspan:	58'
Length:	57'
Tailheight:	16'
Maximum Weight:	17,200 Pounds
Seating Configuration:	2 Crew + 10± Passengers
Cockpit to Main Gear (CMG)	16'
Wheelbase	24'
Main Gear Width (MGW)	17'

Note: Aircraft dimensions and performances vary per model configuration.

Source: Aircraft Manufacturer Website, FAA Aircraft Database Spreadsheet (Obtained August 2018)

Critical Aircraft Forecast Recommendation

The critical aircraft is important to airport planning. The critical aircraft is a basis for determining airfield and landside geometric dimensions, setbacks, separations, airspace clearances, safety areas, and other structural considerations. Regarding critical aircraft determinations, FAA Advisory Circular 150/5000-17 states that facility planning should include consideration of military aircraft or other federally-owned aircraft operating at the airport.

Airport planning considers a variety of critical aircraft to define separate elements of airport design (runway length, taxiway design, apron strength, etc.). This critical aircraft determination is made for airport planning purposes only; federal law does not allow the FAA to fund projects that solely benefit another federal agency. The critical aircraft is used to determine project eligibility or justification; therefore, in some cases, the FAA will need to designate a critical aircraft for Airport Improvement Plan (AIP) or Passenger Facility Charge (PFC) eligibility that is separate and distinct from the critical aircraft used for planning and designing the airfield. It is acknowledged that FAA ability to participate, in full or in part, in LMT capital improvement projects will be determined on a case by case basis closer to the time of project design and implementation.

The following is a summary of LMT existing and future critical aircraft and FAA aircraft classifications as defined by FAA Advisory Circular 150/5300-13, *Airport Design*:

Airport and Runway 14/32 Critical Aircraft (Existing)

- ▶ FAA AAC Category D
- ▶ FAA ADG Category III
- ▶ FAA Runway Visibility Minimums: Not Lower than ½-Mile (2400 RVR).

Airport and Runway 14/32 Critical Aircraft (Future)

- ▶ FAA AAC Category D
- ▶ FAA ADG Category IV
- ▶ FAA Runway Visibility Minimums: Not Lower than ½-Mile (2400 RVR).

Note: Not all airfield facilities and construction projects (such as holding/by-pass areas and certain taxiway segments) would require adherence to ARC D-IV and TDG 5.

Crosswind Runway 7/25 Critical Aircraft (Existing/Future)

- ▶ FAA AAC Category B
- ▶ FAA ADG Category II
- ▶ FAA Runway Visibility Minimums: Visual.

SPECIALIZED CIVILIAN FORECAST ACTIVITIES

The following are unique forecast activities considered for facility planning purposes:

US FOREST SERVICE ACTIVITY

During the fire season, which typically extends from June to October, the US Forest Service Klamath Air Tanker Base (KATB) supports up to 37 different air tanker aircraft flying about 220 flights, or nearly 500 annual operations at LMT. The US Forest Service is in the process of retiring the older multi-engine propeller aircraft (DC-7, Convair 580) and transitioning toward jet transports (RJ-85, MD-80), including interest in accommodating the DC-10-30 transport (3-engine heavy jet) at LMT. KATB flights during the 20-year forecast period are projected to range between 300 and 500 annual aircraft operations, depending on fire season severity.

MEDICAL FLIGHTS

Medical flights include the transport of people and organs/tissues using turbine fixed-wing and helicopter aircraft. Medical-related flight activity during the 20-year forecast period is projected to range between 1,500 and 2,500 annual aircraft operations at LMT, depending on the medical flight contracts.

CIVILIAN FLIGHT TRAINING ACTIVITY

Combined, there are 7 based flight training aircraft (6 fixed-wing and 1 helicopter) conducting about 16,000 operations per year (Civilian flight school training is provided by Pelican Aviation and Precision Aviation. Pelican Aviation provides fixed-wing pilot instruction and training. Precision Aviation offers helicopter and fixed-wing pilot instruction and an accredited flight training program affiliated with the Klamath Community College). As an industry standard, each flight training aircraft typically operates between 200 and 500 hours annually and conducts 2,200 to 2,600 operations per year.

Flight training activity is expected to increase, principally in response to the airline industry demand for supplying professional pilots. However, flight training activities are potentially limited by LMT military activity and surrounding military operating airspace constraints, in addition to other impeding industry factors associated with flight training costs, regulatory costs, and the supply of flight instructors. Flight training activity during the 20-year forecast period is projected to range between 15,000 and 20,000 annual aircraft operations at LMT, depending on the pilot shortage condition.

ADVERSARY AIR (CIVILIAN CONTRACT)

Adversary Air is a private company providing tactical aircraft training under contract with the Oregon ANG starting in a year or two. Adversary Air will base between 4 and 10 L-159 Alca fighter jets, and perhaps other fighter aircraft at LMT. This LMT forecast assumes that Adversary Air will receive a contract extension for four additional years, similar to other military base contract terms. Adversary Air flight training activity during the 20-year forecast period is projected to range between 2,500 and 5,000 annual aircraft operations at LMT, depending on daily flight schedules during the week and weekend periods.

POTENTIAL SCENIC/TOURISM FLIGHTS

Located 55 flight miles from the Crater Lake National Park, there is a potential for scenic air passenger flight tours operating out of LMT. These flights would likely be offered on a seasonal basis, operated as scheduled or non-scheduled service, using fixed-wing aircraft and/or helicopters. The air tour operator may provide scenic flight tours from other surrounding airports and might provide other on-demand passenger service at LMT. During the peak tourism season, flights would likely not be conducted daily and would not exceed one to two flights per day; equivalent to about 1,000 to 2,000 enplaned passengers per year.

POTENTIAL UNMANNED AIRCRAFT SYSTEMS (UAS-DRONES)

Unmanned Aircraft System (UAS) aircraft are rapidly becoming a more mainstream aircraft platform supporting various civilian and military flight applications. Large retail companies are pursuing UAS for product deliveries. While future UAS aircraft may not require airfield facilities for delivery networks, there may be UAS applications which could involve other on-airport land use, such as a domicile for maintenance and training. As the UAS industry and regulations evolve, including advocating airspace compatibility, some aspects of UAS activity could be realized at LMT. However, due to the potential conflicts with military training exercises and uncertainty of the UAS industry for commercial applications, no UAS-specific activities have been projected or forecast for LMT.

CHAPTER SUMMARY

AVIATION FORECAST

This section summarizes the preferred aviation demand forecasts and will be used in subsequent Airport Master Plan tasks. **Table 2-6** summarizes the preferred Master Plan forecasts.

Table 2-6 : Master Plan Forecast Summary

MASTER PLAN FORECAST SUMMARY						
Forecast Component (Annual Totals)	Existing Base Year 2018	Base Year + 1 Year 2019	Base Year + 5 Years 2023	Base Year + 10 Years 2028	Base Year + 15 Years 2033	Base Year + 20 Years 2038
Airline Passengers - Total	0	10,800	26,600	28,200	30,200	31,000
Enplaned	0	5,400	13,300	14,100	15,100	15,500
Deplaned	0	5,400	13,300	14,100	15,100	15,500
Total Operations (Civilian+Military)	48,500	48,755	52,955	51,655	53,355	54,955
Total Operations (Civilian)	31,600	31,800	36,000	34,700	36,400	38,000
Itinerant (Base)	27,500	27,757	28,737	29,977	31,257	32,547
Itinerant (Base + Outlook)	27,500	28,797	29,987	32,157	33,437	35,047
Air Carrier (Outlook)	0	1,040	1,250	2,180	2,180	2,500
Air Cargo	1,000	1,020	1,090	1,180	1,270	1,360
Air Taxi	2,600	2,650	2,840	3,090	3,380	3,680
General Aviation	14,600	14,780	15,500	16,400	17,300	18,200
Military	9,300	9,307	9,307	9,307	9,307	9,307
Local	21,000	21,125	21,435	21,822	22,209	22,596
General Aviation	13,400	13,477	13,787	14,174	14,561	14,948
Military	7,600	7,648	7,648	7,648	7,648	7,648
Instrument Operations	2,460	2,490	2,605	2,751	2,902	3,053
Peak Hour Operations	10.4	10.5	11.8	11.4	12.0	12.5
Air Cargo (Freight+Mail - Lbs)	1,517,821	1,526,800	1,563,600	1,610,900	1,659,600	1,709,800
Based Aircraft	85	85	94	94	100	102
Single Engine Piston	67	67	72	72	76	76
Multi Engine Piston	2	2	3	3	3	3
Turboprop	8	8	9	9	10	12
Jet Engine	7	7	9	9	9	9
Helicopter	1	1	1	1	2	2
Other	0	0	0	0	0	0
GA Operations/Based Aircraft	329	332	312	325	319	325

Note: Forecast values rounded, may not total.

Source: Mead & Hunt, Inc. 2018

FORECAST PLANNING ACTIVITY LEVELS

The preferred aviation forecasts are projected demand levels. The forecasts are used to evaluate the type, size, and location of capital improvements. These serve as the basis for Plan decision-making and recommendations; they are used to analyze facility requirements, to assess alternatives, and to prioritize project improvements.

Based on various circumstances, certain aspects of forecast demand may deviate from the projected timeline or may not materialize as planned. Therefore, because actual year-to-year activity can deviate from forecast projections, the LMT should monitor the relationship between forecast demand and actual activity levels. As recommended by FAA Advisory Circular 150/5070-6B, LMT should track planning activity levels, rather than specific years, to guide the thresholds for triggering Airport project improvements. This approach considers constrained and unconstrained forecasts, as a matter of “reviewing the operational factors and events implicit in the forecast to determine if differing assumptions regarding those factors have affected the forecast results.”

CRITICAL AIRCRAFT FORECAST

The critical aircraft designation has implications for civilian and military tenants/users at LMT, with consequences affecting regional, state, and national safety and security interests. As previously indicated, LMT serves as the only F-15 C/D fighter training facility in the United States and, therefore, is an essential facility for LMT’s key tenant, the Oregon ANG.

In addition, the unique operational factors at LMT are taken into consideration as part of the critical aircraft determination to maintain a safe and efficient airport facility. Therefore, the future critical aircraft for planning LMT and primary Runway 14/32 is the DC-10-30(ARC D-IV), an aircraft directly supporting the US Forest Service, Guard/Military, and the Oregon Resilience Plan at LMT. The DC-10-30 is representative of the most demanding jet transport aircraft of similar characteristics operating at LMT. Other D-IV aircraft also operate at LMT, including the C-130, KC-135, C-17, and likely the KC-46 Air Refueler.

The critical aircraft is relevant to other LMT facilities as it influences runway length, runway width, taxiway systems, and pavement strength. The LMT critical aircraft is used to identify existing and future LMT facilities required to satisfy FAA critical aircraft planning and design standards. These facility requirements are documented in the Facility Requirement Chapter (Chapter 3).

FAA TERMINAL AREA FORECASTS COMPARISON AND APPROVAL

Table 2-7 summarizes and compares the preferred 20-year Master Plan forecasts with the FAA TAF (dated January 2018), in terms of consistency with FAA tolerances. Forecasts are considered consistent with the TAF if the forecasts differ by less than 10 percent in the five-year forecast period, and 15 percent in the 10-year forecast period. The FAA bases primary considerations in forecast review and approval on forecasts using reasonable planning assumptions, current data, and appropriate forecast methods.

The Master Plan forecasts, once approved by the FAA, are commonly accepted as the future FAA TAF forecast, and later used for environmental and financial planning purposes. The forecasts require review and approval by the FAA, as conducted per *FAA Review and Approval of Aviation Forecasts* dated June 2008.

Table 2-7 : Master Plan Forecast and FAA TAF Comparison

COMPARISON OF MASTER PLAN ANF FAA TAF FORECASTS					
Forecast Component	Year (Fiscal)	Master Plan (Preferred Forecast)	FAA TAF Unadjusted (Jan-2018)	FAA TAF Adjusted (Jan-2018)	Airport/TAF (% Difference)
Airline Passenger Enplanements					
Base Year (2018)	2018	0	8,323	Same	-
Base Year + 1	2019	5,400	8,323	Same	-35.1%
Base Year + 5	2023	13,300	8,323	Same	59.8%
Base Year + 10	2028	14,100	8,323	Same	69.4%
Base Year + 15	2033	15,100	8,323	Same	81.4%
Base Year + 20	2038	15,500	8,323	Same	86.2%
Commercial Aircraft Operations (Civilian)					
Base Year (2018)	2018	3,600	4,886	Same	-26.3%
Base Year + 1	2019	3,670	4,921	Same	-25.4%
Base Year + 5	2023	3,930	5,063	Same	-22.4%
Base Year + 10	2028	4,270	5,248	Same	-18.6%
Base Year + 15	2033	4,650	5,435	Same	-14.4%
Base Year + 20	2038	5,040	5,629	Same	-10.5%
Total Airport Aircraft Operations (Civilian)					
Base Year (2018)	2018	31,600	30,941	Same	2.1%
Base Year + 1	2019	31,800	31,044	Same	2.4%
Base Year + 5	2023	36,000	31,462	Same	14.4%
Base Year + 10	2028	34,700	31,999	Same	8.4%
Base Year + 15	2033	36,400	32,546	Same	11.8%
Base Year + 20	2038	38,000	33,108	Same	14.8%
Total Based Aircraft (Civilian)					
Base Year (2018)	2018	85	140	85	0.0%
Base Year + 1	2019	85	141	86	-1.2%
Base Year + 5	2023	94	150	95	-1.1%
Base Year + 10	2028	94	159	104	-9.6%
Base Year + 15	2033	100	169	114	-12.3%
Base Year + 20	2038	102	179	124	-17.7%

Note: Bold text indicates Master Plan Forecast exceeds FAA Forecast Threshold

Source: FAA TAF published January 2018; adjusted to reflect LMT current activity for civilian based aircraft

Note: Forecast values rounded, may not total.

Note: Commercial Aircraft Operation include scheduled air cargo and potential airline outlook.

Source: Mead & Hunt, Inc. 2018

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Chapter 3

Facility Requirements



CRATER LAKE

**KLAMATH REGIONAL
AIRPORT**

Facility Requirements

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.

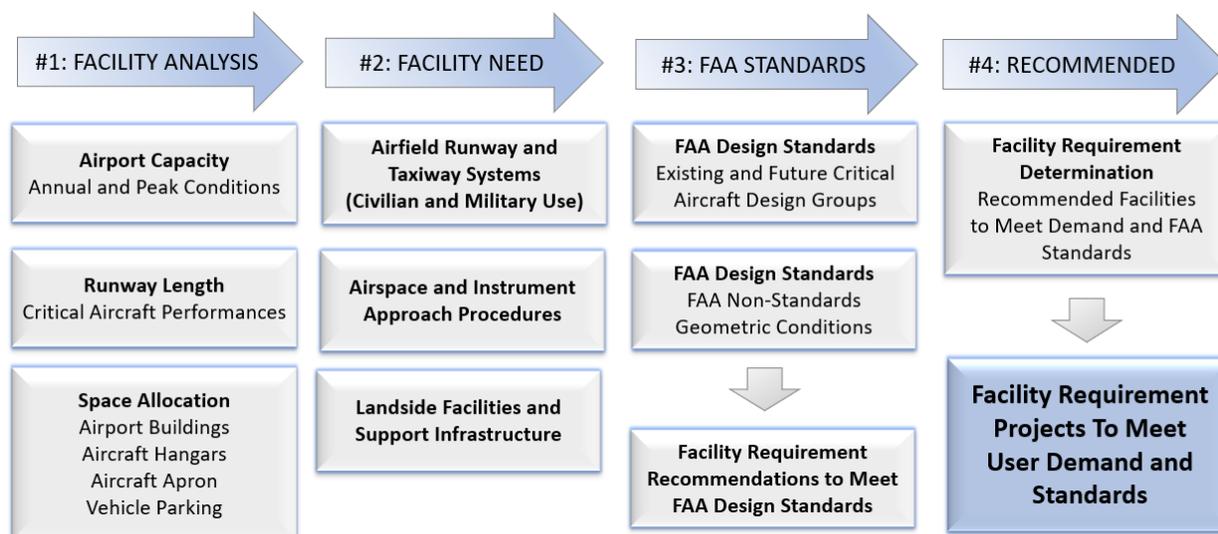
This Facility Requirements Chapter includes:

- ▶ 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).

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.

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.

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:

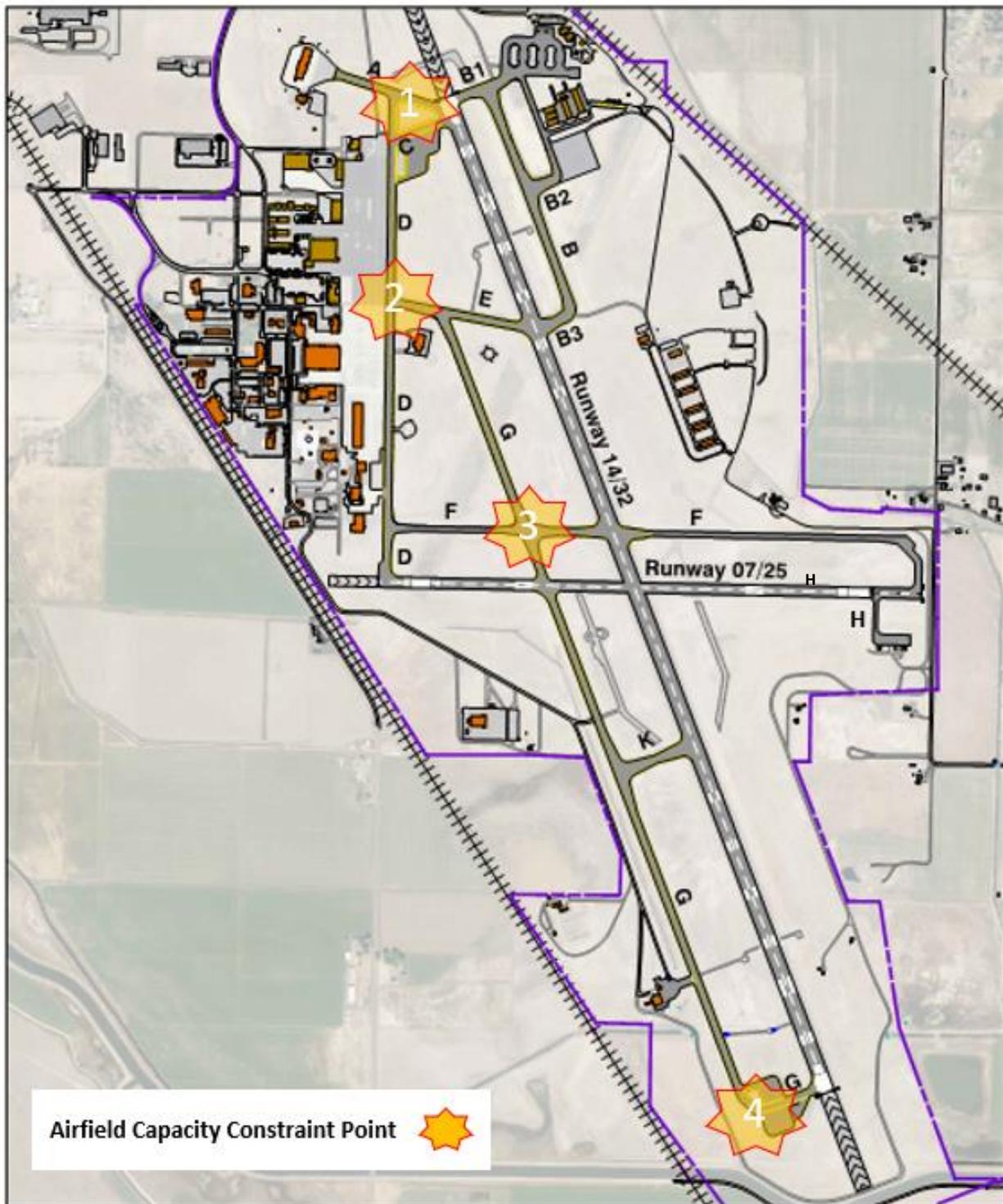
- ▶ Aircraft mix, size, approach speeds, and runway performance requirements
- ▶ Air Traffic Control (ATC) assignment of local traffic pattern(s) and runway utilization
- ▶ Civilian flight training periods
- ▶ Military flight training (8 to 12 aircraft departures/arrivals per training bank session)
- ▶ 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 Ordnance 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, Runway 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 Gear Type)	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' (A, B, C, D)	1/2-Mile 200' (A, B, C, D, E)	3/4-Mile ±200' (A, B, C, D)	1/2-Mile 200' (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 $\frac{3}{4}$ 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

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.

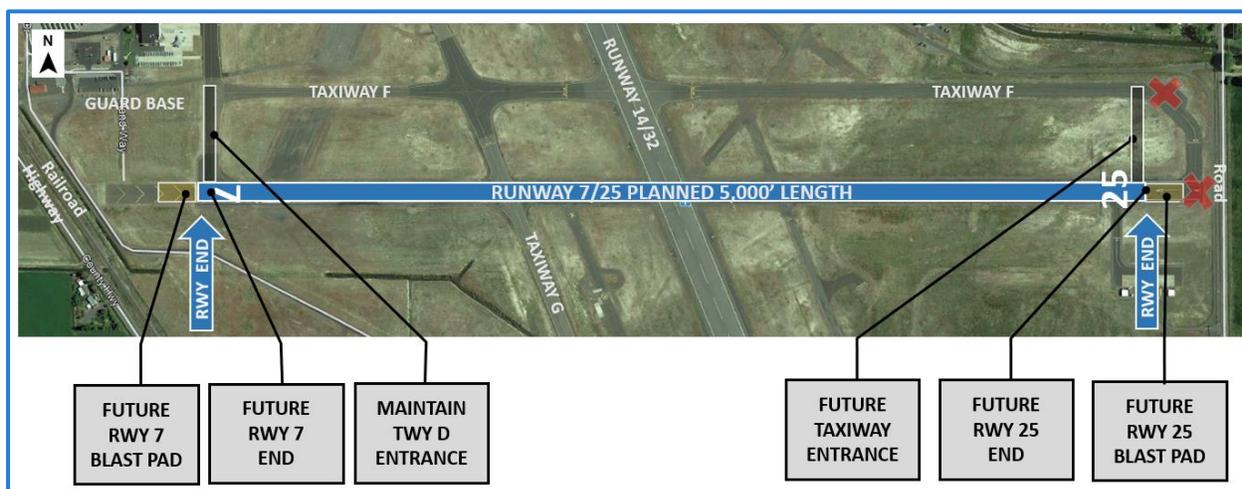
Runway End: The physical ends of the runway that constitute the beginning of the takeoff roll and the end of the landing roll out.

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

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

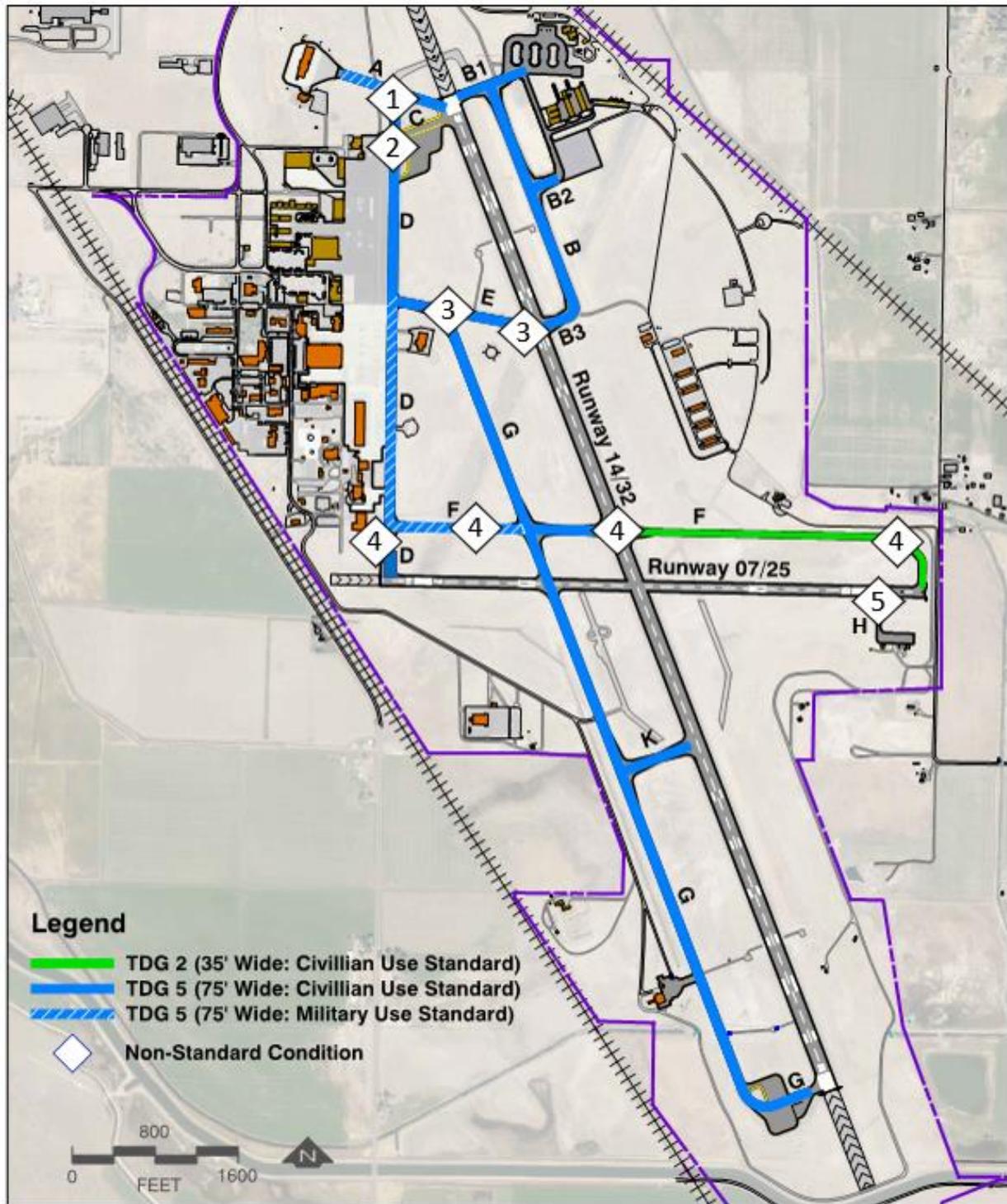
TAXIWAY SYSTEM - FUTURE FACILITY REQUIREMENTS			
Taxiway Segment	A	B	B1
Type	Entrance/Connector	Partial Parallel	Entrance/Connector
Taxiway Design Group - TDG	5	5	5
Taxiway Width	75'	75'	75'
Paved Shoulder Width - Per Side	50' One Side (30')	30'	30' One Side (30')
Edge Lighting	Medium - MITL	Medium - 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
Taxiway 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)
Taxiway Width	75'	75'	75' (35')
Paved Shoulder Width - Per Side	40' to 50' One 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)
Taxiway 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 Access, 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
Taxiway 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.

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.

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.

Rules and Regulations

- ▶ **Aircraft Deicing:** All aircraft deicing activities are to occur on the terminal, FBO or SASO ramp; and deicing of military aircraft occurs 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 ($\pm 35,000$ -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.

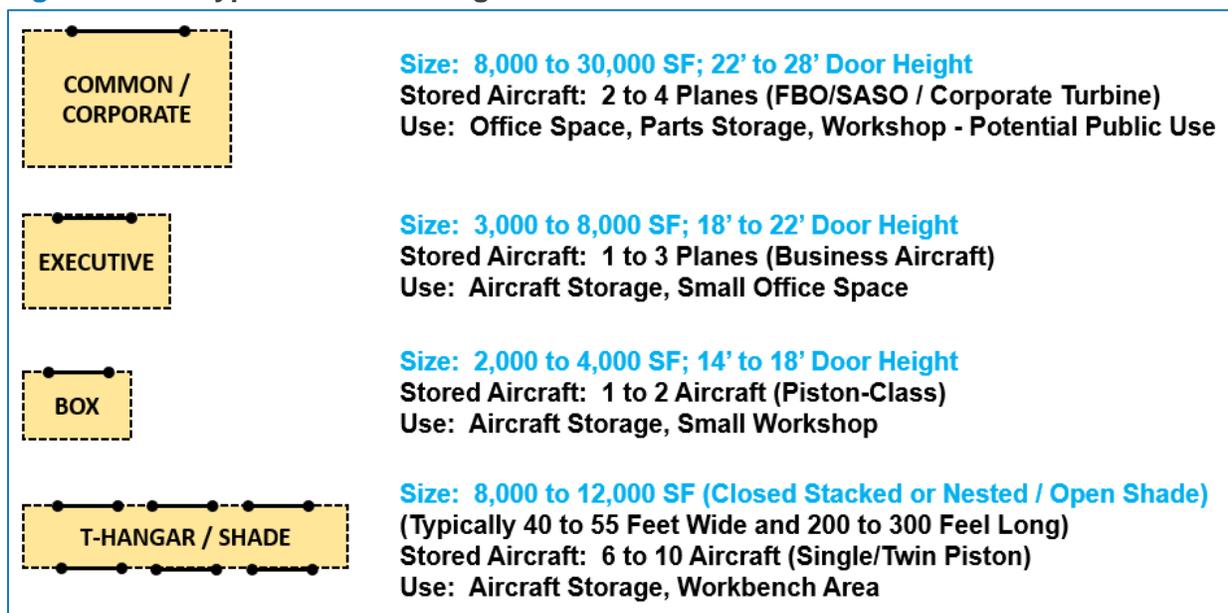
Recommendation: The existing FBO public auto parking area provides sufficient capacity for the 20-year demand. No expansion of the FBO parking area is recommended for the existing FBO location (Building #4-A/B). However, additional parking should be planned as part of a new FBO/SASO building used for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

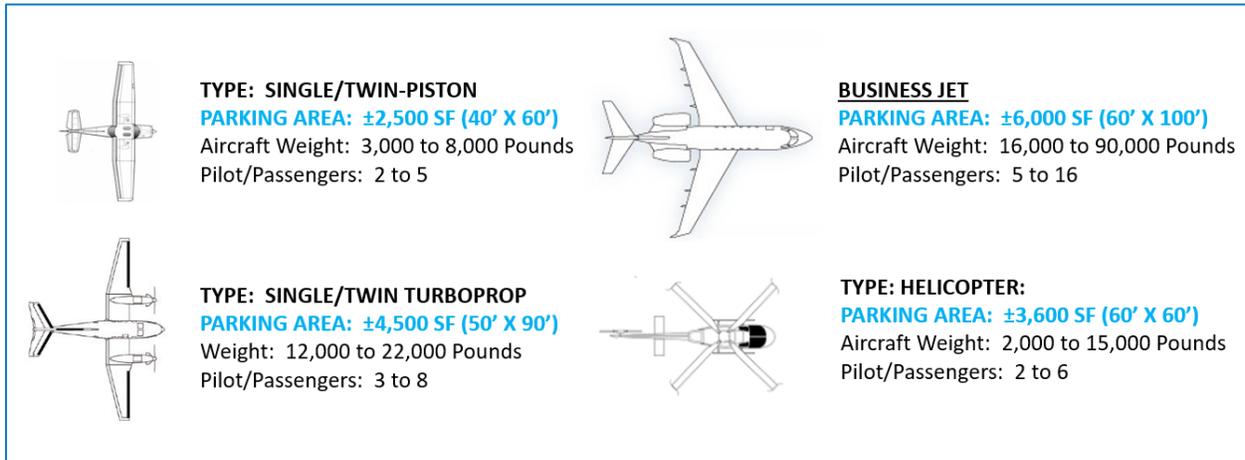
Recommendation: Additional apron area is required to accommodate the 20-year demand for peak-period activity. The main general aviation apron areas should be designed to ADG II standards, with a pavement strength up to 30,000 pounds SWG for piston/turboprop/helicopter aircraft and 60,000 to 90,000 pounds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

Recommendation (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 Administration 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.

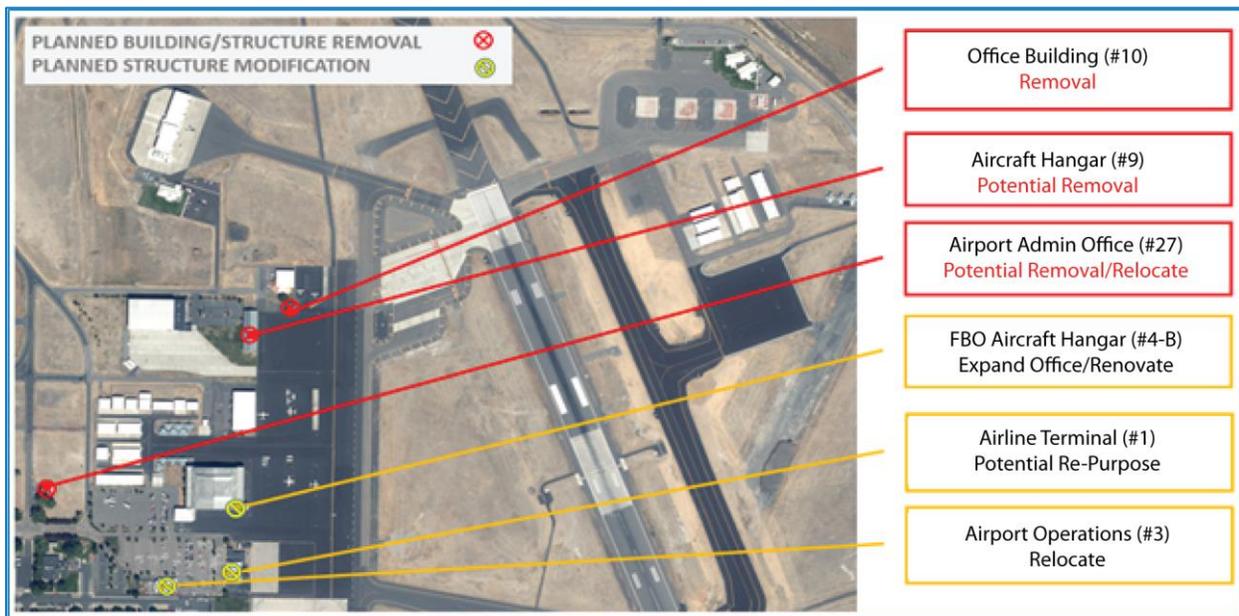
Airport Traffic Control Tower (ACTC)

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 public 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 Muniton 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

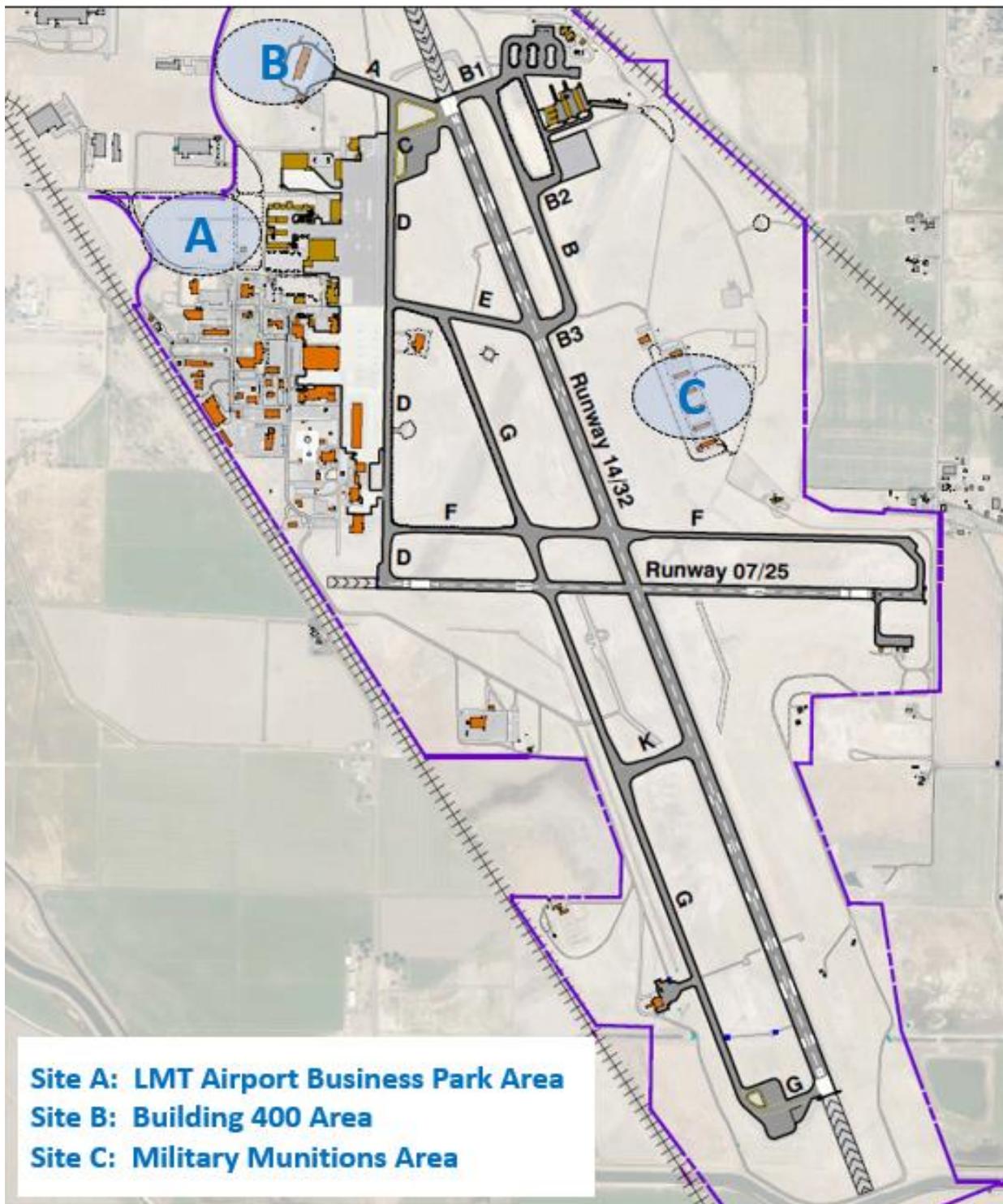
Prudent planning should accommodate compatible land development associated with the potential for accommodating new aviation technologies and emerging aeronautical industries (e.g., aircraft manufacturing, military-centric partnerships).

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.

Chapter 4

Improvement Alternatives



CRATER LAKE

**KLAMATH REGIONAL
AIRPORT**

Alternatives

INTRODUCTION

This chapter documents the evaluation of improvement alternatives and the preferred development plan for the Crater Lake – Klamath Regional Airport (LMT) to satisfy the facility requirements and recommendations described in **Chapter 3**. The purpose of the alternatives analysis is to recommend the size and location of future facility improvements to address Federal Aviation Administration (FAA) design standards and user demand. In some instances, only one design option is feasible. Where multiple design options are available, the alternatives are systematically evaluated to arrive at a preferred design recommendation. The preferred development concept is then carried forward to the Capital Improvement Plan (CIP) and Airport Layout Plan (ALP) discussed in subsequent chapters.

This Alternatives Chapter includes:

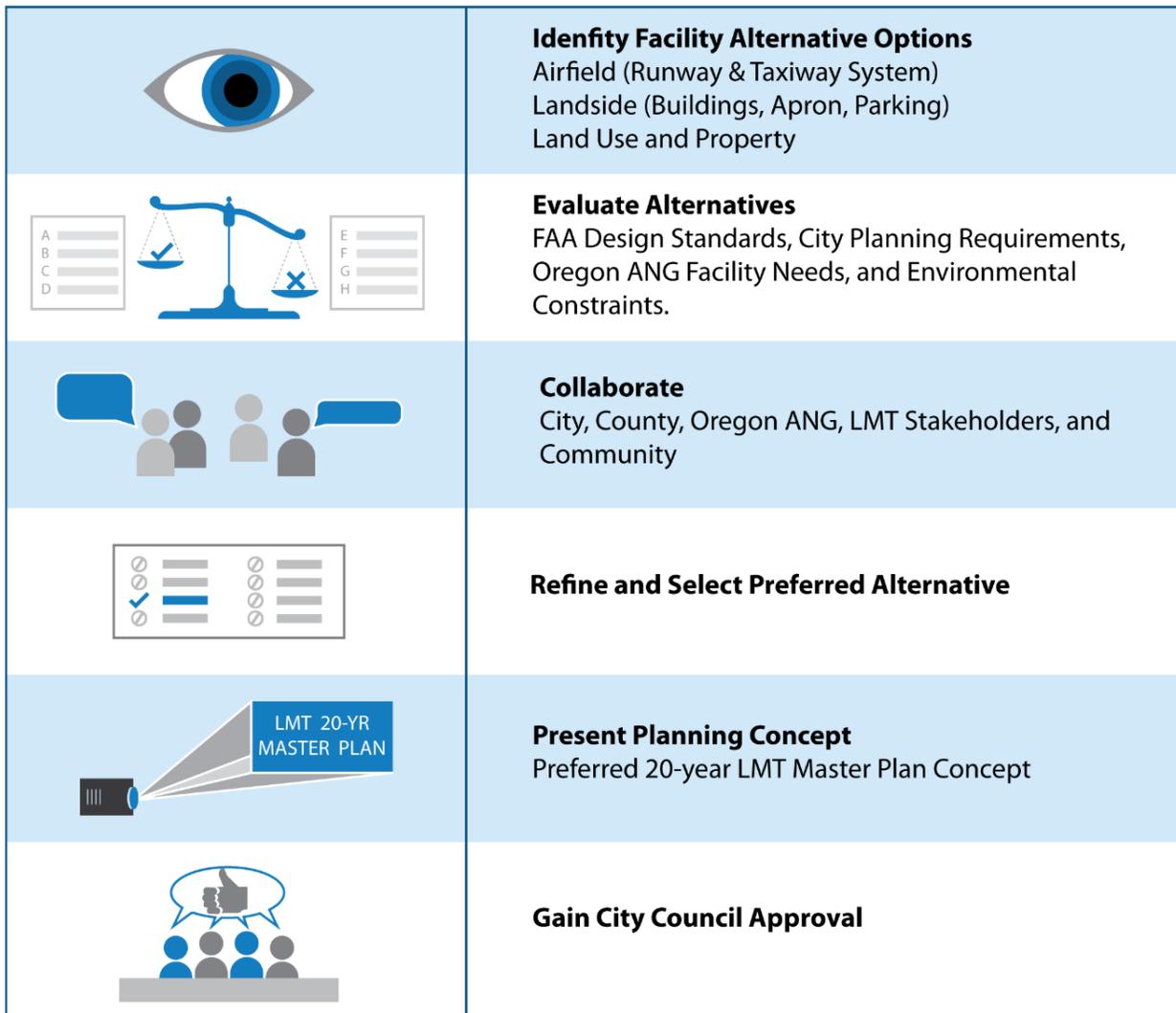
- ▶ Alternatives Approach
- ▶ Airfield System
 - Runway 14/32 Improvements
 - Runway 7/25 Improvements
 - Taxiway System
 - Runway 14 ILS
- ▶ Landside – Aeronautical
 - Airline Terminal
 - General Aviation Development
 - Administration and Operations Building
 - Aviation Tenants
- ▶ Landside – Non-Aeronautical
 - Airport Business Park
 - City Business Park
 - Airport Entrance Road.

ALTERNATIVES APPROACH

PROCESS

Figure 4-1 illustrates the process involved in developing, refining, and selecting the preferred facility improvement alternative. The process of defining and evaluating alternatives is iterative, beginning with a comprehensive range of unconstrained possibilities for facility improvements. These alternatives are then evaluated against screening criteria to assess operational, environmental, and financial constraints. Lastly, the alternatives are refined based on LMT strategic development goals, implementation feasibility, and collaboration with LMT stakeholders. The result of the alternatives analysis is selection of a preferred 20-year development plan for LMT that is carried forward to the CIP and ALP.

Figure 4-1 : Alternatives Process



Source: Mead & Hunt, Inc. 2020

SCREENING CRITERIA

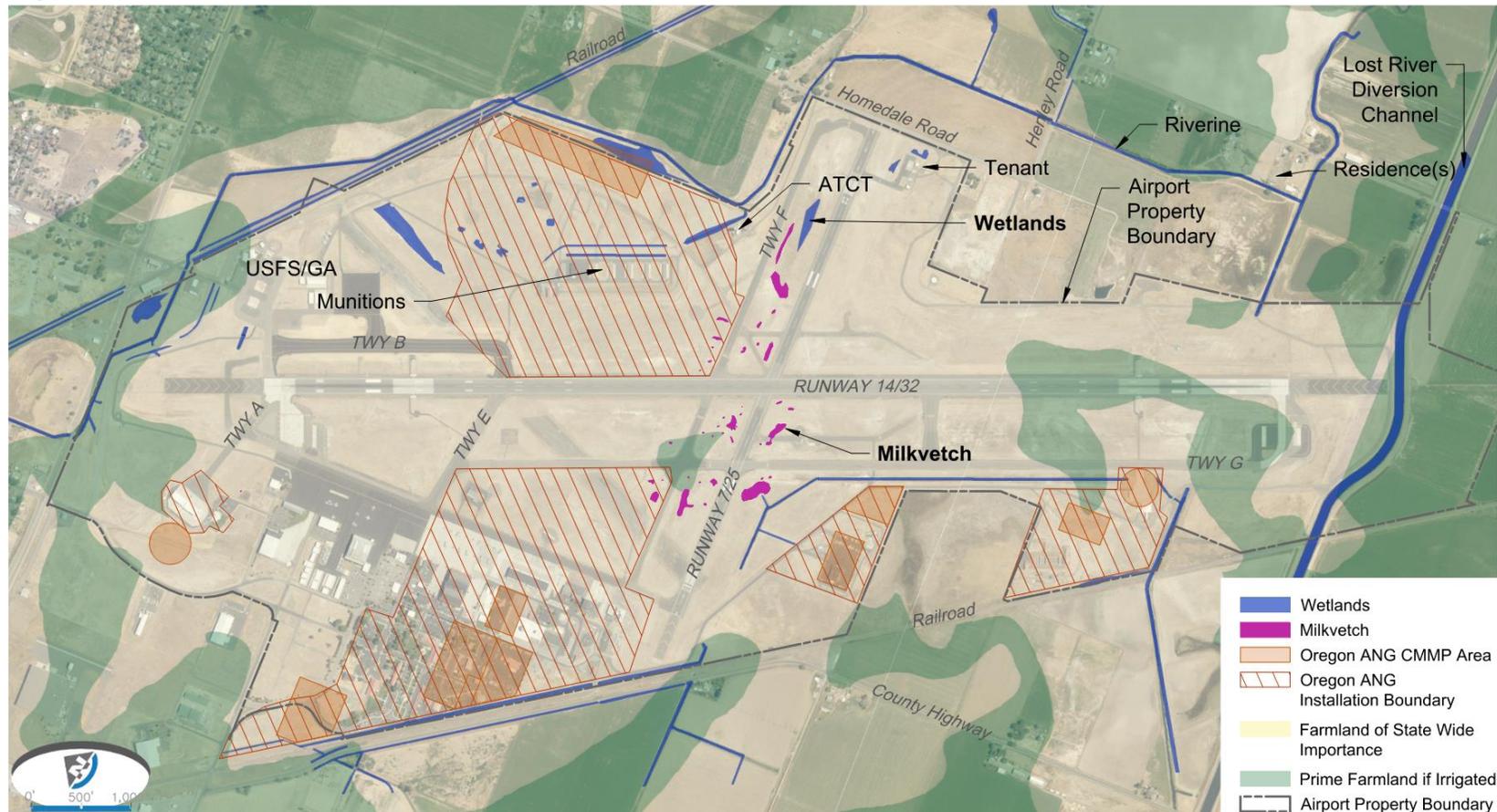
The evaluation of alternatives is iterative and structured. Development of the facility alternatives are initially unconstrained; they are based on LMT user demand and FAA planning guidelines, without consideration of other LMT site factors or constraints. Screening criteria are then applied to provide a consistent analytical approach and technical basis for selection of a preferred design concept. The principal screening criteria used to evaluate the development alternatives and recommended facility improvements include:

- ▶ Operational Efficiency – Improvements in operational capabilities and performance
- ▶ Environmental Considerations – Sensitivities of the natural environment (e.g., flora and fauna, historical and cultural sites)
- ▶ Land Use Considerations – Land acquisition and land use compatibility factors
- ▶ Implementation Feasibility – Constructability, phasing, affordability, and implementation factors.

The factors considered for each screening criterion vary slightly to reflect the unique functional areas of LMT. **Figure 4-2** depicts the principal environmental and land use constraints considered in the evaluation of the improvement alternatives. On-airport facility constraints are also considered in the alternative analysis, but they are not specifically noted in **Figure 4-2**.

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Figure 4-2 : Principle Environmental and Land Use Constraints



Sources: Prepared by Mead & Hunt, Inc. 2020

1. Wetlands: Wetland Permit Application Report, Wildlife Hazard Management Implementation Plan, W&H Pacific, 2006. Select wetlands and waterways filed under US Army Corps of Engineers Permit (NWP-2006-868) and Oregon Department of State Lands Permit (No. 37409) removed from mapped features.
2. Milkvetch: Rabe Consulting, 2019.
3. Oregon Air National Guard (ANG) Boundaries: Final Contaminated Media Management Plan (CMMP), Oregon National Guard, Kingsley Field, October 2017. CMMP establishes contamination cleanup measures for ground-disturbing activities in the specified areas.
4. Soils: US Department of Agriculture (USDA), 2020.

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LMT STRATEGIC DEVELOPMENT GOALS

While technical planning forms the basis for the evaluation of alternatives, selection of a preferred alternative is guided by the strategic development goals established for LMT 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 Air National Guard (ANG) to reimburse the Airport for expenses associated with maintaining shared airport facilities including runway and taxiway system. The shared facilities necessitate a coordinated effort between LMT, the Oregon ANG, and the FAA for future facility improvements. As such, the evaluation of alternatives is guided by the following LMT strategic development goals:

- ▶ 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 Installation 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).

COORDINATION

LMT improvement alternatives are developed and refined based on input from the FAA, local government agencies (the City of Klamath Falls and the County of Klamath), LMT users (e.g., Oregon ANG, US Forest Service, and general aviation tenants), and the public. LMT stakeholder feedback helps shape this Master Plan into a document that reflects community goals and interests while meeting FAA design standards and Oregon ANG mission needs.

RUNWAY SYSTEM

Runway layout influences the development of other LMT facilities, such as the siting of taxiways, parking aprons, and buildings. The following section documents the recommended runway improvements based on the facility requirements and runway performance lengths documented in Chapter 3, *Facility Requirements*.

The following describes the existing facilities and future runway system facility recommendations from Chapter 3, *Facility Requirements*:

- ▶ **Runway 14/32 (Primary)**
 - Existing: 10,302' x 150' (D-III)
 - Future: 10,302' x 150' (D-IV)
- ▶ **Runway 7/25 (Crosswind)**
 - Existing: 5,258' x 100' (B-II)
 - Future: 5,000' x 75' (B-II)

RUNWAY 14/32 IMPROVEMENTS

No physical changes to the length or width of Runway 14/32 are recommended. The existing runway length of 10,302 feet accommodates the existing critical aircraft (F-15/Avro RJ-85/MD-87) and the future critical aircraft (DC-10-30 Series large tanker aircraft). The Runway 14/32 width is recommended to remain at 150 feet to meet the future FAA Runway Design Code (RDC) D-IV design standards and military criteria. Additional runway improvements to satisfy future FAA RDC D-IV and military standards include:

- ▶ Runway 14 Object Free Area Length: 1,000 Feet
- ▶ 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 and 32 in-pavement threshold lights installed within the width of the runway
- ▶ Runway 14 Instrument Approach (Oregon ANG Project): Precision (ILS, Medium Intensity Approach Light System with Runway Alignment Indicator Lights, not less than 3/4-mile visibility minimums)
- ▶ Runway 32 Light Aids: PAPI-4L.

Runway 14 Object Free Area Length Alternatives

The standard ROFA length of 1,000 feet beyond the runway end is limited on Runway 14 to approximately 715 feet by the location of the airfield perimeter roadway, perimeter fence, and Brett Way. Four alternatives are provided that would alleviate the nonstandard condition. **Table 4-1** summarizes the factors involved with the four alternatives.

Option A: Modification of Standards

LMT can submit a Modification of Standards (MOS) form to the FAA that will allow the existing conditions to remain. In order to approve an MOS, according to FAA Order 5300.1F, it must be justified by unusual local conditions and assurance that an acceptable level of safety will be provided. The unusual local conditions that exist at LMT include the presence of Brett Way, a two-lane public roadway located within the ROFA, and a sizeable drainage ditch located north of Brett Way that could be affected by the road relocation.

Option B: Use Declared Distances

Alternative B uses declared distances to reduce the runway length available for certain aspects of aircraft performance on takeoffs and landings. Declared distances can be used to achieve additional ROFA length and to effectively preserve usable runway length. Declared distances represent the maximum runway length an airport owner declares available and suitable for meeting takeoff, rejected takeoff, and landing distance performance requirements for turbine-powered aircraft. There are four declared distance categories:

- ▶ Takeoff Runway Available (TORA) – The runway length declared available and suitable for the ground run of an aircraft taking off.
- ▶ Takeoff Distance Available (TODA) – The TORA plus the length of any remaining runway or clearway beyond the far end of the TORA.
- ▶ Accelerate Stop Distance Available (ASDA) – The runway plus stopway length declared available and suitable for the acceleration and deceleration of an aircraft aborting a takeoff.
- ▶ Landing Distance Available (LDA) – The runway length declared available and suitable for landing an aircraft.

By reducing the published Runway 32 ASDA and LDA lengths by 285 feet, the distance equivalent from the Runway 14 threshold to the intersection of the ROFA and the perimeter road, the standard 1,000-foot ROFA length beyond Runway 14 is achieved. Some reconfiguration to the runway edge and end lights near the Runway 14 end and relocation of the distance-to-go signs would be needed to provide visual clues to pilots that the Runway 32 available takeoff and landing runway lengths are shorter than the physical end of the runway pavement. The Runway 32 lengths provided using declared distances are summarized below.

- ▶ TORA 10,302 feet
- ▶ TODA 10,302 feet
- ▶ ASDA 10,016 feet
- ▶ LDA 10,016 feet.

Option C: Shorten Runway 14/32

Instead of using declared distances to reduce certain aspects of the Runway 32 lengths to satisfy aircraft performance requirements, this alternative physically shortens the Runway 14/32 length by 285 feet. This is achieved by relocating the Runway 14 threshold 285 feet south, thus providing the standard 1,000-foot ROFA length beyond the runway end. This reduces the future Runway 14/32 length from 10,302 feet to 10,016 feet.

Option D: Relocate Perimeter Road, Fence, and Brett Way

This alternative relocates the airfield perimeter roadway, the perimeter fence, and Brett Way completely outside the ROFA, thus retaining the existing Runway 14/32 length of 10,302 feet.

Runway 14 ROFA Alternatives Analysis

Option A is the least expensive to implement (likely only requiring signage on the airfield perimeter roadway warning vehicles they are entering a ROFA and to be cautious within the area). Options B, C, and D improve the safety of the airfield environment at LMT by providing a standard Runway 14 ROFA length. Option B provides a standard ROFA length, but the use of declared distances might cause pilot confusion by having different runway lengths available to satisfy different aircraft performance requirements. Option B also requires some reconfiguration of runway edge and end lights near the Runway 14 end and the relocation of the distance -o-go signs. Option C reduces the Runway 14/32 length to 10,016 feet, which is insufficient to accommodate the future critical aircraft (DC-10-30). Options C and D are expensive alternatives involving road relocations, possible drainage ditch impacts, taxiway relocations, EOR Pad impacts, runway, taxiway, and threshold light relocations, signage relocation, and marking relocations.

Runway 14 ROFA Preferred Alternative

Option A is selected by the City and local stakeholders as the preferred short-term alternative, with Option D as the selected long-term alternative. Seeking and receiving an MOS in the short-term is more likely when large narrow body transport aircraft that have wingspans less than 118 feet (ADG III) are the critical aircraft. When heavy transport aircraft with wingspans greater than 118 feet (ADG IV) have sufficient operations to be the critical aircraft, then a long-term alternative of relocating the roads and fence is more likely to be the preferred option from the FAA.

Table 4-1 : Summary Evaluation of Runway 14 ROFA Alternatives

Summary Evaluation of Runway 14 ROFA Options				
Screening Criteria	Option A - Modification of Standards	Option B - Declared Distances	Option C - Shorten Runway	Option D - Relocate Roads and Fence
Operational Efficiency				
Runway 32 Length				
TORA	10,302'	10,302'	10,016'	10,302'
TODA	10,302'	10,302'	10,016'	10,302'
ASDA	10,302'	10,016'	10,016'	10,302'
LDA	10,302'	10,016'	10,016'	10,302'
Disruption of Airfield Operations	Low	Low	High	Medium
Relocation of Airfield Lighting	Low	Medium	High	Low
Taxiway Impacts	Low	Low	High	Low
EOR Impacts	Low	Low	High	Low
Environmental Consideration				
Drainage Ditch/Wetlands	No	No	No	Yes
Milkvetch	No	No	No	No
Farmland	No	No	No	Yes
Land Use Consideration				
Brett Way	No Relocation	No Relocation	No Relocation	Relocation
Perimeter Road	No Relocation	No Relocation	No Relocation	Relocation
Implementation				
Construction Difficulty (High, Medium, Low)	Low	Low	High	High
Financial	Low	Low	High	High
Phasing Complexity	Low	Low	High	Medium
Implementation Factors (EA and Permitting)	Low	Low	Medium	High
FAA Acceptance	Low	Low	Medium	High
ALTERNATIVE EVALUATION				
Airport Ranking				
Meets Facility Requirements or Low Potential Impact				
Temporarily Does Not Meet Facility Requirements or Medium Potential Impact				
Does Not Meet Facility Requirements or High Potential Impact				

Source: Mead & Hunt, Inc. 2020

RUNWAY 7/25 IMPROVEMENTS

Chapter 3, *Facilities Requirements*, recommends a reduction in the length and width of the crosswind runway. The runway length analysis indicates that a minimum runway length of 5,000 feet is needed to meet the critical aircraft takeoff distance requirements for the King Air Series (King Air 300/1900). A runway width of 75 feet is recommended to meet FAA RDC B-II design standards.

The recommended runway layout provides a 5,000-foot length with no displaced thresholds. The Runway 7 end remains in its existing location and the Runway 25 end is relocated 245 feet west of its current position. The future Runway 25 end is located to provide the FAA-required RDC B-II Runway Safety Area (RSA) and Runway Object Free Area (ROFA) lengths as well as provide vertical clearance over the perimeter road and other nearby objects. The existing pavement west of the Runway 7 end will continue to be maintained as a blast pad to provide additional safety margin for civilian turbine-powered aircraft. The existing pavement east of the future Runway 25 end will be maintained as a blast pad.

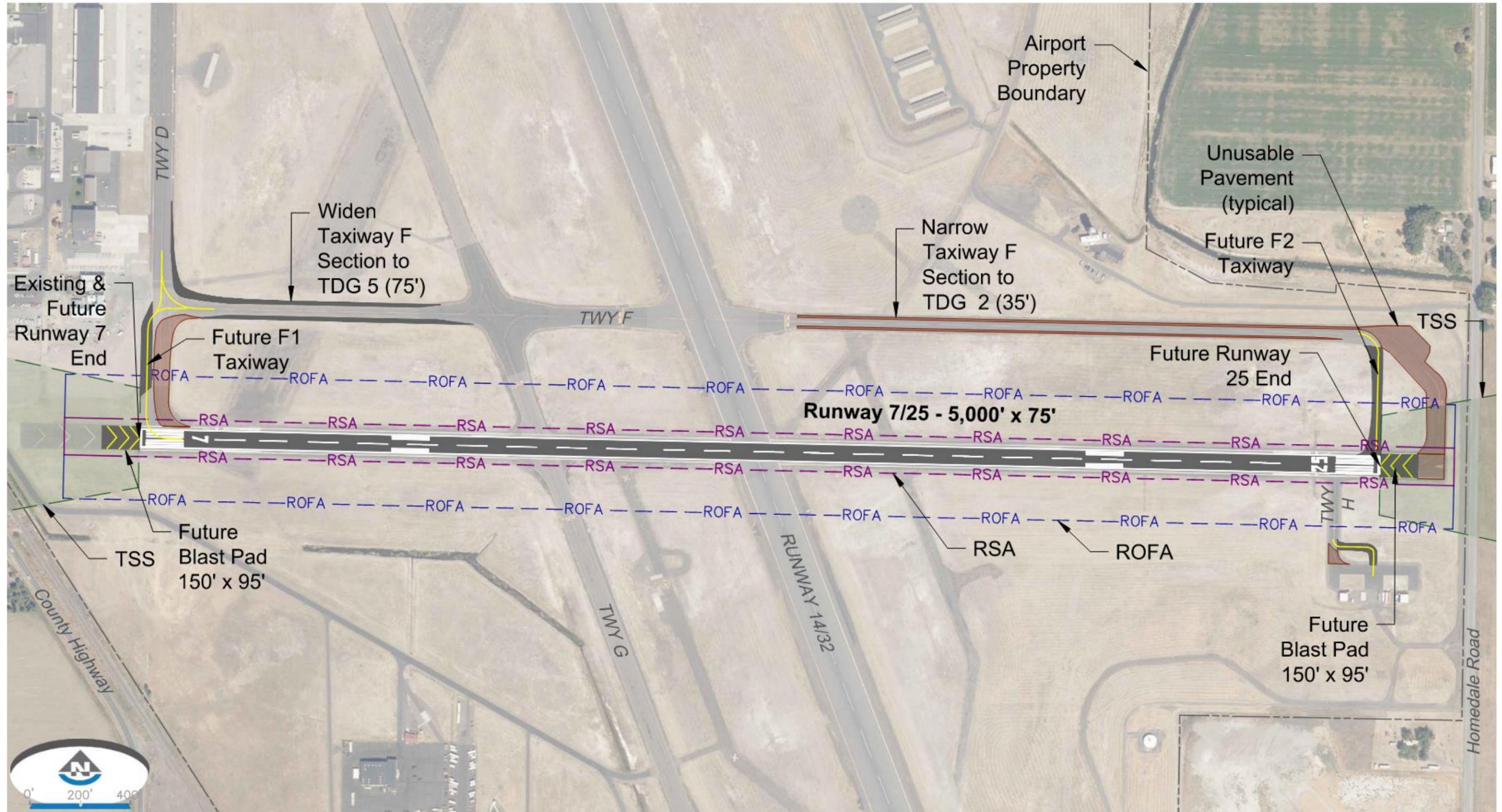
Figure 4-3 shows the new runway configuration and the associated taxiway improvements to align the entrance taxiways with the new runway ends. Changes to the taxiway design are discussed in the Taxiway System section of this chapter.

Additional Runway 7/25 improvements include:

- ▶ Runway 7/25 length: 5,000 Feet
- ▶ Runway 7/25 width: 75 Feet
- ▶ Runway 7/25 Pavement Strength: 50,000 pounds DWG
- ▶ Runway Shoulders: 10 Feet Stabilized Per Side
- ▶ Runway 7 and 25 Blast Pads: 150 Feet Long and 95 Feet Wide
- ▶ Runway 7 Lighting Aids: Precision Approach Path Indicator (PAPI) and Runway End Identifier Lights (REIL)
- ▶ Runway Holding Positions: 200 Feet (from runway centerline; elevation adjustment not required)
- ▶ Runway Numbering: Runway 8 and 26 (change due to magnetic variation)
- ▶ Runway Marking: Visual (install markings to aid pilot and ATC awareness).

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Figure 4-3 : Runway 7/25 Preferred Alternative



Source: Mead & Hunt, Inc. 2020

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TAXIWAY SYSTEM

The following section documents facility requirements for the taxiway system, including planned taxiway improvements based on forecast user demand, critical aircraft, and FAA design standards. The taxiway system is used to provide aircraft circulation between the runway and terminal area facilities. The portion of Taxiway D between the intersections of Taxiway E and Taxiway F is restricted to military use only and has been marked as a non-movement area taxilane adjacent to the military apron. To comply with FAA grant assurances, the Oregon ANG reimbursed the Airport and the FAA for grant funds previously used to maintain that section of Taxiway D.

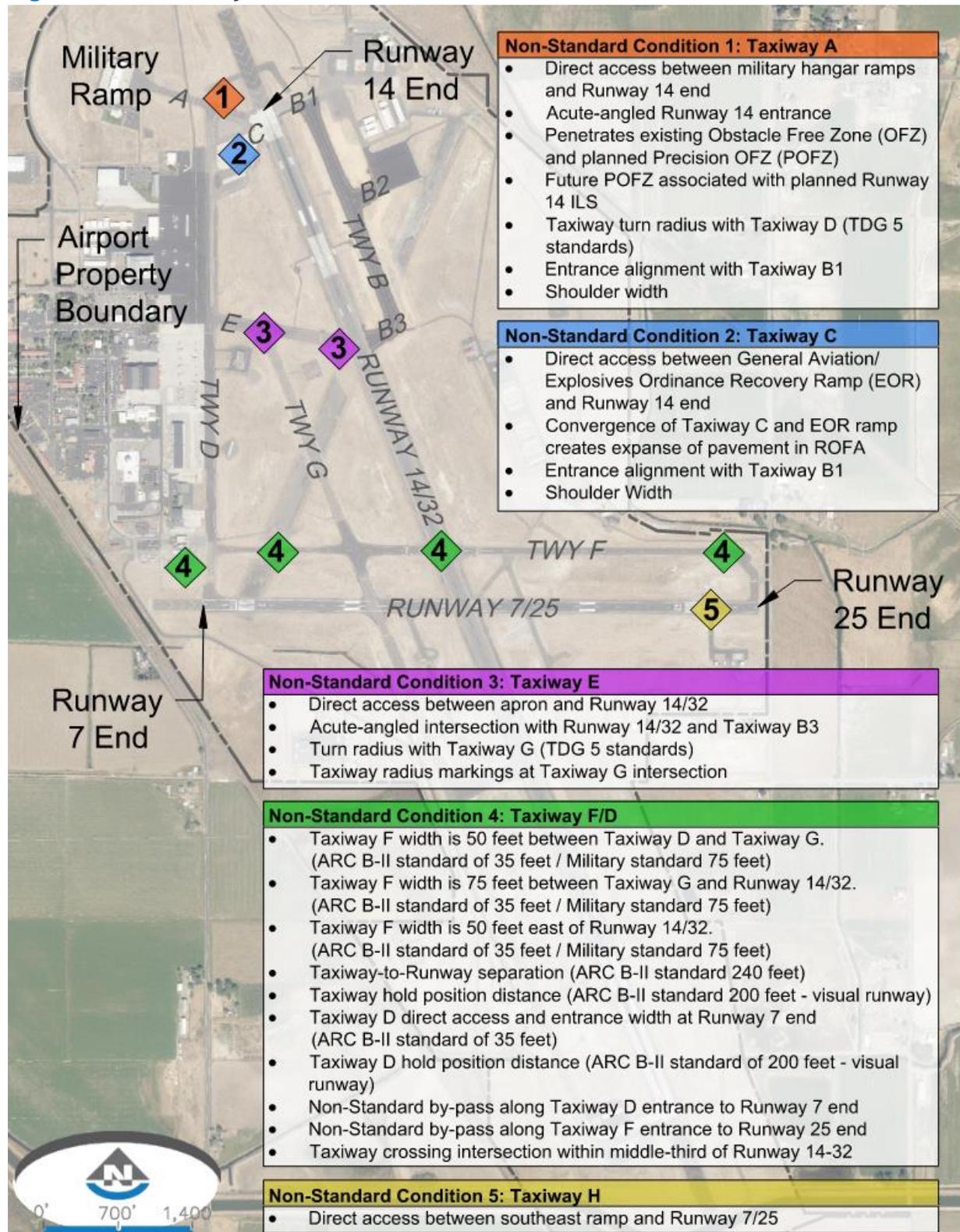
TAXIWAY DESIGN STANDARDS

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

- ▶ Runway 14/32 Taxiway System (DC-10-30 Critical Aircraft): **ADG IV, TDG 5**
- ▶ Runway 7/25 Taxiway System (King Air 300/1900D Critical Aircraft): **ADG II, TDG 2**

Figure 4-4 summarizes the areas of taxiway design noncompliance. The subsequent sections identify the improvements needed to address noncompliant design. Taxiway alternatives are provided where prudent.

Figure 4-4 : Taxiway Nonstandard Conditions



Source: Mead & Hunt, Inc. 2020

TAXIWAY IMPROVEMENTS

Recommended improvements to the taxiway system to address nonstandard conditions are described below and depicted in **Figure 4-5**. Alternatives are presented where prudent.

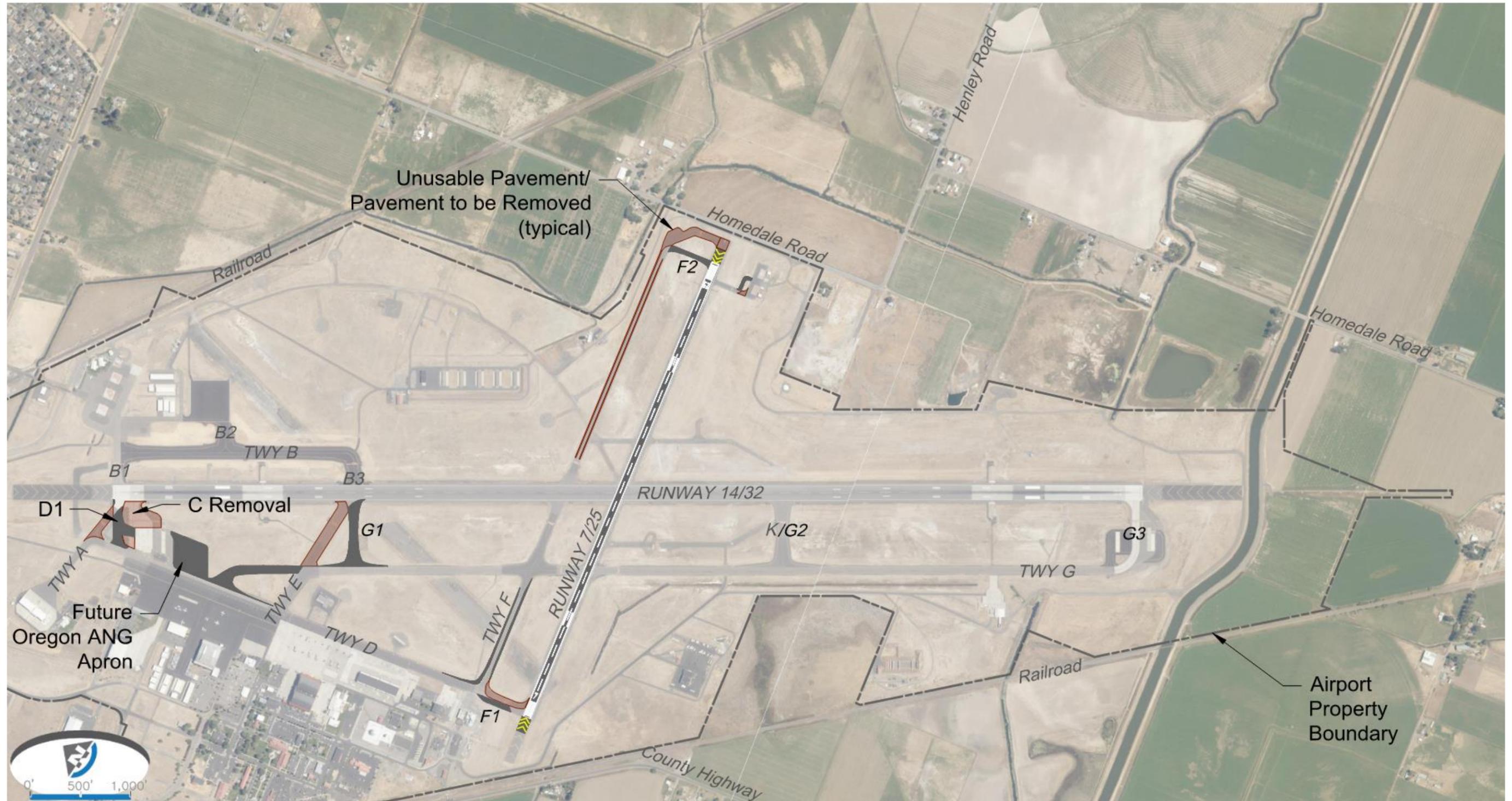
Taxiway A, C and New D1 Connector

A realignment of the taxiway connectors at the Runway 14 threshold is necessary to resolve nonstandard conditions for direct access from an apron, angled intersection with Runway 14/32, insufficient TDG 5 fillet radius, and insufficient separation for civilian aircraft from military aircraft in the Oregon ANG Explosives Ordinance Recovery (EOR) arming/de-arming positions.

Figure 4-6 shows the proposed taxiway realignment that closes Taxiway C and a portion of Taxiway A and provides a new perpendicular Taxiway D1 connector meeting TDG 5 design standards. The runway holding position line will be set 291 feet (elevation adjusted) from the Runway 14/32 centerline. To provide Oregon ANG aircraft on the EOR access to the Runway 14 threshold, a redesign of the EOR parking positions will be necessary. The EOR design concepts are discussed in the Oregon ANG Support Facilities section below.

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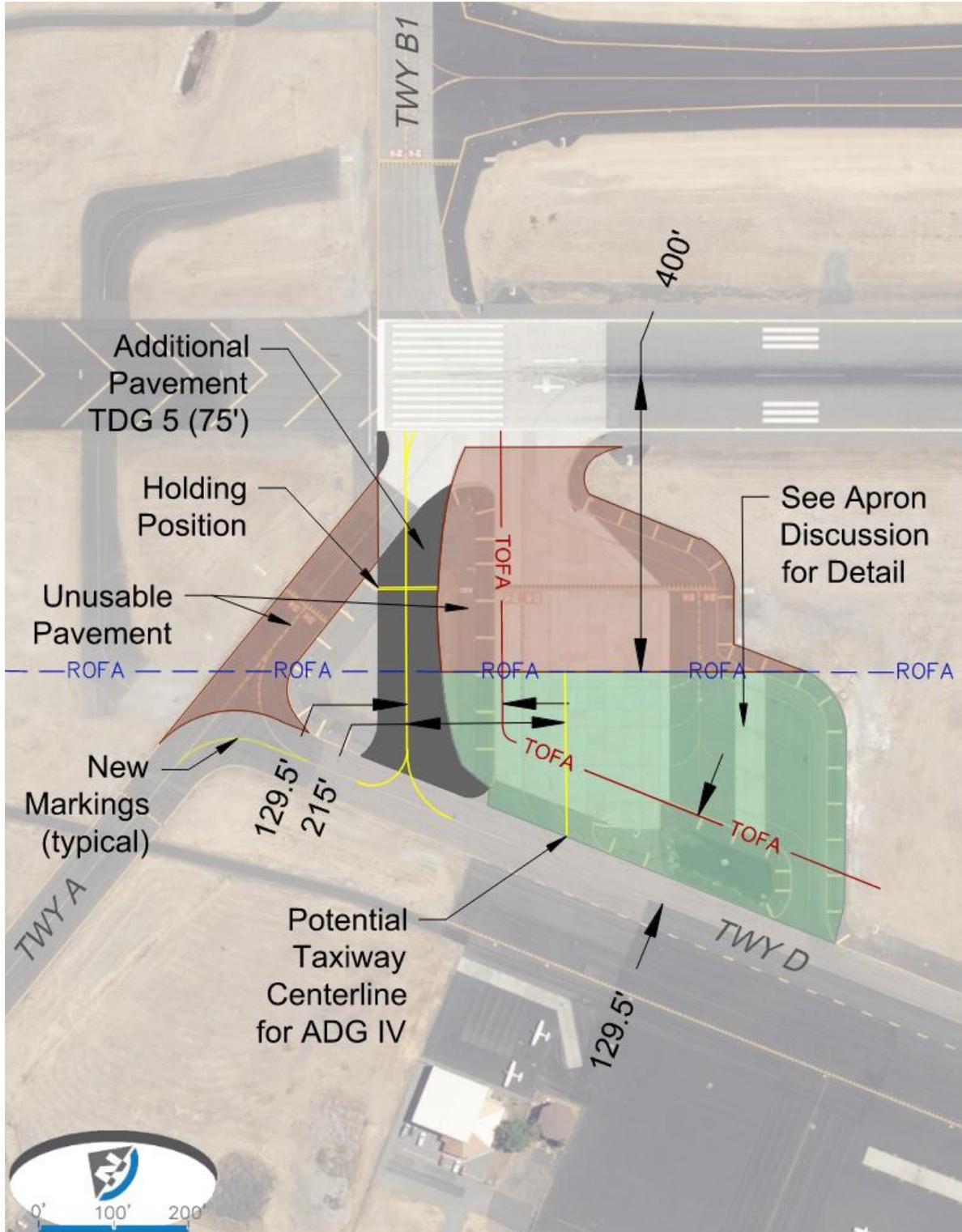
Figure 4-5 : Preferred Alternatives Taxiway Layout



Source: Mead & Hunt, Inc. 2020

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Figure 4-6 : Taxiway A & C Alternative



Source: Mead & Hunt, Inc. 2020

Taxiway E Alternatives and New G1 Connector

A realignment of Taxiway E is necessary to resolve nonstandard conditions for direct access from an apron, angled intersection with Runway 14/32, and insufficient TDG 5 pavement radius to turn onto Taxiway G. A portion of Taxiway E between Runway 14/32 and Taxiway G would be realigned to provide a perpendicular intersection with the runway. Two Taxiway E realignment alternatives are provided. **Table 4-2** summarizes the factors involved with the two Taxiway E alternatives and **Figure 4-7** presents the two realignment options.

Option A: Taxiway E (Taxiway B3 Intersection)

A new perpendicular Taxiway E connector would be aligned with the existing Taxiway B3 connector located east of Runway 14/32. This option minimizes taxiing times for aircraft from the eastside general aviation and US Forest Service aprons (northeast apron) that need to access Runway 32 for takeoffs.

Option B: Taxiway E (Taxiway G Intersection)

A new perpendicular Taxiway E connector would be aligned at the existing Taxiway G intersection. The new Taxiway E connector would be north of the Taxiway B3 and Runway 14/32 intersection and would force aircraft taxiing from the northeast apron onto the runway or to use Taxiway B1 to cross the Runway 14 threshold in order to access Runway 32 for takeoffs.

Taxiway E Alternatives Analysis

Both options locate the new Taxiway E connector outside the middle third of the runway where high-energy operations occur, thereby mitigating the risks associated with potential runway incursions. Option A provides direct access via Taxiway B3 to Taxiway G and the Runway 32 end, which reduces taxiing distances. Option A also helps to reduce traffic congestion at the Runway 14 end, which increases operational efficiencies. Option B forces aircraft to either back taxi on the runway to connect to Taxiway B3 or to cross at the Runway 14 end; neither of which improves safety or operational efficiencies.

Taxiway E Preferred Alternative

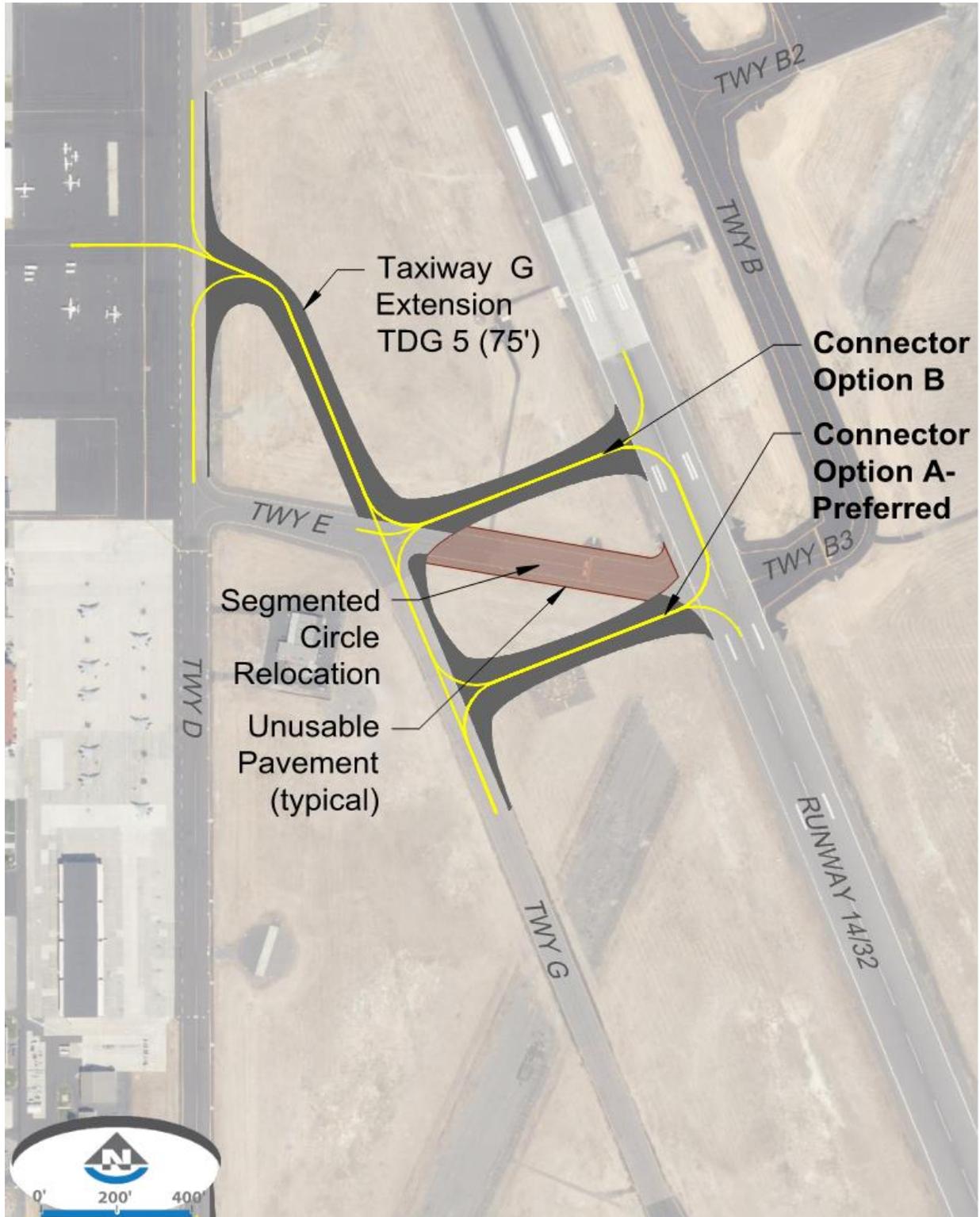
Option A is selected by the City, FAA, and local stakeholders as the preferred alternative. Aligning the new perpendicular taxiway connector (Taxiway G1) with the existing Taxiway B3 intersection provides direct access from the northeast apron to Taxiway G and reduces congestion at the Runway 14 end. The runway holding position line for the Taxiway G1 connector will be set 291 feet (elevation adjusted) from the Runway 14/32 centerline.

Table 4-2 : Summary Evaluation of Taxiway E Alternatives

Summary Evaluation of Taxiway E Alternatives		
Screening Criteria	Option A (Twy B3 Intersection)	Option B (Twy G Intersection)
Operational Efficiency		
Airfield Operability & Access	Improved	Yes, With Longer Taxi Times
Reduces Runway Crossings	No	Yes
Provides Alternate Taxi Routes	Yes	Yes - Longer
Reduces Aircraft Taxi Times	Yes	No
Increases Potential for Development	No	No
Expansion Capabilities	No	No
AC 150/5300-13A Deficiencies	Corrected	Corrected
Segmented Circle Relocation	Yes	No
Complies with Design Standards	Yes	Yes
Runway Crossing within High-Energy Zone	No	No
Environmental Considerations		
Impacts to Airport Property Use	None	None
Aviation Compatible Use	Yes	Yes
Critical Habitat/Endangered Species	No	No
Wetlands/Waterways Impacted	No	No
Impervious Surfaces	Increase	Increase
Land Use Considerations		
Property Acquisitions / Easements	None	None
Implementation		
Construction Difficulty (High, Medium, Low)	Low	Low
Phasing Complexity	Low	Low
Implementation Factors (EA, Permitting, Land Acquisition)	Temporary Closures	Temporary Closures
ALTERNATIVE EVALUATION		
Airport Ranking	1	2
DETERMINATION	Advance	Not advanced
Meets Facility Requirements		
Temporarily Does Not Meet Facility Requirements		
Does Not Meet Facility Requirements		

Source: Mead & Hunt, Inc. 2020

Figure 4-7 : Taxiway E Alternatives



Source: Mead & Hunt, Inc. 2019

Taxiway G Extension

Taxiway G is not a full-length parallel taxiway. Extending Taxiway G to the north, however, would provide another connection to the apron edge taxiway (Taxiway D) that fronts the westside terminal and general aviation apron. This new Taxiway G connection would provide an alternate route to Taxiway E, which is heavily used by the Oregon ANG aircraft fleet and would help mitigate potential conflicts between civilian and military aircraft operations (see **Table 4-2** .

As discussed above, a new Taxiway G1 connector is proposed to replace the Taxiway E segment between Taxiway G and Runway 14/32. To maintain consistent taxiway naming conventions, Taxiway K will be renamed as Taxiway G2 and the entrance taxiway to Runway 32 will be renamed Taxiway G3.

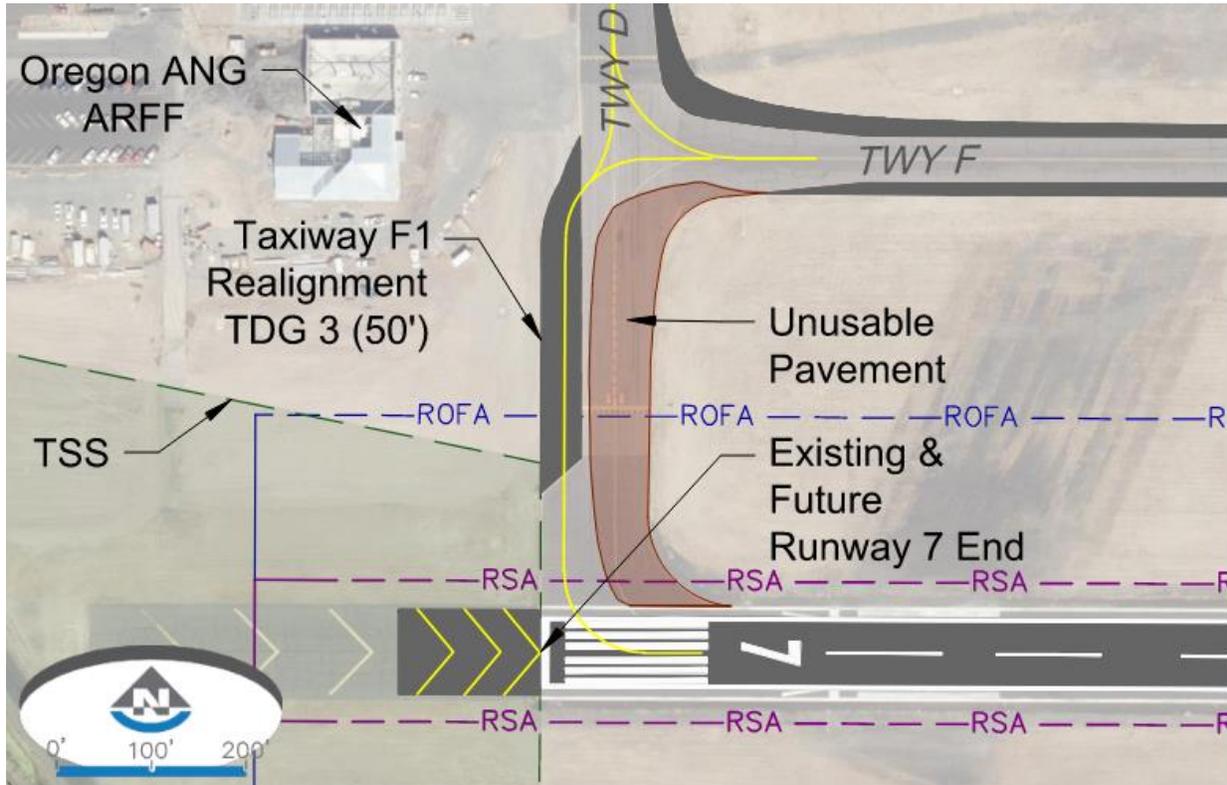
Taxiway F and New F1 and F2 Connectors

Taxiway F is the parallel taxiway serving crosswind Runway 7/25. The Runway 7/25 centerline to Taxiway F centerline separation of 525 feet exceeds the RDC B-II separation standard of 250 feet. Relocating Taxiway F closer to Runway 7/25 to meet the B-II separation standard would involve substantial reconstruction, impact taxiway connections, and potentially impact areas with endangered species of Milkvetch (requiring additional environmental reviews and mitigation efforts). A relocated Taxiway F also would not mitigate the runway incursion hazard of a runway crossing in the middle third of Runway 14/32 where high-energy impacts are most likely to occur. Therefore, to simplify the construction effort and mitigate impacts to sensitive areas, this alternative retains the existing separation distance. Other Taxiway F improvements include:

- ▶ The existing Taxiway F segment between Taxiway D and Runway 14/32 will be increased from 50 feet to 75 feet to accommodate the military standard for regular use by F-15s.
- ▶ The Taxiway F segment east of Runway 14/32 will be reduced from 50 feet to 35 feet to meet TDG 2 standards.
- ▶ Taxiway D at the Runway 7 threshold is reconfigured to provide a new Taxiway F1 connector properly aligned with the Runway 7 end. The new Taxiway F1 connector would normally be a TDG 2 standard width of 35 feet. However, when there is taxiway construction at the Taxiway G and Taxiway F intersection, the Oregon ANG F-15s will require an alternate route to taxi to reach Runway 32. Runway 7 can be used as an alternate connector to Taxiway G during the closure. Taxiway F1 will retain a TDG 3 pavement width of 50 feet to permit occasional F-15 access during construction periods. Runway holding positions would be marked 200 feet from the Runway 7/25 centerline. The nonstandard runup bypass area would be eliminated.
- ▶ Taxiway F2 connector would be relocated to align with the new Runway 25 end. Runway holding positions would be marked 200 feet from the Runway 7/25 centerline. The nonstandard runup bypass area would be eliminated.

Figures 4-8 and 4-9 present the preferred Taxiway F layout and modifications.

Figure 4-8 : Taxiways F and F1 Design

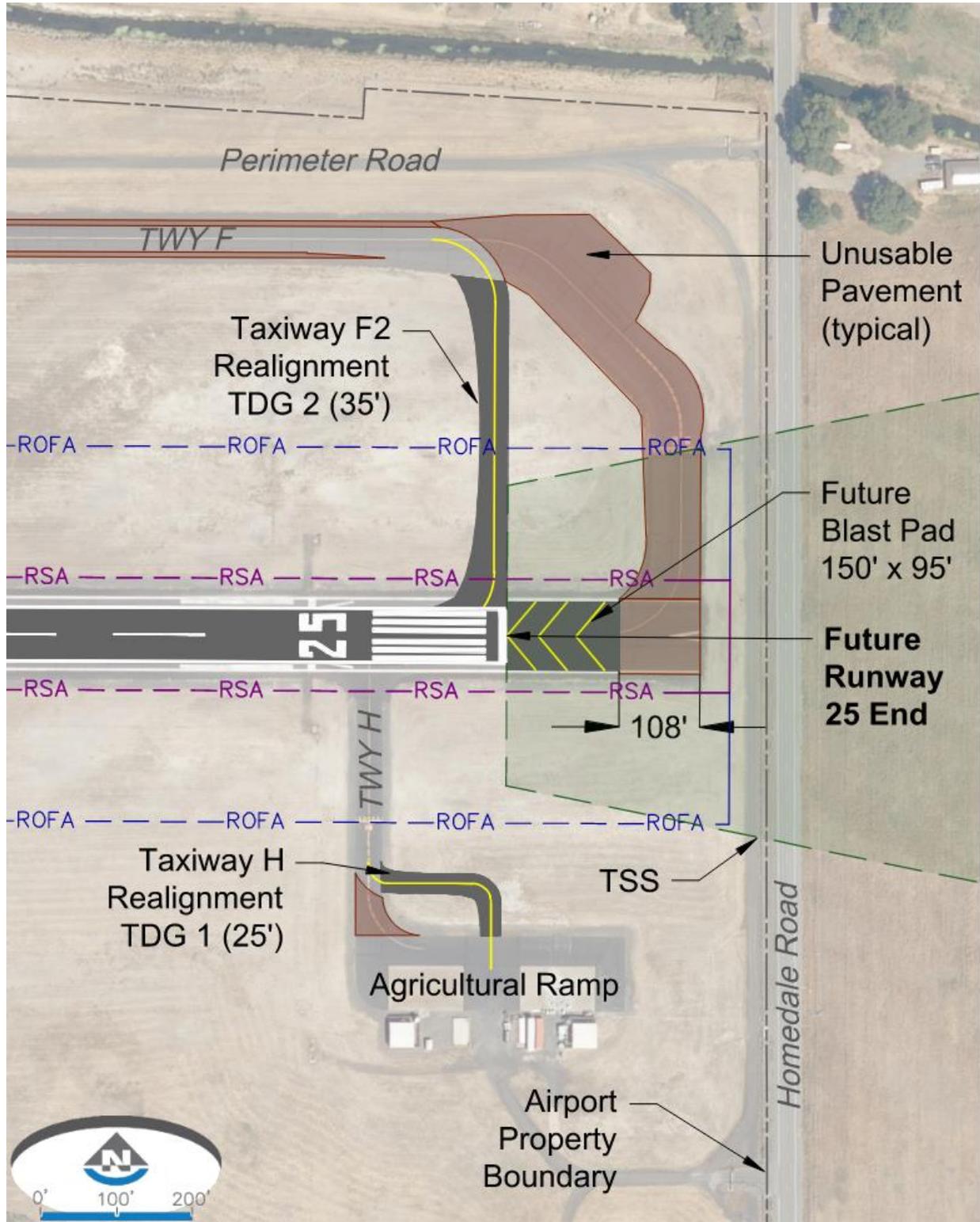


Source: Mead & Hunt, Inc. 2020

Taxiway H

Currently, Taxiway H has direct access from the Agricultural Spray apron to Runway 7/25. A realignment of Taxiway H is needed to mitigate pilot confusion and minimize runway incursions. **Figure 4-9** provides details of the recommended Taxiway H connector at the Runway 25 end.

Figure 4-9 : Taxiways F, F2, and H Design



Source: Mead & Hunt, Inc. 2020

NAVIGATIONAL AIDS (NAVAIDS)

The following section outlines improvements for navigational aids at LMT based on the recommendations provided in Chapter 3, *Facility Requirements*. No changes are planned to the following existing facilities: VHF Omnidirectional Range/Tactical Aircraft Control (VORTAC), Automated Surface Observation Station (ASOS), and Airport Rotating Beacon.

RUNWAY 14 INSTRUMENT LANDING SYSTEM (ILS) ALTERNATIVES

The following section documents findings from a FAA feasibility study conducted in August 2019 and revised in January 2020 for locating an Instrument Landing System (ILS) on Runway 14. The Runway 14 ILS project was initiated by the Oregon ANG to provide instrument approach capability for F-15s landing from the north. Military procedures and policies require both primary and backup instrument systems for aircraft operations. Since F-15s are not equipped with satellite-based navigation systems such as Global Positioning System (GPS), instrument approaches based on a GPS are not eligible as a primary or backup instrument system. With the two existing Very High Frequency Omnidirectional Range Station with Distance Measuring Equipment (VOR/DME) instrument approaches to LMT candidates for cancellation, the Oregon ANG requires another non-GPS based instrument approach capability to insure continued access to Runway 14 under Instrument Flight Rules (IFR) weather conditions. The F-15s use the Ultra High Frequency (UHF) version of the civilian approaches utilizing the Tactical Air Navigation (TACAN) unit co-located with the VOR/DME. This Master Plan assumes that the Runway 14 ILS will not have visibility minimums of less than $\frac{3}{4}$ mile. An ILS system is composed of two primary antenna sites: 1) the Glideslope (GS) antenna that provides descent path guidance; and 2) the Localizer (LOC) antenna that provides course guidance down the extended runway centerline.

Glideslope Antenna Placement

A GS antenna can be located on either side of a runway, but the optimal siting is the side that offers the least possibility of signal reflection from buildings, powerlines, vehicles, aircraft, terrain, and other objects. The GS antenna must be located beyond the RSA and ROFA, which at LMT is a minimum of 250 feet and 400 feet, respectively, from the runway centerline. The GS antenna requires a smoothly graded critical area clear of objects and high growth vegetation. It also requires an equipment shelter, which is typically located near the antenna but outside the GS antenna critical area.

The FAA feasibility study identifies three possible locations for the placement of the GS antenna. **Figure 4-10** shows the location of the GS antenna and the associated critical area associated with Options A, B, and C.

Option A (East - Near)

Option A sites the GS antenna 955 feet south of the Runway 14 threshold and 262 feet east of the runway centerline. At this location, the GS antenna and equipment shelter are outside the Runway 14 RSA but is within the ROFA.

One of two large drainage ditches located on either side of the perimeter road near the US Forest Service ramp is in the north end of the GS antenna critical area. To implement Option A, the approximate 3-foot diameter culvert inside the ditch would need to be extended for the full length of the ditch, backfilled, and graded to meet GS critical area slope standards.

Option B (East - Far)

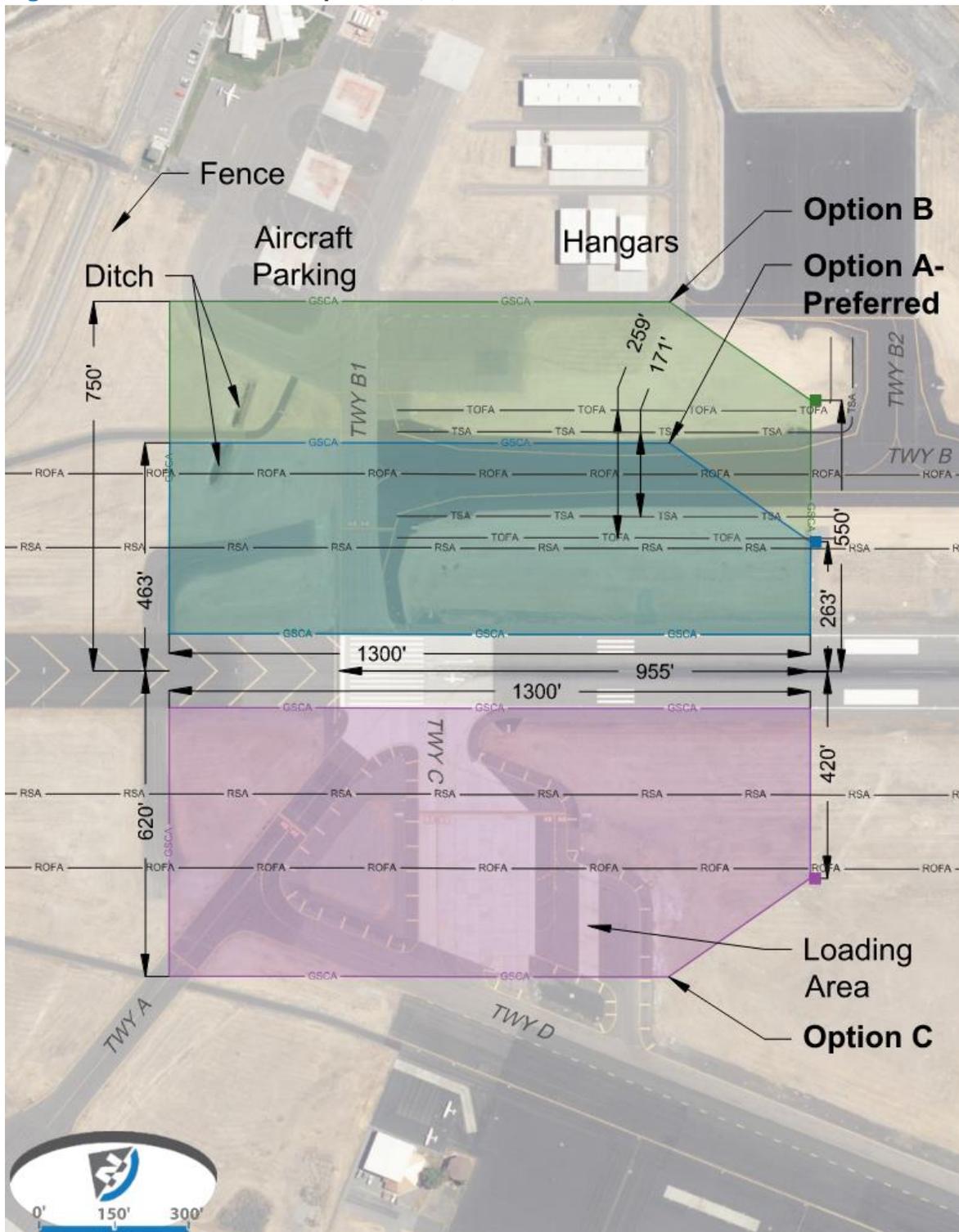
Option B sites the GS antenna 955 feet south of the Runway 14 threshold and 550 feet east of the runway centerline, between Taxiway B and the eastside apron. At this location, the GS antenna is beyond both the RSA and ROFA.

The GS antenna critical area conflicts with the US Forest Service firebase where planes park seasonally. The critical area also includes both drainage ditches near the perimeter road and US Forest Service parking apron. The LMT perimeter fence to the north, although outside the critical area, is near the GS antenna and would need to be modeled to determine signal interference. Distant terrain 5,000 feet beyond the Runway 14 end is more pronounced at the Option B location. This could be an issue for the GS antenna signal propagation and distortion. To implement Option B, the site would need to address critical area grading requirements, fence proximity, nearby buildings, existing ditches, and parked aircraft interference.

Option C (West)

Option C locates the GS antenna 955 feet south of the Runway 14 threshold and 420 feet west of the runway centerline. At this location, the GS antenna is beyond both the RSA and ROFA. The Option C GS antenna critical area encompasses the Explosive Ordnance Recovery (EOR) arming/de-arming ramp. The USAF/ANG uses this area to load and unload F-15 aircraft with munitions prior to and after training mission sorties. The EOR area has flat grading without obstacles, obstructions, fences, or open drainage ditches, which is ideal for GS antenna signal quality. However, aircraft taxiing on the adjacent taxiways or the F-15s parked on the EOR ramp would create signal interference. Therefore, use of the ILS on Runway 14 would prevent F-15s from using the EOR ramp while approaches are being conducted. Alternatively, F-15s in the critical area would preclude aircraft from using the Runway 14 ILS while arming and disarming occurs on the EOR ramp, further limiting the utilization of the ILS. DoD requirements dictate that arm/de-arm pads be located adjacent to runway thresholds.

Figure 4-10 : GS Antenna Options A, B, and C



Source: Mead & Hunt, Inc. 2020

Glide Slope Antenna Alternatives Analysis

Table 4-3 provides a summary of the factors effecting the location of the ILS GS antenna. Operational efficiency, environmental considerations, land acquisition requirements, and implementation challenges are noted.

Option A locates the GS antenna within the Runway 14/32 ROFA. Although not ideal, Table 6-1 in FAA Advisory Circular (AC) 150/5300-13A allows a GS antenna within the ROFA due to a physical constraint and should be evaluated on a case-by-case basis. Mounting the antenna on frangible connectors might be required to satisfy FAA ROFA standards. Option A also requires capping one of the large ditches near the US Forest Service apron. Compared to Option B, however, the clearing and grading needs are less extensive given the smaller size of the GS antenna critical area with Option A.

Option B presents several significant challenges. Foremost, is the potential signal degradation that would result from high terrain located about 5,000 miles to the north. If the intended benefit of reduced visibility and ceiling minimums to allow F-15 operations during IFR weather conditions cannot be met, then there is no benefit to the Runway 14 ILS project. The GS antenna critical area requirements also would reduce the utility of the US Forest Service apron. Lastly, given the size of the GS antenna critical area, substantial grading and the capping of two ditches would be needed.

Option C poses significant operational challenges for the Oregon ANG. Siting the GS antenna on the west side of Runway 14/32 would either: 1) deny use of the EOR site when aircraft are flying the Runway 14 ILS approach, or 2) deny use of the instrument approach procedure when F-15s are parked on the EOR ramp. The Runway 14 ILS is a military-initiated project intended to improve military training missions by providing non-GPS based instrument approach capabilities to Runway 14. However, if the Runway 14 ILS project jeopardizes another critical military facility (i.e., EOR site), then there is reduced benefit to installing an ILS on Runway 14. As such, Option C is deemed least desirable by the City, Oregon ANG, and local stakeholders.

Table 4-3 : Summary Evaluation of Runway I4 ILS GS Antenna Location Alternatives

Summary Evaluation of Runway 14 ILS GS Location Alternatives			
Screening Criteria	Option A - East side (Nearest)	Option B - East side (Far)	Option C - West Side
Operational Efficiency			
Antenna in ROFA	Yes - OK with Frangible Mounts	No	No
Antenna in TOFA	Yes - OK with Frangible Mounts	Yes - OK with Frangible Mounts	No
Ditch in Critical Area	Yes - OK with Capping	Yes - OK with Capping	No
Taxiway Complexity in Critical Area	Yes - Low	Yes - Medium	Yes - High
Apron/Hangar in Critical Area	No	Yes - USFS Non-Movement Area	No
OANG EOR Apron in Critical Area	No	No	Yes
EOR Interference When Aircraft Present	No	No	Yes
Critical Area Grading	Small area, Precise criteria	Large area - Moderate criteria	No
Terrain Interference with Signal	No	Yes	No
Runway 14 PAPI	Requires Relocation	Requires Relocation	No Relocation
Runway 14 MALSF to MALSR	Requires Replacement	Requires Replacement	Requires Replacement
Environmental Considerations			
Wetland/Retention Pond Displacement	Yes- For MALSR	Yes- For MALSR	Yes- For MALSR
Land Use Consideration			
Land Acquisition - Easement	Yes- For MALSR	Yes- For MALSR	Yes- For MALSR
Implementation			
FAA AIP Eligibility / Grants	No FAA Funding - OANG Project	No FAA Funding - OANG Project	No FAA Funding - OANG Project
Implementation Factors (EA, Permitting, Land Acquisition)	Possible for MALSR	Possible for MALSR	Possible for MALSR
ALTERNATIVE EVALUATION			
Airport Ranking	1	2	3
DETERMINATION	Preferred Alternative	Not advanced	Not advanced
Meets Facility Requirements			
Temporarily Does Not Meet Facility Requirements			
Does Not Meet Facility Requirements			

Source: Mead & Hunt, Inc. 2020

Glide Slope Antenna Preferred Alternative

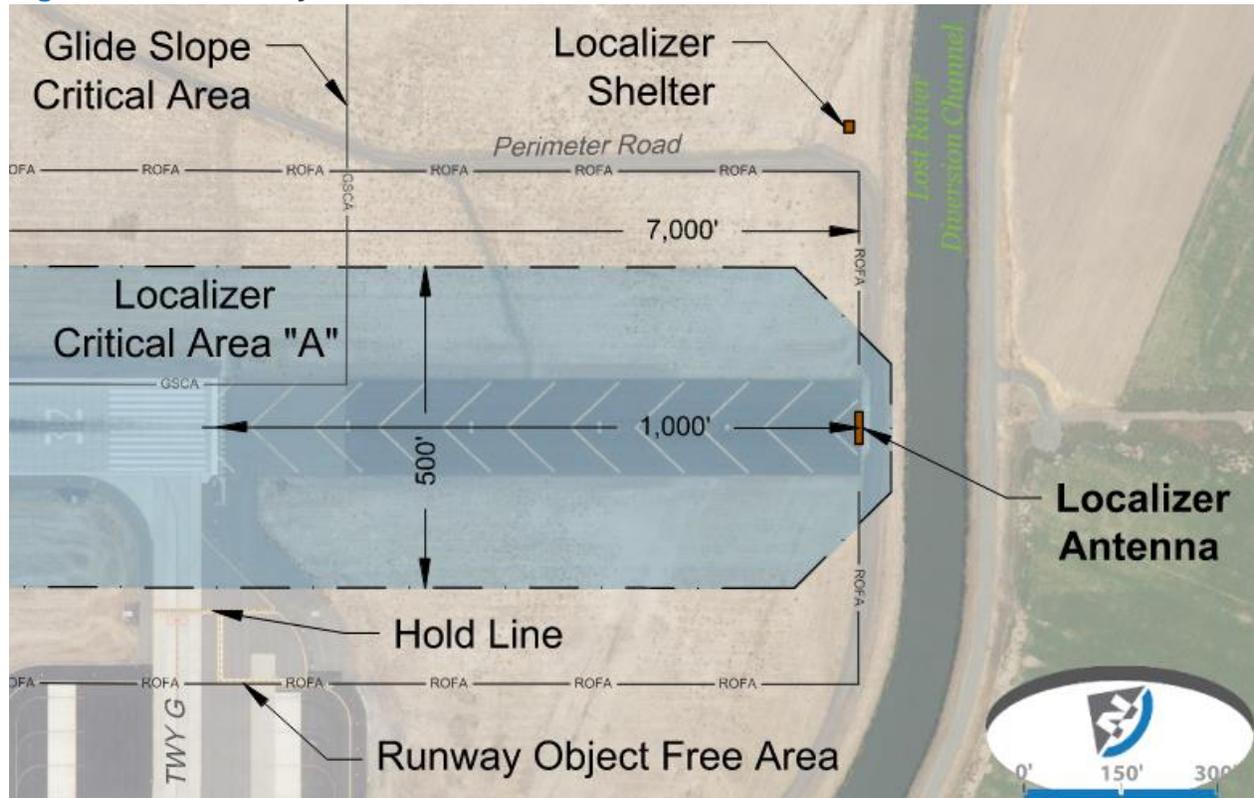
Based on the assessment described above, Option A is the preferred location for the GS antenna as it has the fewest impacts on or interference with existing facilities. It also has the lowest impact to aircraft operations on Taxiway B, the US Forest Service ramp, and the Oregon ANG EOR ramp.

Localizer Antenna Placement

The ideal siting location for the LOC is along the extended runway centerline beyond the RSA and ROFA. According to the ILS feasibility study, the proposed location for the LOC antenna is 1,000 feet south of the Runway 32 end at the edge of the RSA. Due to an existing ditch at this location, the LOC antenna would require a platform structure for mounting the equipment. This location would require the continued practice of ATCT personnel controlling vehicular traffic on the perimeter road into and out of the critical area. Additionally, there are three light stanchions associated with the existing Runway 32 Medium Intensity Approach Light System with Runway Alignment Indicator Lights (MALSR) currently located in this area. An approximate 20-foot relocation of the light stanchions either to the north or south might be required for proper LOC antenna function.

The LOC shelter that houses the electronics, power, and control system for the LOC antenna is 1,000-feet south of Runway 32 threshold and offset by 420 feet east of the runway centerline. This location places the LOC shelter outside of the ROFA and Runway 32 ILS GS antenna critical area. **Figure 4-11** presents the proposed LOC antenna location and the position relative to the drainage ditch.

Figure 4-11 : Runway 14 Localizer Antenna



Source: Mead & Hunt, Inc. 2020

Runway 14 Approach Light System

The existing Runway 14 Medium Intensity Approach Light System with Sequenced Flashing Lights (MALSF) is nearing its useful life span. The FAA has approved decommissioning the MALSR pending any catastrophic failures or inability to maintain and restore the light system since the flush mounted lights are no longer manufactured nor supported by manufacturers. To fully incorporate the proposed Runway 14 ILS, the MALSF would require replacement by a new MALSR light system. Due to the extended length of the MALSR relative to the MALSF, additional property north of Highway 140 would need to be acquired.

Runway 32 VASI to PAPI

Runway 32 is currently equipped with a four-box Visual Approach Slope Indicator (VASI) on the west side of the runway. It is recommended that the VASI be replaced with a Precision Approach Path Indicator (PAPI) that provides an enhanced visual glideslope reference.

LANDSIDE – AERONAUTICAL FACILITIES

The following section describes the recommended improvements to landside facilities at LMT. Landside facilities located on-airport are used to support aircraft parking and storage, on-airport businesses, and airport administration, operations, and maintenance.

LANDSIDE ALTERNATIVES COMMON ELEMENTS

After LMT staff and stakeholders reviewed Chapter 3, *Facility Requirements*, they found the facilities listed below to be sufficient for existing and forecasted demands. No changes or alternatives were evaluated for these facilities. Should demands change during the planning period, landside development can be accommodated within designated areas reserved for future growth. Project development that replaces or repurposes buildings and facilities that have reached the end of their expected service life can be completed when service demands make those changes financially feasible.

The facilities listed below are sufficient through the planning period.

- ▶ Passenger Terminal Apron
- ▶ Passenger Terminal Building Automobile Parking
- ▶ Deicing Apron Containment System
- ▶ General Aviation (GA) Automobile Parking
- ▶ US Forest Service Apron
- ▶ Agricultural Spray Facilities
- ▶ Air Traffic Control Tower
- ▶ Passenger Terminal Rental Car Facilities

Landside Facilities that do have recommended changes and will be evaluated further in this section include the following:

- ▶ Terminal Building Repurposing
- ▶ Westside Hangar and Apron Area
- ▶ Eastside Hangar and Apron Area
- ▶ Oregon ANG Support Facilities
- ▶ Airport Administration and Maintenance Facilities
- ▶ Perimeter Security Fencing and Gates enclosing entire Airport Operations Area
- ▶ Airport Entrance Road – Realignment.

TERMINAL BUILDING REPURPOSING

While there are no recommendations for changing the existing passenger terminal building's size or location, there is a possibility for repurposing the facility. While not currently being used for commercial airline service, the space could be used by private or public entities to conduct business. With access to the flight apron, the building space could be used for other flight services such as charters, aircraft leasing, or aircraft sales. Repurposing of the facility is not within the scope of this Master Plan and would be on an as needed basis. Should commercial air service resume at LMT, an evaluation is recommended for the floor plan layout to include updated Transportation Security Administration (TSA) office space and screening area needs and passenger holding areas capable of meeting expected passenger traffic needs.

GENERAL AVIATION DEVELOPMENT

General aviation development at LMT includes 116,300 square feet (4.4 acres) of general aviation/corporate hangar space and 76,300 square feet (1.8 acres) of hangar space for a full-service Fixed Base Operator (FBO) or Specialized Aviation Service Operation (SASO) providing a single service. The general aviation apron totals 781,500 square feet with 62 marked tie-down parking positions for fixed-wing aircraft.

The following section describes the layout of future general aviation development within LMT's two building areas: Westside Building Area and Eastside Building Area. The proposed layout of future development in the westside building area is shown in **Figure 4-12** and in the eastside building area in **Figure 4-13**.

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Figure 4-12 : Westside Development Options



Source: Mead & Hunt, Inc. 2020

Note: Fixed Base Operator (FBO), Flight School (FS), General Aviation (GA), Specialized Aviation Service Operation (SASO); Forecast Hangars- facilities needed to meet 20-year forecast– and Contingent Hangars as demand requirements.

Figure 4-13 : Eastside Development Options



Source: Mead & Hunt, Inc. 2020

FBO Hangar Building and Facilities

Existing FBO facilities are located immediately north of the airline terminal area and include two large commercial hangars (Buildings #4 and #8) and an aircraft parking apron. In response to user demand, the following facility improvements are planned:

- ▶ Renovate/expand FBO hangar for GA patrons (Building #4-B). The existing FBO/General Aviation terminal building space is 1,800 square feet and is attached to the FBO maintenance hangar. A larger dedicated space or structure between 3,000 and 4,500 square feet is recommended as either an attached structure to the FBO hangar or stand-alone building near the existing Flight School hangar. 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.
- ▶ Build a new, large hangar (±35,000-square-foot building) for FBO/SASO common or maintenance hangar. A site west of Building #8-A has ample space to accommodate a large 38,000-square-foot common hangar as well as a large 16,000-square-foot box hangar. Access to the site, however, is dependent upon crossing an existing leasehold for Building #8-A, as well as closing a segment of Altamont Drive. Another site on the northeast apron also provides space for a large common hangar (>35,000 square feet).
- ▶ Install 100LL Avgas self-serve fuel storage/dispensing system. A 100LL Avgas self-serve fuel storage/dispensing system can be accommodated on the main apron directly east of the existing FBO hangar. This fuel location provides convenient access to fuel services from Taxiway D, which facilitates aircraft turn times. Although this fuel location would displace existing tie-down spaces for transient aircraft and parking areas for current fuel trucks, there is sufficient space on the existing northwest apron near the existing flight school to accommodate the displaced spaces.
- ▶ Provide additional aircraft parking/tie-down area(s) on the northwest apron near the existing flight school.

General Aviation Hangars

Approximately 80 to 90 percent of LMT's based aircraft are stored in hangars with the remainder parked on the tie-down apron. 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 comprising 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. Hangars must be developed consistent with LMT Minimum Standards and City building/fire codes.

The following list identifies general hangar siting considerations:

- ▶ Hangars should be developed in a linear, modular manner. Hangar locations should be centralized or grouped by type, function, and aircraft size categories (piston, turboprop, jets, rotor) to promote efficient airfield and landside access. Hangars should be constructed along existing flight lines as much as possible to minimize costs associated with expanded paved areas, drainage, utilities, auto parking, and secured access.
- ▶ Hangar orientation should consider weather conditions and provide adequate drainage with minimal slope differential.
- ▶ Hangars must be constructed beyond the runway and taxiway safety areas, object free areas, and NAVAID critical areas. Hangars must remain beyond visibility line of sights and regulated by height to prevent encroachment of airspace surfaces.
- ▶ Hangars should be separated to meet, at a minimum, FAA taxilane object free area distances while providing enough access, maneuvering, and apron space for the expected class of aircraft.

Small Hangars (Box/T-Hangars)

All future based aircraft are anticipated to be stored in hangars. The forecasted need is for 2 to 8 additional new hangars for individual aircraft owners (total 20,000 square feet). These hangars can be accommodated in either the westside or eastside building areas with the preference based on LMT and tenant needs.

The eastside building area offers ample space to accommodate the hangar forecast needs within the existing building constraints of the US Forest Service leasehold to the north and Oregon ANG munitions buffer to the south. The new hangars would include infill development along existing taxilanes or an expansion of the building area with new taxilanes to the east.

The westside building area also provides space for small box or T-hangar development west of the existing general aviation hangar area. However, hangar expansion to the west is constrained by the following circumstances:

- ▶ Separation between the existing hangar buildings restrict use of the new hangar area to aircraft in the FAA Airplane Design Group I (ADG I, wingspan < 49 feet).
- ▶ Conversion of nonaeronautical land in the Airport Business Park and relocation of the LMT Administrative Building would be required to accommodate these new hangars.
- ▶ Closure of Fairchild Avenue would be required.
- ▶ A connecting taxilane would be needed along the current Fairchild Avenue alignment to provide alternate routes of taxi between the long rows of hangars.

Since the westside development option includes greater implementation complexities, the westside hangar expansion is shown in **Figure 4-12** as contingent development.

Also shown in **Figure 4-12** is the option to replace several existing portable hangars north of FBO building #4-A to allow construction of box or T-hangars. A site on the northeast apron is provided for the relocation and consolidation of portable hangars, if warranted.

Large Hangars (Executive/Corporate/FBO/SASO/Business Aircraft Owners)

Chapter 3, *Facility Requirements*, indicates a forecast need for 2 to 3 additional large hangars (total 61,500 square feet) for use as executive or corporate hangars or FBO/SASO common and aircraft maintenance hangars. These large hangars are intended to accommodate aircraft in ADG II (wingspan < 79 feet) and III (wingspan < 118 feet) categories. These types of hangars can be accommodated in both the westside and eastside building areas and built based on demand.

The eastside building area offers a site for a large hangar of 55,000 square feet with office space immediately east of the general aviation apron. This site offers convenient access to Runway 14/32 via Taxiway B.

On the westside building area, a site east of Building #8-A could be redeveloped to accommodate a large hangar of 11,000 square feet. Although this site requires removal of an existing T-hangar, it offers direct access to Taxiway D to facilitate use by large general aviation and corporate aircraft and space for an expanded apron for additional aircraft parking.

Additional sites for large hangars on the westside and eastside building areas are identified in **Figure 4-12** and **Figure 4-13** as contingent development.

General Aviation Apron

The general aviation apron is in the westside building area. The existing apron area is not designated by tenant user nor is it distinguished for fixed wing or helicopter aircraft types. Providing dedicated space for specific users and activities will improve operational efficiencies during peak-periods (summer). It is recommended that the taxilanes and aircraft parking spaces be developed to meet ADG II dimensional standards with a pavement strength up to 30,000 pounds for piston, turboprop, and helicopter aircraft and 60,000 to 90,000 pounds for business jets based on intended use.

Several facility improvements proposed in the terminal, FBO, and air cargo areas will displace general aviation facilities to other areas of the westside aircraft apron. Given this spatial relationship between aviation activities on the apron, the proposed improvements to the westside aircraft apron (including non-general aviation improvements) are summarized below:

- ▶ Dedicated parking space for aircraft deicing is proposed east of the terminal building and west of Taxiway D.
- ▶ Dedicated space for a 100LL Avgas fuel storage/dispensing system is proposed on the main apron in front of the FBO Building (#4-A).
- ▶ Dedicated space for air cargo users (total 5,000 square feet) is proposed east of the cargo hangar.

- ▶ Dedicated space for large aircraft parking is proposed east of the cargo hangar fronting Taxiway D.
- ▶ Dedicated space for helicopter parking is proposed at the north end of the apron fronting Taxiway D.
- ▶ 6 additional parking/tie-down spaces is proposed to meet forecasted demand.

Apron expansion is also necessary to support future hangar development. **Figure 4-12** depicts three apron expansion areas in the westside building area:

- ▶ A new aircraft parking apron is proposed north of the existing flight school and is intended to support flight training operations. A self-serve fuel facility for the flight training school would be located on the north edge of the new apron.
- ▶ If a large hangar is constructed east of Building #8-A, expanding the existing apron to provide access to the new hangar would be needed. Additional paved areas would be available for aircraft parking.
- ▶ If hangar development is proposed west of Building #8-A, a new parking apron would be required to provide hangar access.

Figure 4-13 shows apron expansion in the eastside building area to provide access to a large hangar (contingent development). The apron expansion areas are also anticipated to accommodate some of the tie-down spaces displaced by the proposed improvements to the main aircraft apron discussed above (e.g., fuel island).

Flight Training Facilities

Chapter 3, *Facility Requirements*, recommends the development of a hangar and flight training building comparable to the existing 12,000-square-foot building. Locating the second facility close to the current location was deemed important for shared purpose and common operational characteristics. The existing general aviation hangar and apron area directly to the north of the existing flight school has a dedicated location set aside for future development. A self-serve fuel facility would be on the northern edge of the apron directly north of the flight school serving the flight training facility. Development of this area is dependent upon future tenant and flight training demand as well as financial feasibility.

US FOREST SERVICE FACILITIES

The US Forest Service, with facilities located on the eastside building area, has not identified facility improvements for their leased area, buildings, aircraft parking, or support facilities. However, future changes to the US Forest Service mission at LMT may trigger facility improvements and modification to the lease area. As such, systems installations for retardant tanks and fuel storage are shown as additions to the existing general aviation aircraft parking apron. These facilities are sited to provide wingtip clearance for the DC-10-30 maneuvering on the apron.

AIRPORT ADMINISTRATION AND OPERATIONS FACILITIES

LMT Administration and Operations Building

The existing Airport Administration building is located on the corner of Airport Way and Arnold Avenue. The existing size of the airport administration building is inadequate for current uses, such as public meetings and staff office space, and it is reaching the end of its expected service life. The current Airport Operations/Maintenance facility is located on Airport Way, in the southwest corner of the passenger terminal parking lot. Operations and maintenance personnel do not have direct access to the airside, resulting in less efficient operations and slower response times to events on the airfield. The current maintenance building also does not have sufficient floorspace to house the snow removal equipment or garage door clearance to enable moving equipment in and out of the building. Exposure to the elements reduces equipment life span and increases maintenance costs. Maintenance buildings to house equipment are eligible for FAA AIP grant funding.

Chapter 3, *Facility Requirements*, recommends replacing and combining the Airport Administration building with the Airport Operations and Maintenance building to gain administrative and operational efficiencies. Two alternatives are provided that combine these Airport functions in a single 6,500-square foot Airport Operations/Maintenance Building (AOB). Between 2,500 and 3,000 square feet would be used for administration offices and meeting rooms, and the rest of the building would be used for Airport operations and maintenance. **Figure 4-12** above shows the location for AOB 1 and AOB 2 in the westside building area.

AOB Alternative Analysis

Several benefits are gained by combining the two primary airport administration and operations buildings into one facility. Staff communication, coordination, and effectiveness are improved by having all staff in the same building. Benefits for equipment maintenance and expected lifetime of service duration are improved by housing equipment indoors and out of the elements, thus reducing the need for equipment replacement or repairs. Equipment servicing and upkeep can be conducted indoors, improving staff working conditions, comfort, and efficiencies. A new facility will also have benefits of more efficient construction to improve heating, ventilation, and air conditioning (HVAC) systems that reduce the energy consumption required.

Siting the proposed AOB was based on the following criteria:

- ▶ Remaining within the primary west side GA hangar and passenger terminal area;
- ▶ Minimizing impacts to existing tenant lease spaces; and
- ▶ Not restricting existing aircraft access to hangars.

The two proposed locations meet these requirements. The primary operational need for the AOB is to have both public access to the administration side of the facility and, if possible, have direct access to the airside operations area for operations and maintenance personnel in order to improve staff efficiencies and reduce response times to events on the airfield.

AOB Option A (North)

AOB Option A is located on the west side of the FBO parking lot. This location displaces vehicle parking spaces for FBO and hangar tenants; however, the area is underutilized, and additional parking is available closer to the FBO. The location is still outside the existing airside fence, but it does not require maintenance equipment and snow removal vehicles to drive on public roads before entering the airport operations area.

To improve airside access without having to pass through a security gate, a realignment of the operations area perimeter fence is proposed. The public would have access to the building from the street side but would be prevented from accessing the aprons directly. The operations and maintenance staff would have direct access to the apron. The fence alignment would still allow fuel trucks to deliver to the nearby FBO fuel storage tanks and would provide public access to the FBO parking lot via Airport Way.

Advantages of AOB Option A include:

- ▶ Using underutilized space in the parking lot near the FBO
- ▶ Providing direct access to the airport operations area.

Disadvantages of AOB Option A include:

- ▶ Displacing some vehicle parking for FBO and hangar tenants
- ▶ Needing to realign the fence to encompass the back portion of the AOB area to enable direct access to the airport operations area by Airport personnel.

AOB Option B (South)

AOB Option B is located 200 feet to the west of the existing Operations/Maintenance facility. The site would displace underutilized passenger terminal overflow parking. The site is large enough to accommodate the airport administration offices and house the maintenance and snow removal equipment in one facility. Access to the airport operations area would be via Fairchild Avenue and through the access gate near the GA hangar area.

Advantages of Option B include:

- ▶ Using underutilized parking space in the overflow parking lot
- ▶ Not impacting any current lease holds.

Disadvantages of Option B include:

- ▶ Not improving access to airside facilities
- ▶ Eliminating parking spaces in the overflow lot used for the terminal
- ▶ Needing to realign Airport Way to accommodate the new building footprint.

AOB Preferred Alternative

After review by the City, the preferred alternative is AOB Option A because it can provide direct access to the airport operating area while providing public access to the administration offices.

Perimeter Security Fencing and Gates

Chapter 3, *Facility Requirements*, identifies that enclosing the entire Airport Operations Area (AOA) is necessary in order to comply with the 2014 Wildlife Hazard Management Plan. Perimeter fence is installed except for a section along the southern AOA, north of the Lost River Diversion Channel. Fencing standard for a general aviation airport is a 6-foot tall chain link fence with three strands of barbed wire on the top for a total height of 8 feet.

OREGON ANG SUPPORT FACILITIES

This Master Plan considers the facilities identified by the Oregon ANG to meet future mission needs. The runway concepts discussed below considers FAA design standards as well as military standards defined in the US Department of Defense (DoD) Unified Facilities Criteria (UFC) and Air National Guard Handbook (ANGH) for shared-use facilities. Since the Oregon ANG projects are not eligible under the FAA AIP grant program, the funding for the projects would come from the Oregon ANG and DoD.

New Additional Runway

To amplify safety factors, military standard practices prefer having two runways capable of accommodating F-15 operations. With a single runway available at LMT for use by F-15 aircraft, any incident that closes Runway 14/32 would cause F-15s out on training sorties to divert to Rogue Valley International Airport in Medford, Oregon. Circumstances such as these create significant operational, safety, and financial burdens for the Oregon ANG.

The Oregon ANG's 2005 Installation Development Plan (IDP) includes a proposal to extend the crosswind runway 3,000 feet to the east for a total length of 8,000 feet. The proposal also includes designing the runway to meet military Class B runway standards and installing a cable arresting system at each end of Runway 7/25.

As documented in Chapter 3, *Facilities Requirements*, several significant constraints (e.g., railroads, terrain, school) preclude extension of the crosswind runway to 8,000 feet and cannot therefore be used as a secondary runway for F-15s. Several locations for an additional runway were assessed to recognize the Oregon ANG's desire to amplify safety factors, improve operational efficiencies, and augment future mission capabilities by providing an alternate runway in the event that the primary runway is closed for an emergency.

Both military and FAA design standards have been considered for the new additional runway layout. For runways serving F-15s, military standards require the runway to have a length and width of 8,000 feet and 150 feet, respectively, and include 1,000-foot long overruns at each runway end. The US Military guidance for runway classification and specifications are found in Attachment B at the end of this chapter. LMT is not designated as a joint-use facility, so, according to Department of Defense (DoD) criteria, the runway design must comply with FAA design standards.

The purpose and need for an additional runway is not based on the forecasted operational capacity of the existing runway; it is based on the Oregon ANG operational mission characteristics and gaining efficiencies for launching and recovering large numbers of aircraft in a short period during training scenarios that may be needed in the future. Such a need is not expected to occur during this Master Plan's planning period of 20 years; as such, a preferred design option is not selected. Rather, the additional runway evaluations described below were conducted to determine the space allocation requirements and to gain a general assessment of impacts to facilities and environmental resources to determine project feasibility. The ultimate layout of an additional runway will be determined by the City, Oregon ANG, and DoD at a future date. While the additional runway concepts consider FAA design standards, the project would not be funded by the FAA because LMT operations do not justify an additional runway. The Oregon ANG and DoD would be the primary funding source.

The runway concepts described below consider the design factors listed below.

Design Factors

Runway Classification

- ▶ FAA Runway Design Standard (RDC): D-III
- ▶ Military Runway Design Standard (UFC 3-260-01): Class B (8,000' x 150')

Runway Design

- ▶ Runway Dimensions: 8,000' x 150' with paved shoulders (Military Class B Aircraft)
- ▶ Paved Overrun: 1,000' beyond each runway end
- ▶ Runway Equipment: edge lighting and arresting gear installation
- ▶ Approach Capabilities: Visual
- ▶ Taxiway System: Connectors, Partial-Parallel, Full-Parallel
- ▶ Pavement Strength: ±150,000 Pounds DWG

On-Airport Site Factors

- ▶ Airport civilian and military facilities impact – both existing and planned
- ▶ Conformity with existing airfield configuration and geometry
- ▶ Military munitions proximity
- ▶ VORTAC proximity
- ▶ Air Traffic Control Tower (ATCT) proximity
- ▶ Automated Weather Observing Station (AWOS) proximity
- ▶ Airport Tenants (agricultural spray facilities)
- ▶ Irrigation Ditches
- ▶ Environmental Factors (noise, impact on residential land, wetlands, Applegate's Milkvetch).

Off-Airport Site Factors

- ▶ Public Roadway (realignment and/or closure)
- ▶ Air Traffic and Airspace Pattern
- ▶ Land Uses (residential, farm and business acquisition and/or relocation)
- ▶ Utilities (relocation)
 - Electrical Transmission Lines
 - Sewer Systems
- ▶ Drainage/Irrigation Ditches
- ▶ Wetlands
- ▶ Land Use Compatibility:
 - Military standards (UFC/ANGH guidance)
 - Civilian standards (FAA guidance)
 - City/County Ordinances (Height, Safety Zones, Noise)
- ▶ Environmental and Permitting
- ▶ Funding of Site Development and Airfield Infrastructure
- ▶ Constructability

Additional Runway Concepts

Several locations for an additional runway were considered by the City, County, Oregon ANG, and FAA. As indicated in Chapter 3, *Facility Requirements*, a parallel runway on the east side of primary Runway 14/32 is recommended. **Figure 4-14** shows three parallel runway configurations for Runway 14L/32R that are 8,000 feet long and 150 feet wide with 1,000-foot long overruns at each runway end.

The three parallel runway configurations considered include:

- ▶ Option A (1,000-Foot Separation)
- ▶ Option B (2,075-Foot Separation)
- ▶ Option C (2,500-Foot Separation)

Table 4-1 summarizes the factors considered in reviewing the three additional runway concepts. The factors are grouped by operational efficiencies, environmental considerations, land use considerations, and implementation feasibility. The color coding (green, orange, red) indicates the level of effort required to satisfy facility requirements.

The purpose and need for an additional runway is not based on the forecasted operational capacity of the existing runway; it is based on the Oregon ANG operational mission characteristics and gaining efficiencies for launching and recovering large numbers of fighter aircraft in a short period during training scenarios that may be needed in the future. Such a need is expected to occur beyond the current planning period of 20 years. The additional runway evaluations were conducted to determine the space required and to gain a general assessment of impacts to facilities and environmental resources to determine project feasibility. While the additional runway concepts considered FAA design standards, the project would not be funded by the FAA because LMT operations do not justify an additional runway. The Oregon ANG and DoD would be the primary funding source.

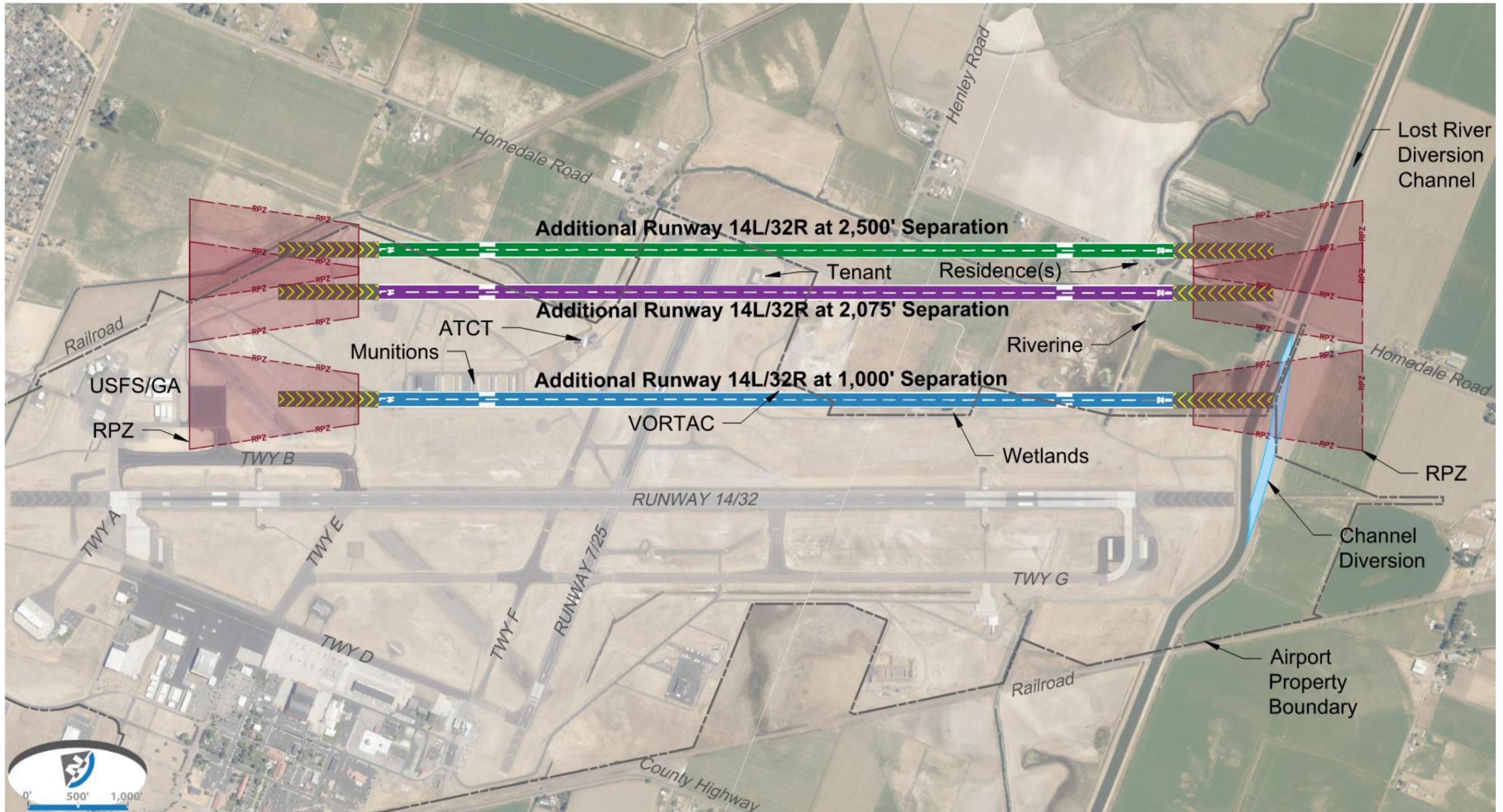
Table 4-4 : Summary Evaluation of Additional Runway Concepts

Summary Evaluation of Additional Runway Options			
Screening Criteria	Option A - 1,000' Offset	Option B - 2,075' Offset	Option C - 2,500' Offset
Operational Efficiency			
Runway length 8,000' x 150' Military Class B Standard	8,000' x 150'	8,000' x 150'	8,000' x 150'
Runway Overrun	1,000' Each End	1,000' Each End	1,000' Each End
RPZ Easement / Property Acquisition	Yes	Yes	Yes
VOR-TAC	Relocation Required	Relocation Required	Relocation Required
Runway 25 PAPI	Relocation Required	Relocation Required	No Disruption
Munitions Storage Depot	Relocation/Displacement	Relocation/Displacement	No Relocation
AG Sparyers Hangars and Apron	No Relocation	Relocation/Displacement	Relocation/Displacement
Northwest Apron	Loss of Use within RPZ	No Relocation	No Relocation
ATCT	Relocation/Displacement	Relocation/Displacement	Relocation/Displacement
Environmental Consideration			
Wetland	Yes	Yes	Yes
Milkvetch	Yes	Yes	Not Known
Farmland	Yes	Yes	Yes
Land Use Consideration			
Homedale Road	No Relocation	Relocation/Displacement	Relocation/Displacement
Henley Road	No Relocation	Relocation/Displacement	Relocation/Displacement
Private Residence	No Relocation	Relocation/Displacement	Relocation/Displacement
Farmland	No Relocation	Relocation/Displacement	Relocation/Displacement
Railroad	No Relocation	Relocation/Displacement	Relocation/Displacement
Retention Pond	Relocation/Displacement	Relocation/Displacement	No Relocation
Schools	No	No	Yes
Drainage/Irrigation	No	Yes	Yes
Lost River Diversion Channel	Yes	Yes	Yes
Implementation			
Construction Difficulty (High, Medium, Low)	Medium	High	Very High
Financial	Not AIP Eligible	Not AIP Eligible	Not AIP Eligible
Phasing Complexity	High	High	High
Implementation Factors (EA, Permitting, Land Acquisition)	Medium	High	High
Runway 7/25	Disrupted During Construction	Disrupted During Construction	Disrupted During Construction
ALTERNATIVE EVALUATION			
Airport Ranking	2	1	3
Meets Facility Requirements			
Temporarily Does Not Meet Facility Requirements			
Does Not Meet Facility Requirements			

Source: Mead & Hunt, Inc. 2020

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Figure 4-14 : Additional Runway Concepts



Source: Mead & Hunt, Inc. 2020

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Option A: Additional Runway (1,000-Foot Separation)

The 1,000-foot runway-to-runway separation reflects FAA design standards. This runway separation allows for simultaneous VFR operations only. Option A provides a partial parallel taxiway 400 feet from the runway centerline, which aligns the new parallel taxiway with the existing Taxiway B segment at the end of Runway 14.

The location and length of the runway, with paved overruns and Runway Protection Zones (RPZs), will have impacts to facilities on and off airport. Option A impacts the following existing facilities:

- ▶ The northern edge of the RPZ covers the existing US Forest Service apron adjacent to Taxiway B, which prevents future development of general aviation facilities south of the existing T-hangars in order to reserve this area for future RPZ and runway overrun.
- ▶ The Oregon ANG munitions storage depot site would require relocation.
- ▶ The existing ATCT and VORTAC would require relocation.
- ▶ The agricultural spray tenant hangars and apron would require relocation. Future apron and hangar layouts would accommodate this move.
- ▶ Existing wetlands and drainage canals would be affected.
- ▶ The Lost River Diversion channel at the south end would require realignment to accommodate the new 1,000-foot overrun/stop way.
- ▶ Land acquisition or aviation easements would be needed at the south end where the runway overrun and RPZ extend beyond Airport property lines.

Option A remains primarily on the existing Airport, but the RSA, ROFA, RPZ, and airspace considerations would have off-airport impacts to properties south of LMT. The amount of land acquisition, the number of residences displaced, and the extent of relocating railroads, roads, and waterways make this the least challenging concept to implement. However, Option A restricts the ability to expand aeronautical development near the US Forest Service and general aviation apron located northeast of Runway 14/32.

Option B: Additional Runway (2,075-Foot Separation)

The runway-to-runway separation distance of 2,075 feet reflects DoD airfield design standards for allowing a parallel taxiway between two runways. This runway separation also allows for future instrument approach capability but would not permit conducting simultaneous instrument operations to both runways. Therefore, there is no operational gain for the Oregon ANG at this separation distance.

Option B enables expansion of the US Forest Service and general aviation apron located east of Runway 14/32. In terms of off-Airport impacts, Option B involves greater displacements and more land acquisition due to the additional offset distance. The existing on- and off-Airport factors impacted by this option are listed below.

- ▶ Northern edge of the RPZ covers an area that includes a roadway, drainage canal, and railroad, which could all be considered incompatible land uses and might require displacements to be clear.
- ▶ The Oregon ANG weapons storage depot site would require relocation.
- ▶ The existing ATCT would require relocation – no alternate site has been determined.
- ▶ The existing VORTAC would require relocation to accommodate a parallel taxiway – no alternate site has been determined.
- ▶ Ag sprayer tenant hangars and apron would require relocation – additional hangar development for future GA would accommodate this relocation.
- ▶ Existing wetlands and drainage canals would be displaced.
- ▶ Waterway canal at south end would require shift to be clear of overrun/stop way and RPZ.
- ▶ A roadway bridge over canal would require relocation along with a shift in the roadway alignment.

When compared to Option A, the additional amount of land acquisition, the number of residences displaced, and the extent of relocating railroads, roads, and waterways make this option the second most challenging concept to implement.

Option C: Additional Runway (2,500-Foot Separation)

Option C provides a runway-to-runway separation of 2,500 feet based on DoD design standards for simultaneous instrument approach to one runway and instrument condition departure on the other runway. There are similar impacts to existing on- and off-airport facilities as found in Option B; however, most of the runway system would be outside the existing LMT property and would require the relocation of 10-12 residences, several roadways, and the greatest linear feet of relocation for canals. Cloud cover and visibility below VFR (1,000 feet and 3 miles) occur an average of 4.1 percent of the year based on National Oceanic and Atmospheric Administration records of weather observations at LMT. Based on that percentage, IFR conditions occur an average of 15 days a year at LMT. This option would provide minimal gain to Airport capacity and operational efficiencies.

The off-airport siting and orientation would require the greatest amount of land acquisition of all the options discussed. Option C also causes the most residences to be displaced, and the extent of relocating railroads, roads, and waterways make this option the most difficult concept to implement.

Runway 14 ILS

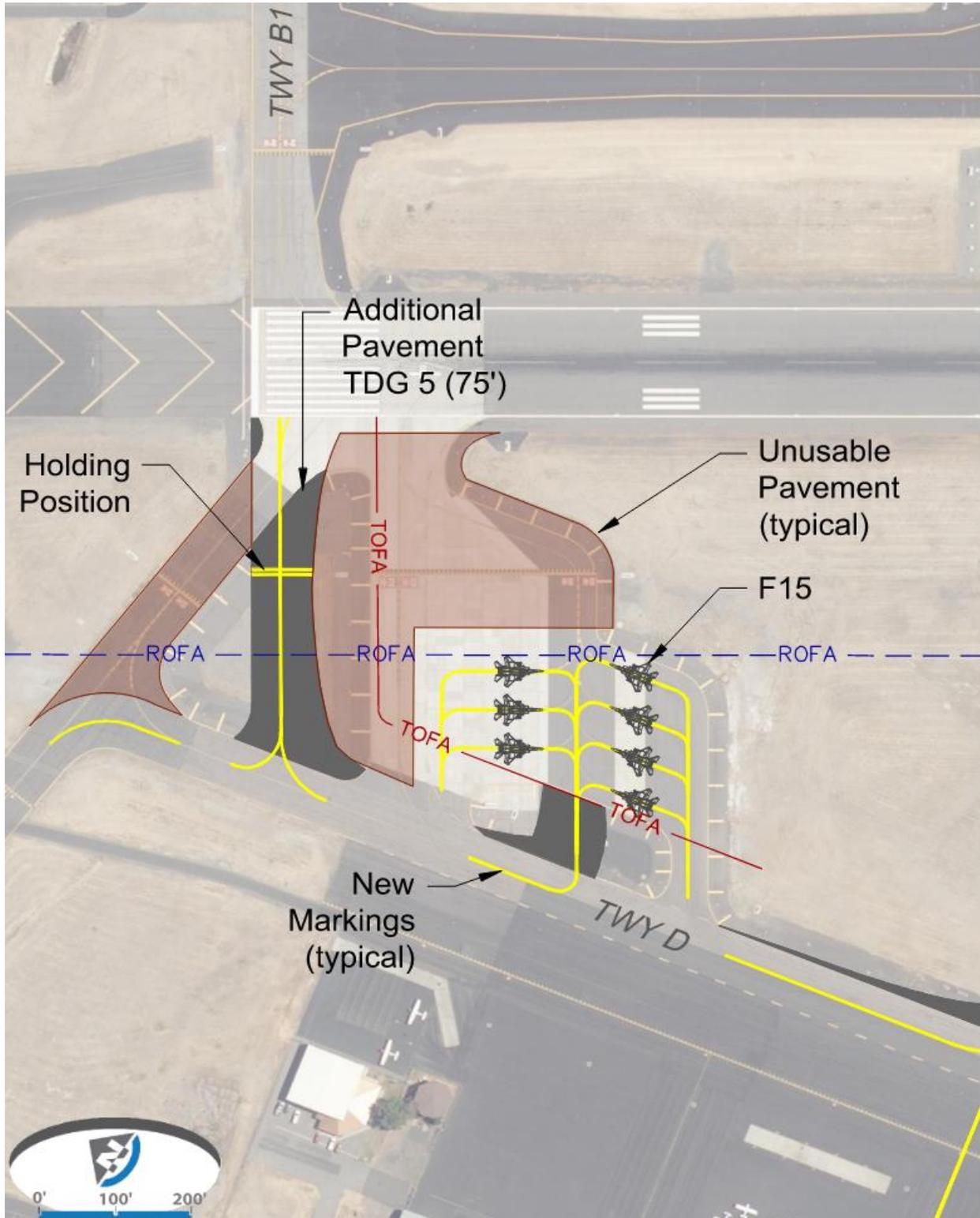
As discussed above, the Oregon ANG is proposing a new ILS system for Runway 14 to provide additional capability for operations during instrument weather conditions. It is anticipated that the ILS would be available for use by civilian aircraft, but its primary purpose is to enhance Oregon ANG instrument weather capabilities. The details of this proposal are discussed above in the instrument approach and NAVAIDS section. The ILS would not be funded by FAA as it is not required under FAA criteria.

Explosive Ordinance Recovery (EOR) Ramp Concepts

The realignment of Taxiway A and C into a single new Taxiway D1 connector to the Runway 14 threshold creates a runway access challenge for the Oregon ANG F-15s using the northern EOR ramp adjacent to Taxiway D. The existing access point to the runway from the EOR ramp does not meet taxiway separation standards. A realignment of the markings and parking spaces on the EOR ramp will be needed in order to provide direct access to Taxiway D1 to allow the F-15s to enter the runway environment. **Figures 4-15 through 4-17** show three potential layout options for the realignment of the EOR ramp. **Figure 4-17** includes a potential future expansion of the EOR ramp to include a total of 12 parking spaces and represents the preferred alternative.

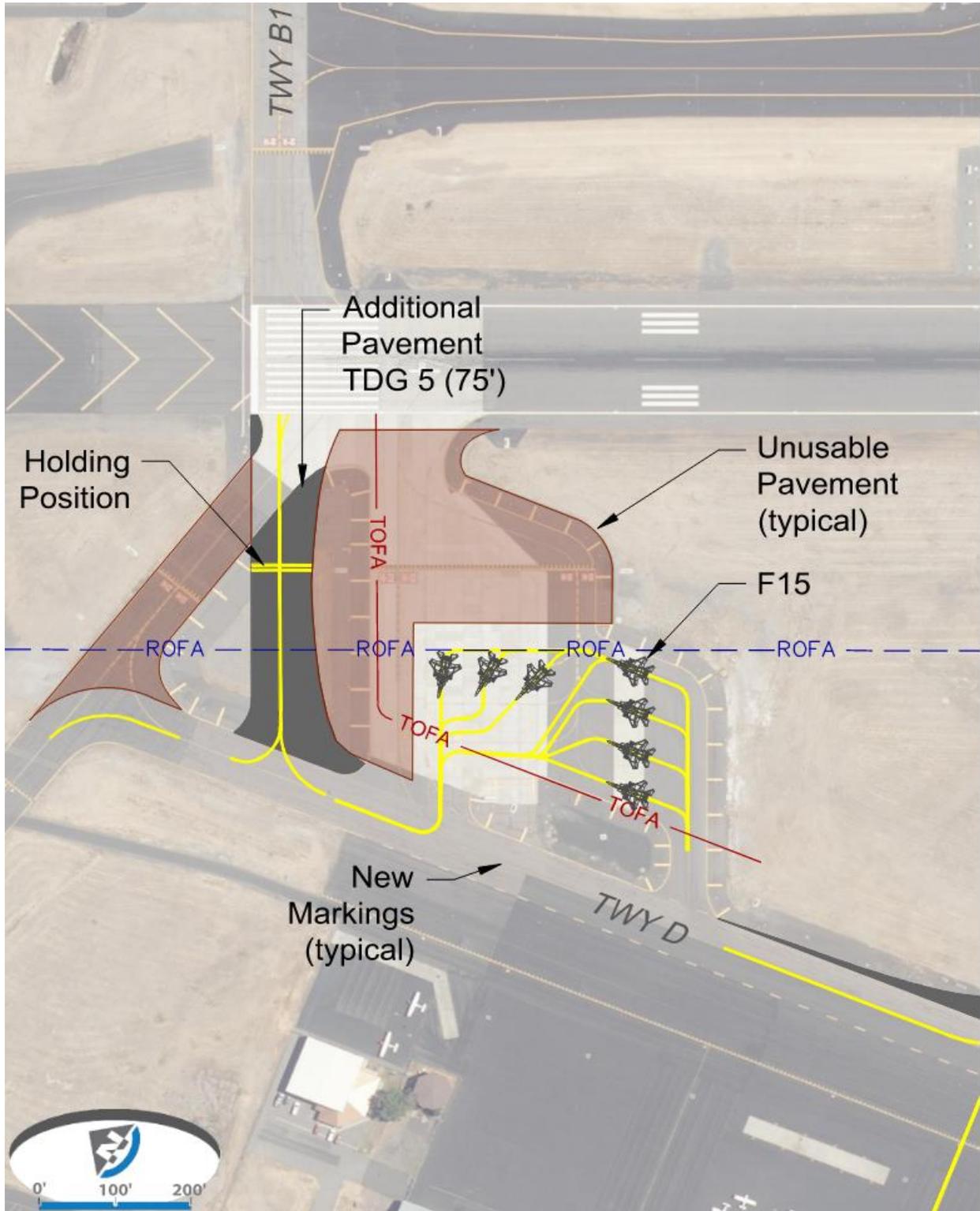
An additional challenge for the location of the EOR ramp is the proposed Runway 14 ILS system, which has an option for the siting of the GS antenna on the west side of Runway 14. Placement of the GS antenna on the westside would limit access to the EOR ramp while instrument approaches are being conducted. And likewise, F-15s parked on the EOR ramp would be inside the GS antenna critical area and would preclude other aircraft from using the Runway 14 ILS approach. In either case, locating the GS antenna on the west side has negative impacts to the operational efficiencies and capabilities of the intended Oregon ANG mission. Retaining the EOR ramp in its current location with a GS antenna on the west side would require additional coordination with the local ATCT and regional radar approach control to continue EOR operations during instrument weather conditions.

Figure 4-15 : Oregon ANG EOR Concept A



Source: Mead & Hunt, Inc. 2020

Figure 4-16 : Oregon ANG EOR Concept B



Source: Mead & Hunt, Inc. 2020

Figure 4-17 : Oregon ANG EOR Concept C (Preferred)



Source: Mead & Hunt, Inc. 2020

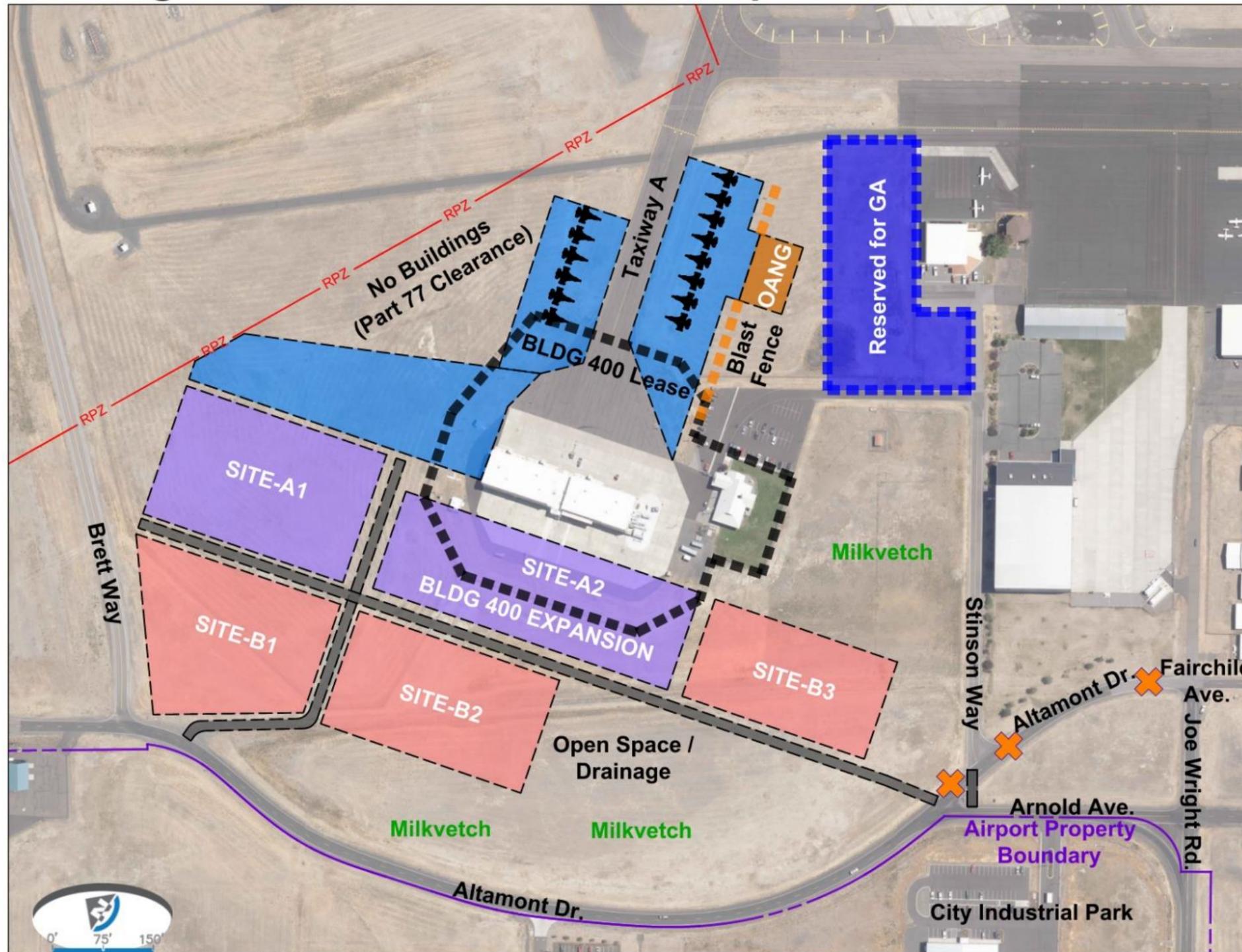
Building 400 Annex

The Building 400 Annex is located at the west end of Taxiway A, to the north of the west side GA apron and hangar area.

The areas reserved for future expansion of apron, hangars, and support facilities are shown in **Figure 4-18**. The Oregon ANG lease areas have been reserved for future use to support the expected growth in aircraft supporting the aggressor role for Oregon ANG training missions. An additional hangar and a blast fence (to protect areas to the south of the apron from jet blast) are shown on the extended parking apron. There are known Milkvetch sites in the proposed development area, so any projects will require updated Milkvetch surveys and environmental reviews before proceeding.

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Figure 4-18 : Building 400 Annex Development



Source: Mead & Hunt, Inc. 2020

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Capital Improvement Projects

Figure 4-19 identifies capital improvement projects programmed by the Oregon ANG for the next five years (2020-2025). These projects are proposed within the Oregon ANG leasehold and include the following:

- ▶ **Building 127 Addition:** Includes a 4,750 square foot addition to the current multi-use facility to house the support services such as deployment processing, physical fitness training and testing, honor guard and office space.
- ▶ **Running Track:** A new 400-meter rubberized running track will be located west of Building 127.
- ▶ **Building 210 Addition:** Includes a 5,000 square foot addition to the backside of the existing communications facility in order to co-locate all the communications functions that are housed in various facilities around the base.
- ▶ **Building 243 Operations Patio:** A 30-foot by 60-foot concrete covered patio will replace the existing concrete patio on the south side of the building.
- ▶ **Delta Barns:** Includes a 4-bay, 8-parking-spot aircraft shelter with High Expansion Foam (HEF) fire suppression system and wet pipe sprinkler systems and will be located in the infield right area east of Taxiway D.
- ▶ **Defense Logistics Agency (DLA) Compound:** Existing complex will replace/expand facilities and will include the following: aboveground fuel storage tanks, pump house with a control room, product recovery tank, petroleum, oil, and lubricants (POL) operations building with a laboratory, refueling vehicle parking, truck loading and unloading points, motor gas storage tank, diesel storage tank, and supporting facilities.

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Figure 4-19 : Oregon ANG Capital Improvement Projects (2020-2025)



Source: Oregon ANG 2020
 Notes: Defense Logistics Agency (DLA); Petroleum, Oil, and Lubricants (POL)

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LANDSIDE – NON-AERONAUTICAL FACILITIES

NON-AERONAUTICAL DEVELOPMENT OF AIRPORT PROPERTY

The following section describes the future landside facilities, which are on-airport areas outside of the airfield and are used to develop on-airport businesses. In conjunction with Airport-owned properties there is a large business park development owned by the City to the north of Airport development area.

AIRPORT BUSINESS PARK

Approximately 14.8 acres of LMT property is 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 put in place and layouts are dependent upon the facility needs of prospective leaseholders. Utilities and other supporting infrastructure are stubbed in for connection to facilities when built. As discussed above, approximately 4 acres of the easterly portion of the Airport Business Park is needed for aeronautical development to meet forecasted GA hangar demand. As shown in **Figure 4-20**, approximately 10.8 acres of land would remain for the Airport Business Park.

Figure 4-20 : Airport Business Park



Source: Mead & Hunt, Inc. 2020

CITY INDUSTRIAL PARK

The City of Klamath Falls has a City Industrial Park located immediately north of the Airport Business Park. The City Industrial Park encompasses approximately 61 acres and is bound by Southside Expressway (Highway 140) to the north, Altamont Drive to the east, Joe Wright Road to the south, and Washburn to the west. The City owns 34.8 acres of land within the Industrial Parkland, which is available for lease or purchase by private entities. As described below, a new access road providing more direct access to LMT is proposed to go through the City Industrial Park.

AIRPORT ENTRANCE ROAD – REALIGNMENT

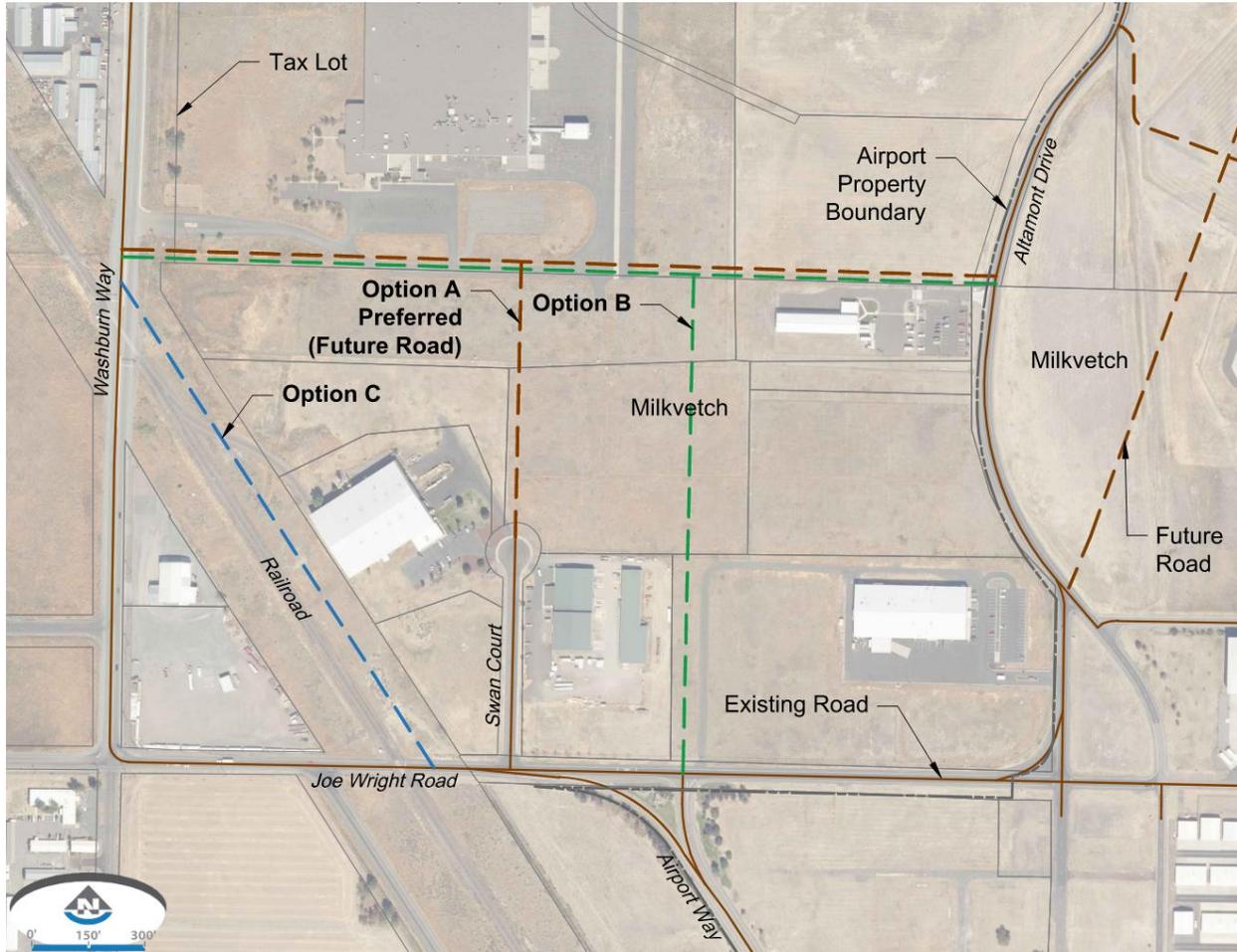
The primary entrance road to the terminal requires crossing the railroad line twice west of the airport on Washburn Way and Joe Wright Road. For public and emergency response purposes, a new entrance road access route is recommended to bypass the railroad tracks and connect directly with Washburn Way. **Figure 4-21** presents three potential alignments.

- ▶ Option A 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.
- ▶ Option B is similar to Option A, but the new north/south road segment would connect at the intersection of Joe Wright Road and Airport Way. This alignment provides the most direct route to the LMT terminal.
- ▶ Option C reflects the future Washburn Way realignment included in the City of Klamath Falls Urban Area Transportation System Plan (TSP) Update (April 2012).

Option A is considered by the City to be the least problematic due to an existing tie-in for the surface street at Swan Court. Although Option B provides the most direct route to the LMT terminal, the protected species of Milkvetch may be present along the proposed north/south road segment and could require environmental mitigation efforts. The Option C alignment, which would parallel the railroad tracks, would be within existing railroad easements and would require coordination with the Union Pacific Railroad. Option A is deemed by the City to be the most feasible and preferred option.

The City's TSP also shows realignment plans for portions of Brett Way to connect with Homedale Road west of LMT. Brett Way and Summers Lane are used to access the eastside hangars and US Forest Service facilities. **Figure 4-22** shows the existing and future road system in the immediate vicinity of LMT.

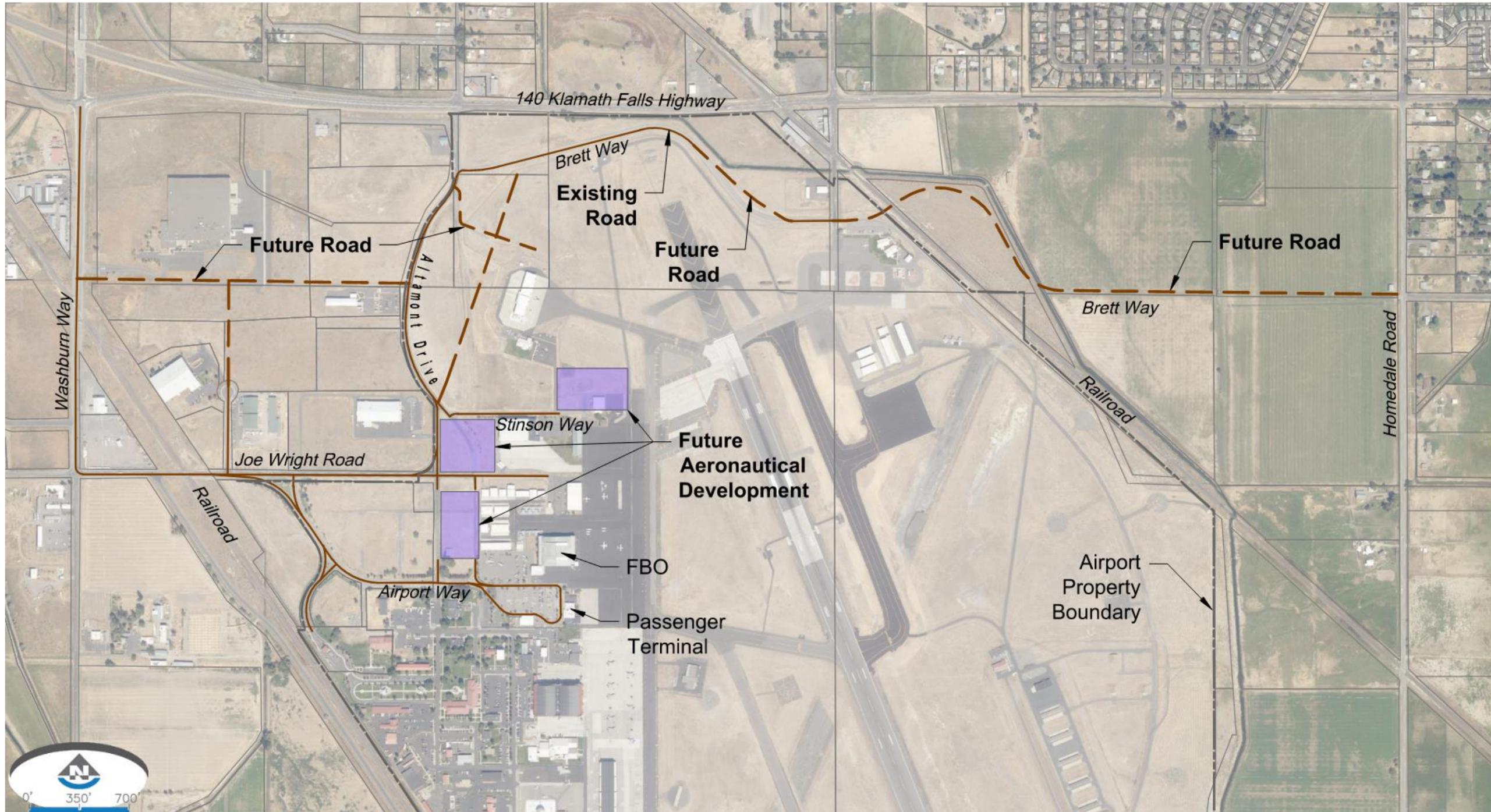
Figure 4-21 : Airport Entrance Road Realignment



Source: Mead & Hunt, Inc. 2020

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Figure 4-22 : LMT Road System



Source: Mead & Hunt, Inc. 2020

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Chapter 5

Capital Improvement Plan



CRATER LAKE

**KLAMATH REGIONAL
AIRPORT**

Capital Improvement Plan

INTRODUCTION

This chapter documents the strategy to implement, fund, and finance the recommended 20-year project improvements for Crater Lake – Klamath Regional Airport (LMT). The Airport Capital Improvement Plan (CIP) provides guidance for continued maintenance, upgrade, and expansion of LMT facilities in a fiscally responsible manner and within realistic Airport financial capabilities. This analysis also supports the LMT's local budgeting process and federal and state airport-in-aid programming. This chapter is prepared per FAA Order 5100.38D, *AIP Handbook*, and FAA Order 5100.39A, *Airports Improvement Plan*, other FAA guidance and procedural requirements. This chapter is arranged in the following order:

- ▶ Capital Improvement Plan
- ▶ Funding Sources
- ▶ Financial Plan
- ▶ Summary.

CAPITAL IMPROVEMENT PLAN

The CIP identifies and prioritizes financial needs for planning and development at the Airport. Projects included in this CIP were identified using FAA criteria. Some are immediately justified and eligible, while others may become justified as activity changes in the future. The CIP is intended to provide a framework for phasing of CIP projects while providing flexibility to move projects based on new priorities and financial considerations. Projects that receive Federal Aviation Administration (FAA) funding will need to meet FAA design standards, be justified based on FAA criteria, and undergo an environmental review pursuant to the requirements of the National Environmental Policy Act (NEPA), as amended.

CAPITAL IMPROVEMENT PLAN APPROACH

The CIP identifies the overall airport development objectives, individual project costs, and anticipated funding by planning period: short-term (1-5 years), intermediate-term (6-10 years), long-term (11-20 years), and ultimate (20+ years). The CIP projects are based on the needs identified in **Chapter 3 – Facility Requirements**, the most recently approved FAA 5-year CIP, and planning and pavement maintenance projects. The following considerations influenced project priority:

- ▶ Ability to meet user demand and desired level of service
- ▶ Ability to enhance efficiency and meet FAA design standards
- ▶ Ability to repair and upgrade facilities reaching the end of useful life.

Projects also consider LMT preference and ability to facilitate an orderly sequence of improvements while taking into consideration economic and environmental factors. Projects are sequenced with regard to strategic vision, forecast demand triggers, and funding considerations. Short-term projects are sequenced in a year-by-year format; mid-term, long-term, and ultimate projects are identified in priority order without year distinction. The LMT project lists are identified by potential funding source and are arranged in the following order:

- ▶ LMT Overall Projects
- ▶ Oregon Air National Guard (Oregon ANG) Funded Projects.

Projects identified in the LMT Overall Projects List (**Table 5-1**) as potentially funded by the FAA are eligible projects according to the AIP Handbook and LMT will pursue funding through the FAA AIP grant-in-aid program. It is anticipated that these projects will be funded mainly through AIP funds with a match from LMT.

Projects identified as *Other* are not eligible for AIP funding. However, these projects are a necessary contribution to the quality and overall development potential of the Airport. They could be funded through multiple sources such as the City, Oregon Department of Aviation (ODA), other governmental agencies, or private funding. LMT will participate in projects that are eligible and non-eligible for AIP funding.

Table 5-1 provides LMT with an overview of all projects potentially needed in the planning period regardless of AIP eligibility.

The Oregon ANG projects have been identified as projects that the Air National Guard will develop through a 20-year period and beyond (**Table 5-2**). The Oregon ANG has established a priority list of projects similar to the LMT CIP that is also divided into four terms: short, mid, long, and ultimate. Since the Oregon ANG projects are not eligible under the FAA AIP grant program, the funding for the projects would come from the Oregon ANG and Department of Defense (DoD). LMT, and possibly the FAA, will coordinate with the DoD with respect to design standards for shared-use facilities.

Table 5-1 : LMT Overall Projects

Project	Potential Funding Source ¹
Short-Term	
Runway 7/25 and Reconstruction, Runway Lighting, and Taxiway F Reconstruction (Phase I - Design)	FAA/LMT
Runway 7/25 Reconstruction and Runway Lighting (Phase II - Construction)	FAA/LMT
Taxiway F Reconstruction (Phase II - Construction)	FAA ²
Wildlife Hazard Assessment (WHA)	LMT/ODA
Pavement Condition Index Update (PCI)	ODA
Mid-Term	
Taxiway C (new D1), G, and E (new G1) Reconfiguration - Environmental Assessment/Design	FAA/LMT
Taxiway C Reconfiguration (Twy A, C closures and new Twy D1)	FAA/LMT
Taxiway G Extension (to north)	FAA/LMT
Taxiway E Reconfiguration (Twy E closure and new Twy G1)	FAA/LMT
Runway 14/32 Sealing and Remarking	FAA/LMT
Taxiway B Sealing and Remarking	FAA/LMT
Westside GA Apron Rehabilitation- Environmental	FAA/LMT
Westside GA Apron Rehabilitation	FAA/LMT
Long-Term	
Airport Beacon Replacement -Environmental	FAA/LMT
Airport Beacon Replacement	FAA/LMT
Obstruction Removal Maintenance (existing approaches)	FAA/LMT ²
Runway 8/26 and Taxiway F Sealing and Remarking	FAA/LMT
Taxiway K Rehabilitation -Environmental	FAA/LMT
Taxiway K Rehabilitation/Overlay	FAA/LMT
Taxiway G Sealing and Remarking	FAA/LMT
Taxiway B and Northeast Apron Rehabilitation -Environmental	FAA/LMT
Taxiway B Rehabilitation/Overlay	FAA/LMT
Runway 14/32 Rehabilitation /Overlay	FAA/LMT ²
Runway 14 ROFA Improvements -Environmental	FAA/LMT
Runway 14 ROFA Improvements - Design	FAA/LMT
Runway 14 ROFA Improvements - Construction	FAA/LMT
Master Plan Update	FAA/LMT
Perimeter Road Resurfacing	FAA/LMT
Westside GA Apron Sealing and Terminal Apron Remarking	FAA/LMT
Northeast US Forest Service Apron Rehabilitation/ Overlay	Other
Northeast Aviation Taxi Lane Extension	FAA/LMT
Taxiway D1 and G Sealing and Remarking	FAA/LMT
Taxiway G Rehabilitation/Overlay	FAA/LMT
Security Fence Upgraded	FAA/LMT
Northeast Ramp Rehabilitation and Expansion	FAA/LMT
Main Apron Rehabilitation and Designated Parking Area Markings	FAA/LMT
Airline Terminal Apron Remarking	FAA/LMT
Airline Terminal Auto Parking -Pavement Maintenance	LMT
Airline Terminal Building Renovation	LMT
SASO/FBO Pilot Lounge Expansion	Other

Project	Potential Funding Source ¹
Ultimate	
Future Land Acquisition	FAA/LMT ²
SASO/FBO Large Hangar Building Expansion	Other
Westside GA Hangar Area Structure Removal	LMT
Westside GA Hangar Expansion (contingent)	Other
Westside Airport Operations Building (AOB/SRE) Relocation	LMT
Snow Removal Equipment	FAA/LMT
Airport Entrance Reconfiguration	LMT
Northwest Airport Development (Bldg. 400 Area)	Other
¹ Distinguishes projects that are eligible for FAA funding from those that may be funded by other sources including city, state, and other government or private entities. ² Oregon ANG contributes towards the local match for the maintenance of shared use facilities per the Airport Joint Use Agreement (AJUA).	

Table 5-2 : Oregon Air National Guard Funded Projects

Projects	
Short Term	
<ul style="list-style-type: none"> • Building 127 Addition • Running Track • Building 210 Addition • Building 243 Operations Patio 	<ul style="list-style-type: none"> • Delta Barns • Defense Logistics Agency (DLA) Compound • Runway 14 ILS Obstruction Removal and Land Acquisition/Avigation Easement • Shasta Shelter Removal
Mid-Term	
<ul style="list-style-type: none"> • Corrosion Control/NDI/Structural Hangar Construction • Installation of HEF in Building 325 • New CATM/21- Lane Indoor Range Construction 	<ul style="list-style-type: none"> • Buildings 585 and 4086 Demolition • De-Icing Pad and Access Twy Construction • EOR Pad expansion and Twy A Closure Construction
Long-Term	
<ul style="list-style-type: none"> • Joint Squad Ops/MX Hangar /DPC Construction • Building 219 Demolition • Building 243 Demolition 	<ul style="list-style-type: none"> • Airfield Pavement Repairs • Building 211 Reconfiguration
Ultimate	
<ul style="list-style-type: none"> • Building 220 Renovation • Non-Compliant Parking Closure, New Parking Construction • Maintenance Relocation into new MXG/Squad Ops • Building 216 Alteration for American Military University (AMU) • Building 535 Addition • New Munitions Storage Igloo Construction • Buildings 539,540,541,4067,4068,4069 • Building 210 Addition/Alteration • Crosswalk Installation • Sidewalk Installation 	<ul style="list-style-type: none"> • Upgrade Mechanical Systems (KJQA1 42004) • Upgrade HVAC Systems (KJQA142068) • Water Distribution System Study • Water System Distribution Repair/Replacement • Facility Maintenance Plan Development • Stormwater Study • Stormwater System Repair • Renewable Energy Study • Renewable Energy System Installation • Vehicle Operations Parking Shed Construction

COST ESTIMATES

Cost estimates help LMT and the FAA understand potential cost obligations. The cost estimates are developed only for FAA-eligible projects. Cost estimates were not calculated for ultimate projects, non-AIP eligible projects, or Oregon ANG projects.

Professional engineers and architects have developed cost estimates for each project contained in the 20-year CIP based on 2020 dollars. For projects occurring beyond 2020, the estimators adjusted costs with an inflation rate of three percent per year. Project costs have contingencies added to account for unknowns at the planning level of design. The contingency amount varies by project but is generally set between 15 and 35 percent depending on the term in which the projects are located. Costs for planning, environmental review, design, and construction management are included as appropriate. **Table 5-3** shows each project and estimated costs.

Table 5-3 : Summary of Project Cost Estimates

Projects Improvements	Estimated Cost (2020 Dollars)
Short-Term	
Runway 7/25 (Future 8/26) Reconstruct, Runway Lighting, and Taxiway F (Phase I - Design)	\$ 771,200
Runway 7/25 (Future 8/26) Reconstruct and Runway Lighting (Phase II - Construction)	\$ 9,926,700
Taxiway F Reconstruct (Phase II - Construction)	\$ 7,607,800
(2021-2025) Short-Term Subtotal	\$ 18,305,700
Mid-Term	
Runway 14/32 Sealing and Remarketing	\$ 1,665,700
Taxiway B Sealing and Remarketing	\$ 253,700
Taxiway C,G,E-Environmental	\$ 600,000
Westside GA Apron Rehabilitation-Environmental	\$ 35,000
Taxiway C Reconfiguration (Twy A and C Closures, New Twy D1)	\$ 3,169,300
Taxiway G North Extension	\$ 4,715,000
Taxiway E Reconfiguration (Twy E Closure and New Twy G1)	\$ 4,268,600
Westside GA Apron Rehabilitation	\$ 4,382,400
(2026-2030) Mid-Term Subtotal	\$ 19,089,700
Long-Term	
Airport Beacon Replacement-Environmental	\$ 25,000
Airport Beacon Replacement	\$ 85,400
Obstruction Removal Maintenance (existing approaches)	\$ 166,050
Runway 8/26 and Taxiway F Sealing and Remarketing	\$ 711,700
Taxiway K Rehabilitation-Environmental	\$ 40,000
Taxiway K Rehabilitation/Overlay	\$ 752,700
Taxiway G Sealing and Remarketing	\$ 816,900
Taxiway B and Northeast Apron Rehabilitation-Environmental	\$ 45,000
Taxiway B Rehabilitation/ Overlay	\$ 2,231,700
Runway 14/32 Rehabilitation/Overlay	\$ 12,943,300
Runway 14 ROFA Improvements-Environmental	\$ 700,000
Runway 14 ROFA Improvements-Design	\$ 256,600
Runway 14 ROFA Improvements-Construction	\$ 2,950,700
Master Plan Update	\$ 1,073,300
Perimeter Road Resurfacing	\$ 2,216,000

Projects Improvements	Estimated Cost (2020 Dollars)
Westside GA Apron Sealing and Terminal Apron Remarking	\$ 480,300
Northeast Ramp Rehabilitation and Expansion	\$ 3,846,700
Northeast Aviation Taxilane Extension	\$ 799,600
Taxiway D1 and G1 Sealing and Remarking	\$ 609,900
Taxiway G Rehabilitation/Overlay	\$ 1,935,400
Security Fence Upgrades	\$ 114,000
(2031-2040) Long-Term Subtotal	\$ 32,800,250
Total	\$ 70,195,650
Note: A three percent annual inflation rate is added to 2020 dollars for projects beyond year 2020	

The LMT CIP includes project cost estimates for projects that may require pavement maintenance in later years. Pavement maintenance projects generally occur in increments of ten to twenty years. This may vary depending on the pavement condition when it is evaluated. This LMT Master Plan CIP is predominately a capital facilities plan and is not intended to capture cost estimates for all the routine operating and preventative maintenance projects.

PROJECT PHASING

Project phasing is a prioritization of projects that are identified with a priority ranking system based on development needs. The FAA’s priorities in administering the ACIP give highest priority to projects that currently do not meet FAA standards and must be constructed in order meet standards to maintain safety, security, and efficiency of the airport. Projects in the higher priority categories are considered to have more urgency and are placed in the beginning term. Those projects with lower priorities are placed in latter terms. Several projects identified in this CIP can be phased over multiple years. This approach helps distribute capital costs more evenly and allows LMT to implement improvements as demand materializes. Project phasing supports accelerating or delaying project implementation in response to economic conditions and changing airport user needs.

Future demand for airport facilities is difficult to predict accurately, especially during the latter stages of the 20-year planning period. Therefore, emphasis is placed on the initial portion of the planning period. In this phase, projections are more definable, and the magnitude of program accomplishment is more pronounced.

The CIP project phasing is comprised of projects identified as eligible for AIP funding. Ineligible projects will be paid for with local money or through other non-AIP sources. The components of each period of the CIP are described in the following sections:

- ▶ Short-Term Projects (2021-2025)
- ▶ Mid-Term Projects (2026-2030)
- ▶ Long-Term Projects (2031-2040)
- ▶ Ultimate-Term Projects (2041 and beyond).

Short-Term Projects

Table 5-4 provides a sequencing and cost for each project. Short-term projects include reducing the length and width of the crosswind runway (Runway 7/25) to reflect a change in the existing Runway Design Code (RDC) from B-III to B-II. After the completion of Runway 7/25 improvements, the runway will be numbered Runway 8/26 due to the change in magnetic variation. The existing Taxiway F segment between Taxiway D and Runway 14/32 will be increased from 50 feet to 75 feet to accommodate the military standard. This RDC change also requires reducing the width of the parallel taxiway (Taxiway F) east of the primary runway from 50 feet to 35 feet. **Figure 5-1** illustrates the location of these projects on the airfield.

Table 5-4 : Short Term Project Cost Estimates

Projects Improvements	Estimated Cost (2020 Dollars)	Estimated Cost (Current Cost) 3% Inflation	AIP Non-Primary Entitlements	AIP Discretionary Funds ¹	Local Funding
Project 1 – FY 2021 Runway 7/25 Reconstruct, Runway Lighting, and Taxiway F (Phase I - Design)	\$155,340 ²	\$160,000	\$150,000	\$ -	\$10,000
Project 2 – FY 2022 Runway 7/25 Reconstruct and Runway Lighting (Phase II – Design and Construction)	\$10,542,560 ³	\$11,184,600	\$150,000	\$10,353,700	\$700,300
Project 3 – FY 2024 Taxiway F Reconstruct (Phase II - Construction)	\$7,607,800	\$8,562,600	\$300,000	\$7,727,400	\$535,200
Short-Term Totals	\$18,305,700	\$19,907,200	\$600,000	\$18,663,000	\$1,244,200

Note:

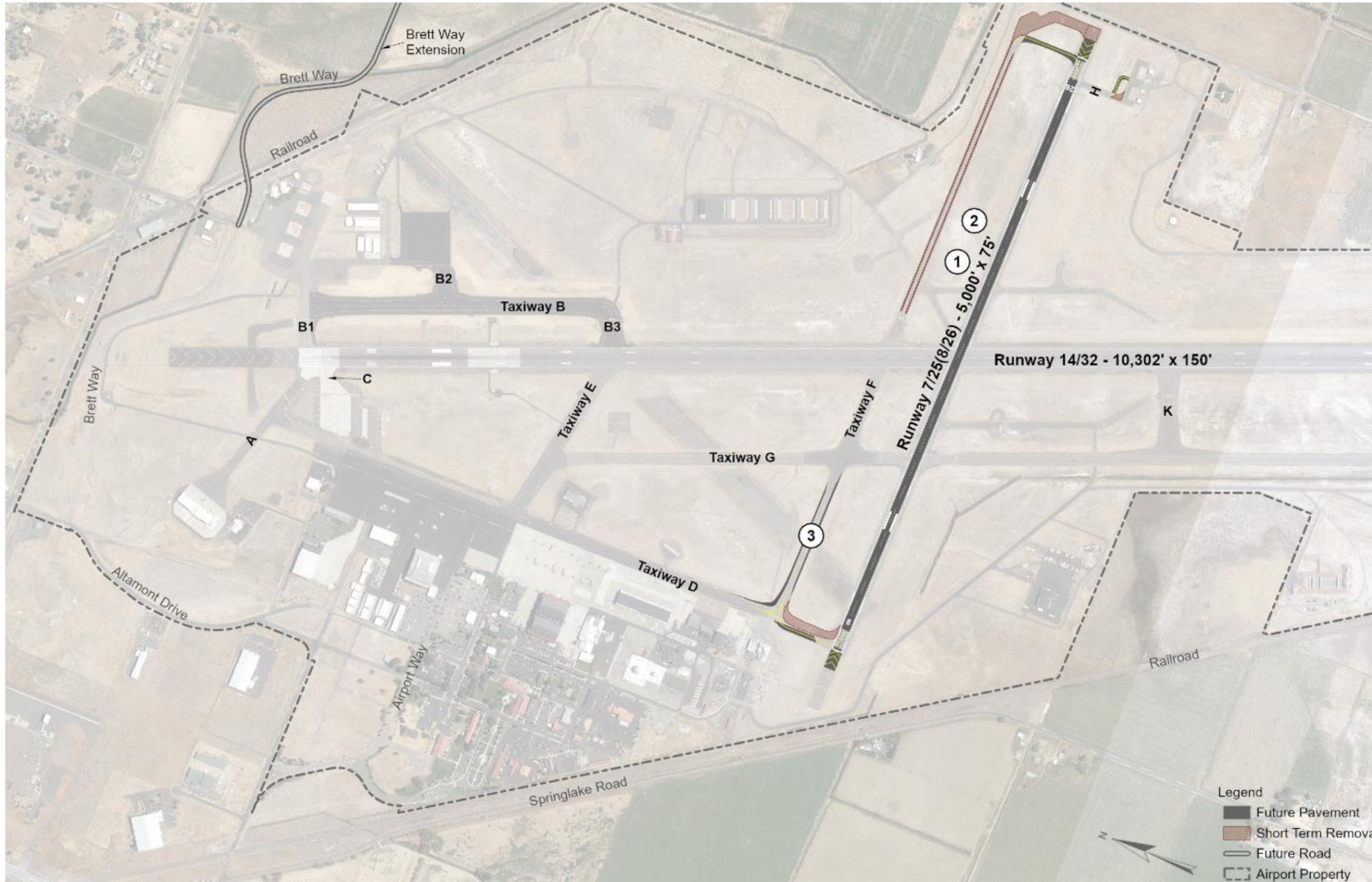
¹Discretionary funds are not guaranteed, and their approval is established through a project priority ranking methodology used by the FAA to award grants.

²Estimated 2020 cost for Project 1 includes \$155,340 of the total Phase I design cost (\$771,200).

³Estimated 2020 cost for Project 2 includes \$615,860 of the total Phase I design cost (\$771,200).

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Figure 5-1 : Short -Term: 5 Year CIP (2021-2025)



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Mid-Term Projects

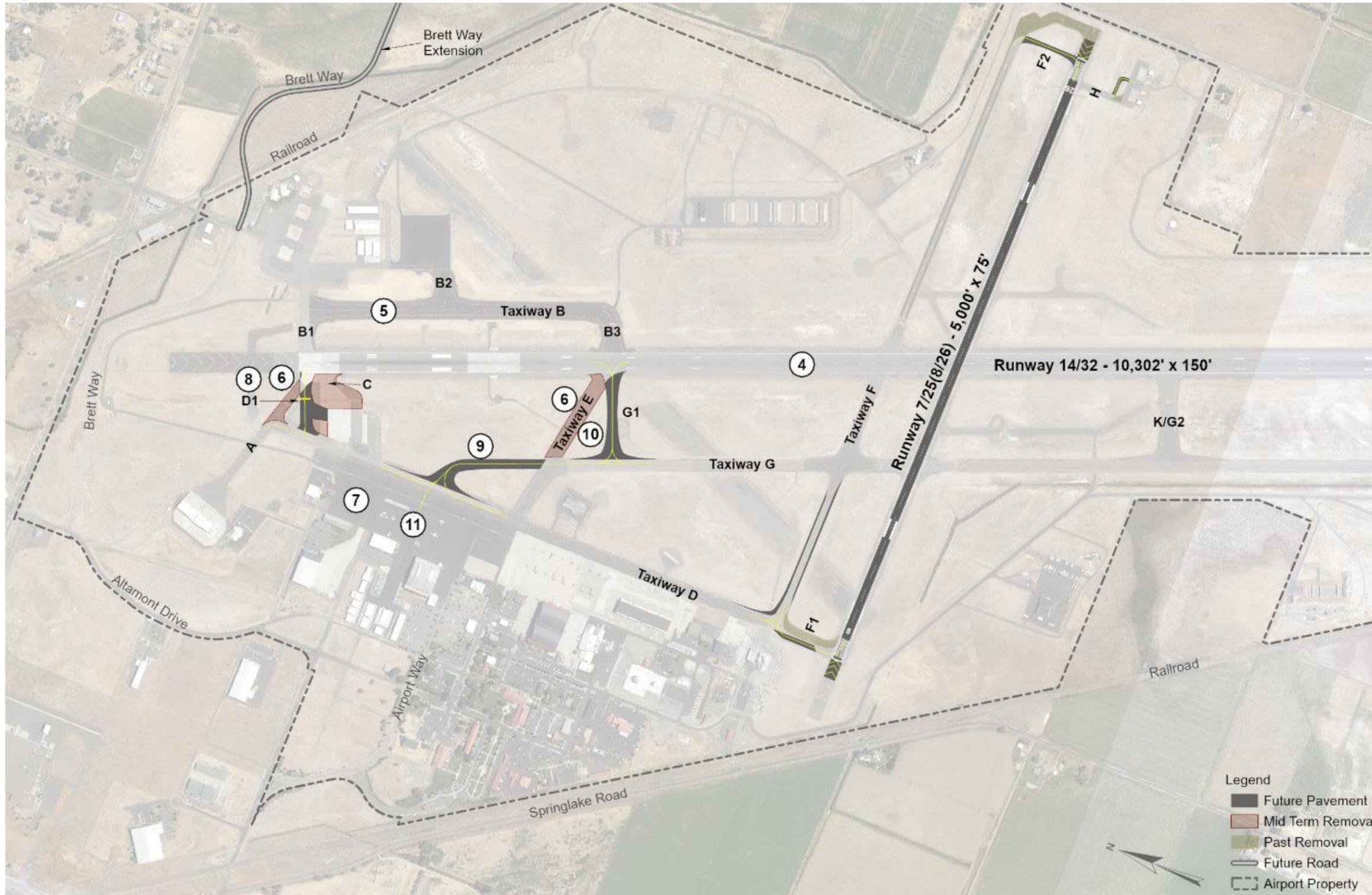
The mid-term CIP projects are anticipated to be implemented following the completion of the reconstruction of Taxiway F. Some projects include pavement sealing and re-marking for routine maintenance of the runways and taxiways. Taxiway C Reconfiguration will include closure of Taxiway A and C, with the development of a new Taxiway D. The geometry configuration for each Taxiway project is done to meet FAA standards. This term includes environmental processing for projects that will be implemented later in the term or in the long-term. **Table 5-5** identifies the mid-term projects with cost estimates, and **Figure 5-2** illustrates the location of the projects.

Table 5-5 : Mid-Term Project Cost Estimates

Projects Improvements	Estimated Cost (2020 Dollars)	Estimated Cost (Current Cost) 3% Inflation	AIP Funding	Local Funding
Project 4 Runway 14/32 Sealing and Remarking	\$1,665,700	\$1,988,900	\$1,864,600	\$124,300
Project 5 Taxiway B Sealing and Remarking	\$253,700	\$302,900	\$284,000	\$18,900
Project 6 Taxiway C,G,E-Environmental	\$600,000	\$737,900	\$691,800	\$46,100
Project 7 Westside GA Apron Rehabilitation-Environmental	\$35,000	\$43,000	\$40,300	\$2,700
Project 8 Taxiway C Reconfiguration (Twy A and C Closures, New Twy D1)	\$3,169,300	\$4,014,800	\$3,763,900	\$250,900
Project 9 Taxiway G North Extension	\$4,715,000	\$6,152,000	\$5,767,500	\$384,500
Project 10 Taxiway E Reconfiguration (Twy E Closure and New Twy G1)	\$4,268,600	\$5,736,600	\$5,378,100	\$358,500
Project 11 Westside GA Apron Rehabilitation	\$4,382,400	\$5,889,600	\$5,521,500	\$368,100
Mid-Term Totals	\$19,089,700	\$24,865,700	\$23,311,700	\$1,554,000
Note: AIP discretionary funds are not guaranteed, and their approval is established through a project priority ranking methodology used by the FAA to award grants. AIP funding is calculated at 93.75 percent of cost estimated with the inflated rate.				

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Figure 5-2 : Mid-Term: 6-10 Year CIP (2026-2031)



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Long-Term Projects

Long-term projects are difficult to predict accurately, but like all CIP projects, they are depicted on the Airport Layout Plan (ALP). Some of the major projects recognized in this term are the rehabilitation of Runway 14/32, Runway 14 ROFA improvements, and maintenance on Taxiways K, G, and B. Runway 14 ROFA improvements include relocating the perimeter road and fence, Brett Way, and a possible relocation of the northerly ditch. **Table 5-6** identifies the long-term projects with cost estimates, and **Figure 5-3** illustrates the location of the projects.

Table 5-6 : Long-Term Cost Estimates

Projects Improvements	Estimated Cost (2020 Dollars)	Estimated Cost (Current Cost) 3% Inflation	AIP Funding	Local Funding
Project 12 Airport Beacon Replacement-Environmental	\$25,000	\$34,600	\$32,400	\$2,200
Project 13 Airport Beacon Replacement	\$85,400	\$121,800	\$114,200	\$7,600
Project 14 Obstruction Removal Maintenance (existing approaches)	\$166,050	\$236,700	\$221,900	\$14,800
Project 15 Runway 8/26 and Taxiway F Sealing and Marking	\$711,700	\$1,014,700	\$951,300	\$63,400
Project 16 Taxiway K Rehabilitation-Environmental	\$40,000	\$57,000	\$53,400	\$3,600
Project 17 Taxiway K Rehabilitation/Overlay	\$752,700	\$1,105,400	\$1,036,300	\$69,100
Project 18 Taxiway G Sealing and Marking	\$816,900	\$1,199,600	\$1,124,600	\$75,000
Project 19 Taxiway B and Northeast Apron Rehabilitation-Environmental	\$45,000	\$66,100	\$62,000	\$4,100
Project 20 Taxiway B Rehabilitation/ Overlay	\$2,231,700	\$3,375,600	\$3,164,600	\$211,000
Project 21 Runway 14/32 Rehabilitation/Overlay	\$12,943,300	\$19,577,900	\$18,354,300	\$1,223,600
Project 22 Runway 14 ROFA Improvements-Environmental	\$700,000	\$1,058,800	\$992,600	\$66,200
Project 23 Runway 14 ROFA Improvements-Design	\$256,600	\$399,800	\$374,800	\$25,000
Project 24 Runway 14 ROFA Improvements-Construction	\$2,950,700	\$4,735,000	\$4,439,100	\$295,900

Projects Improvements	Estimated Cost (2020 Dollars)	Estimated Cost (Current Cost) 3% Inflation	AIP Funding	Local Funding
Project 25 Master Plan Update	\$1,073,300	\$1,774,000	\$1,663,100	\$110,900
Project 26 Perimeter Road Resurfacing	\$2,216,000	\$3,662,700	\$3,433,800	\$228,900
Project 27 Westside GA Apron Sealing and Terminal Apron Remarking	\$480,300	\$817,700	\$766,600	\$51,100
Project 28 Northeast Ramp Rehabilitation and Expansion	\$3,846,700	\$6,548,700	\$6,139,400	\$409,300
Project 29 Northeast Aviation Taxilane Extension	\$799,600	\$1,361,300	\$1,276,200	\$85,100
Project 30 Taxiway D1 and G1 Sealing and Remarking	\$609,900	\$1,069,500	\$1,002,700	\$66,800
Project 31 Taxiway G Rehabilitation/Overlay	\$1,935,400	\$3,495,500	\$3,277,000	\$218,500
Project 32 Security Fence Upgrades	\$114,000	\$205,900	\$193,000	\$12,900
Long-Term Totals	\$32,800,250	\$51,918,300	\$48,673,300	\$3,245,000

Note: AIP funding is calculated at 93.75 percent of cost estimated with the inflated rate.

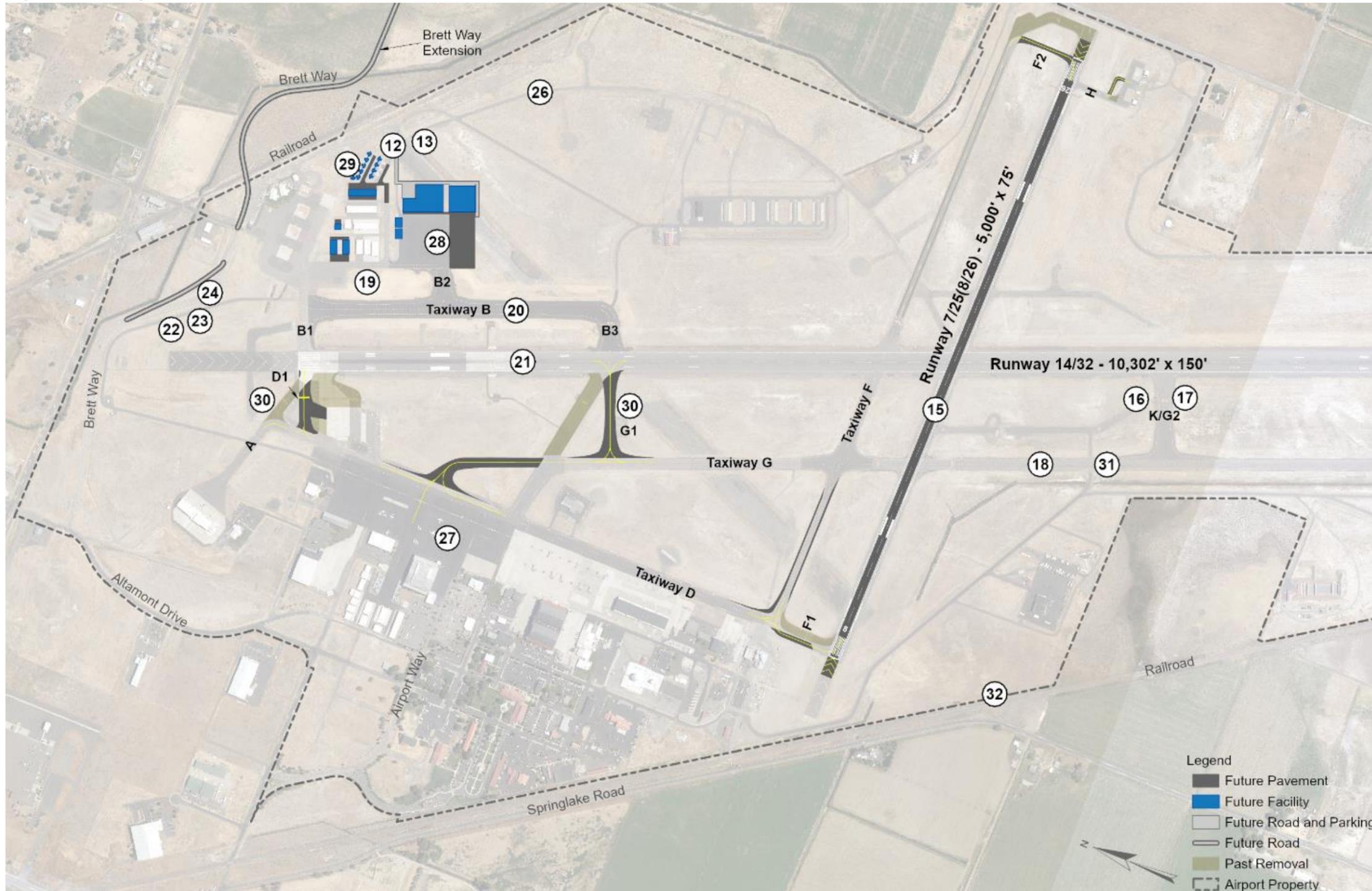
Ultimate-Term Projects

The ultimate-term projects are identified as contingent projects that are anticipated for implementation beyond the 20-year planning period. Most of these projects include building or hangar expansion that will most likely be funded by LMT or through private funding. As such, no cost estimates are provided for contingent development in the ultimate phase. **Figure 5-4** illustrates the ultimate development plan for LMT, including the Oregon ANG capital projects.

CIP Summary

The CIP aids LMT with budgeting and programming processes. The short-term typically constitutes the FAA and the Oregon Department of Aviation (ODA) Airport Capital Improvement Program (ACIP) to assist LMT in providing justification and funding strategies for projects under the FAA and ODA grant-in-aid-programs. This will assist LMT in implementing CIP projects as necessary to meet federal and state grant assurances.

Figure 5-3 : Long-Term- 11-15 Year CIP (2031-2040)



Note: CIP Project #14, not shown in figure, will be tree removal obstructions off Runway 14/32 ends.
 Note: CIP Project #25, not shown in figure, will be the Master Plan Update which is updated every ten years.

Figure 5-4 : LMT Ultimate Development Plan

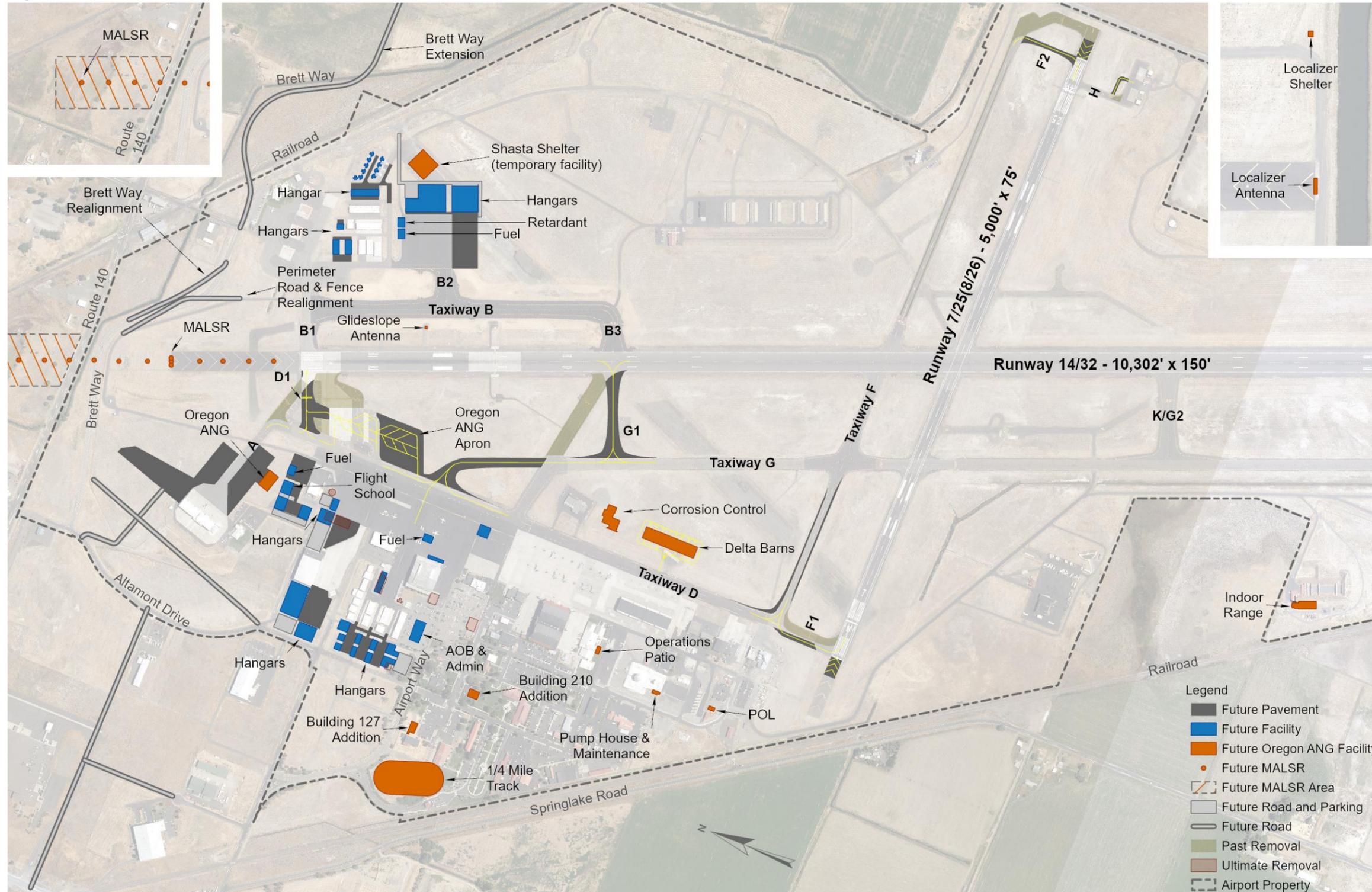
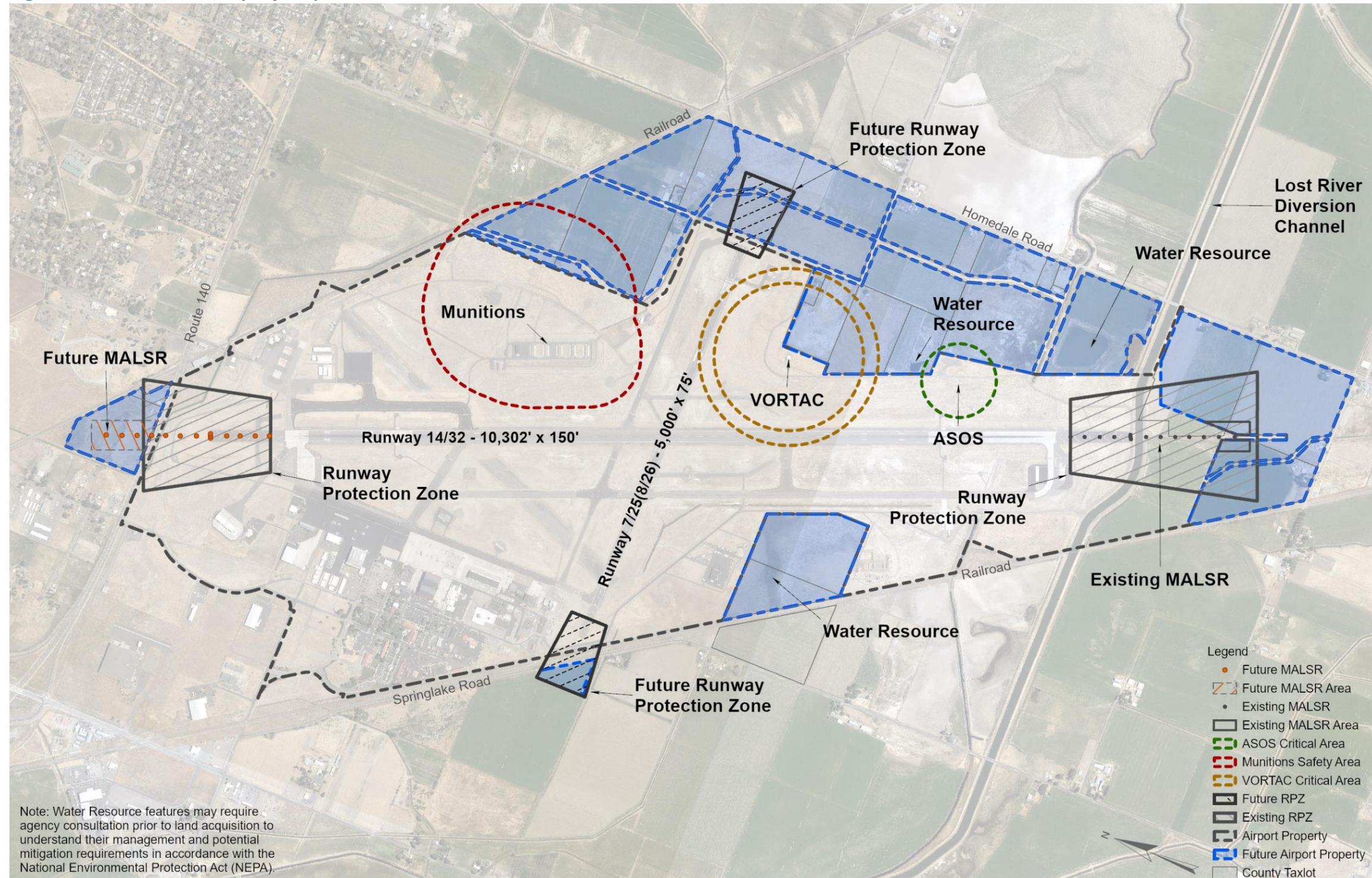


Figure 5-5 : LMT Ultimate Property Acquisition



Note: Figure 5-6 shows ultimate land acquisition interest based on civilian and military aviation facilities and associated restriction zones that extend beyond LMT property. Many of these areas are currently controlled through aviation easements held by LMT.

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FUNDING SOURCES

Funding sources for future development projects depend on a variety of factors that include AIP eligibility, the ultimate type and use of facilities to be developed, debt capacity of LMT, the availability of other financing sources, and the priorities for scheduling project completion. For planning purposes, assumptions have been made related to the funding sources of each project. The following funding sources provide background and context when reviewing the financial feasibility of proposed improvements.

- ▶ Federal
- ▶ State
- ▶ Local
- ▶ Other

FEDERAL

The FAA provides funding for airport improvements through the Aviation Trust Fund (ATF), which is financed by aviation system user fees and taxes (e.g., airline passenger tax, aircraft parts taxes, fuel taxes, and aircraft registration fees). The AIP provides the mechanism to reinvest the ATF at FAA-eligible airports. FAA Order 5100.38D, *Airport Improvement Program Handbook* (AIP Handbook), describes AIP funding eligibility. Because Oregon has more than five percent of its geographic acreage comprised of unappropriated and unreserved public lands and nontaxable Indian lands, the AIP program allows a higher than normal federal percentage match for AIP-eligible projects. The adjusted formula provides for an FAA contribution of 93.75 percent compared to a normal contribution of 90 percent. The AIP grants require LMT to contribute a local match of 6.25 percent.

The FAA's most recent version (2020) of the National Plan of Integrated Systems (NPIAS) classifies LMT as a commercial service (nonprimary) facility. However, no scheduled air carrier service has been provided since 2017 and LMT is operated as a general aviation airport. The NPIAS identifies airports eligible for AIP funding and estimates the amount of AIP funds needed for projects that will update airports to current FAA standards and increase capacity as needed. FAA AIP funds are classified as non-primary entitlement and discretionary.

Entitlements

General aviation airports are eligible for annual non-primary entitlement funding under the AIP. The total amount of non-primary entitlement funding is governed by congressional appropriations to the AIP. The AIP Handbook defines how the FAA calculates non-primary entitlement for general aviation airports to receive lesser of the following:

- ▶ \$150,000 or
- ▶ One-fifth of the estimated five-year costs for airport development for each of the airports as listed in the most recent NPIAS.

The FAA makes the project decisions on the use of the funds in consultation with the state of Oregon. LMT is assumed to receive \$150,000 in non-primary entitlements when evaluating project organization and coordination during this planning process. The FAA distributes AIP entitlement funding annually, and LMT can save the entitlement funds for up to three years.

Discretionary

Projects eligible for AIP funding may receive discretionary funding if the total cost exceeds costs covered by entitlement funds. Discretionary funds are not guaranteed, and their approval is established through a project priority ranking methodology used by the FAA to award grants, at their prerogative, based upon a project's importance to the National Airport System (NAS). Discretionary funds are generally provided for projects that have placed high in priority towards enhancing safety, security, and capacity and would be difficult to fund otherwise. Dollar amounts vary and can be significant compared to non-primary entitlement funds. The amount dedicated to any one airport is determined by its demonstrated and documented need compared to the needs at other airports within the NPIAS.

STATE

The ODA administers all state aviation grant programs. The Statewide Capital Improvement Plan (SCIP) is a partnership with the FAA and LMT to assist with the following funding options:

- ▶ Maintaining the five-year ACIP
- ▶ Capturing yearly and projected needs
- ▶ Coordinating Joint Planning Conferences (JPC)
- ▶ Managing the software to track FAA funding for state aviation needs.

ODA also provides grants to assist capital improvement projects such as the Critical Oregon Airport Relief (COAR). LMT is eligible to apply for the COAR grant, and the maximum amount that can be requested is \$150,000. The grants are determined by category that is associated with the Oregon Aviation Plan, similar to the FAA's categorization with the NPIAS.

LOCAL

Local funds include, but are not limited to, airport revenues from leases, fuel surcharges, landing fees, property taxes, percentage of transient room tax, and grant funding. Local funds can also include bonds issued by the City of Klamath Falls and property taxes collected by the City. LMT uses local funds to provide the 6.25 percent match on AIP-eligible projects and to pay for projects that are not eligible for or do not compete well for AIP funding.

OTHER

The Oregon ANG 173d Fighter Wing is located on LMT and has significant tenant facilities and operations. The military conducts planning for Oregon ANG facility and land use needs. The Airport Joint Use Agreement (AJUA) specifies the conditions and amount that Oregon ANG contributes for shared use of LMT property and services. The AJUA provides the mechanism for the Oregon ANG to provide funding support of major repair projects and/or new construction projects for shared facilities on a project-by-project basis through Military Construction Cooperative Agreements (MCCA).

FINANCIAL PLAN

The financial plan is developed for the preferred five-year capital improvement plan to demonstrate LMT's ability to fund project improvements. LMT financial governance, structure, and fiscal authority will be described by the existing financial policy and rates and charges used for assessing funding assumptions, strategies, and suitability. An analysis based on financial statements, budgets, and audit reports has been reviewed and historical data tabulated to identify LMT budget trends, income patterns, operating influence, and debt retirement schedules. A pro forma escalation of LMT operating revenues and expenses has been conducted to identify LMT net income, carryovers, cash flow balances, and capital cost recovery amounts reasonably available to fund future LMT projects.

The financial plan focuses on:

- ▶ Historical Review (revenues and expenses)
- ▶ Pro Forma Analysis (future financial projections)
- ▶ Forecasted Operations and Based Aircraft (cargo, general aviation, military)
- ▶ Budget Summary (impact on future finances).

HISTORICAL REVIEW

The City of Klamath Falls owns LMT. The Airport Fund, established by the City, is used to operate and maintain LMT. The Airport Fund accounts for operations of LMT. Revenues consist of FAA funding, property taxes, portion of transient room tax, rental revenue, landing fees, other grant funding, and miscellaneous sources. LMT files annual financial reports with the FAA using the Certification Activity Tracking System (CATS). This system provides public access to the financial reports of commercial airports. LMT currently has no scheduled air carrier service; it has been operating as a general aviation airport since 2017, but maintains a Part 139 certificate and has been providing financial information to the FAA through CATS. Historically, LMT received passenger airline aeronautical revenues for 2017 and 2018 but has received no passenger airline aeronautical revenues after 2018. **Table 5-7** provides LMT's historical operating budget based on CATS data.

Airport revenue includes rates and charges collected from airport tenants, rental cars (excluding customer facility charges (CFC)), proceeds from property taxes, and grants such as those issued by the FAA. Revenues generated and expenses incurred through the operation of LMT are referred to as *operating* and activities not directly related to the running of the Airport are referred to as *non-operating*.

Table 5-7 : LMT Historical Operating Budget Summary

	2015	2016	2017	2018	2019
Cash Flow from Operating Activities					
Total Aeronautical Revenue	\$438,352	\$401,405	\$440,589	\$466,898	\$452,083
Total Non-Aeronautical Revenue	\$1,018,330	\$971,632	\$1,430,721	\$1,453,210	\$1,257,755
Total Operating Expenses (1)	\$(1,055,989)	\$(1,159,526)	\$(1,646,198)	\$(1,307,019)	\$(1,415,660)
Subtotal	\$400,693	\$213,511	\$225,112	\$613,089	\$294,178
Cash Flow from Non-Operating Activities					
Total Non-Operating Revenue (Expenses) (2)	\$154,362	\$658,303	\$2,625,339	\$4,792,164	\$2,046,045
Total Capital Expenditures and Construction In Progress (3)	\$(294,464)	\$(670,989)	\$(2,714,340)	\$(6,240,782)	\$(1,081,640)
Subtotal	\$(140,102)	\$ (12,686)	\$ (89,001)	\$(1,448,618)	\$964,405
Cash at End of Year					
Net Increase (Decrease) in Cash	\$260,591	\$200,825	\$136,111	\$(835,529)	\$1,258,583
Cash at Beginning of Year (4)	\$40,608	\$301,199	\$502,024	\$638,135	\$ (197,394)
Total	\$301,199	\$502,024	\$638,135	\$(197,394)	\$1,061,189
(1) Depreciation expense (CATS line 6.8) is not a cash transaction, so it has been removed. Depreciation averaged \$1.6 million per year from 2015-2019.					
(2) Includes FAA and state grants.					
(3) These are capital projects reported on the capital improvement plan. Funding for these projects, including FAA and State grants, is included in Total Non-Operating Revenue					
(4) 2015 Cash at Beginning of Year comes from 2014 CATS form					

Pro Forma Analysis

Pro forma is a scenario-based planning tool that can be used to estimate future revenues and expenses. This pro forma analysis is prepared using the operations and based aircraft projections determined in **Chapter 2 - Forecasts**. The LMT Master Plan forecasts cover a 20-year planning period (2018 to 2038) with 2018 as the existing baseline year. The compound annual growth rate (CAGR) is calculated by determining the rate of change over the planning period, for LMT this is the baseline year (2018) to the ending year (2038). The CAGR for each forecast activity is then used to calculate the projections for aeronautical revenue, non-aeronautical revenue, operating and non-operating expenses.

Forecast activity and CAGR, provided in **Table 5-8** determine the rate of change for each category. For the revenues and expenses that are not driven by aircraft operations or based aircraft category, they are escalated with the CIP inflation rate. The Master Plan CIP cost estimates are normally escalated with a three percent inflation; however, the CIP inflation rate used for the pro forma analysis is the average CAGR for all forecast activities and is listed in **Table 5-8**.

Table 5-8 : Forecasted Compound Annual Growth Rate

Forecast Activity	Compound Annual Growth Rate
Airline Passengers	0%
Air Cargo (Total Pounds)	1.4%
Based Aircraft (Civilian)	0.9%
Annual Operations (Civilian and Military)	0.6%
Annual Operations (Civilian Only)	0.9%
USFS	0.7%
Aircraft Operations (Military)	6.0%
Based Aircraft (Military)	0.0%
CIP Inflation Rate	1.0%

The financial feasibility and project potential cash flows are evaluated in this pro forma analysis. The pro forma projections consider a five-year window beginning in 2021 and continuing through 2025. The budget for 2020 is assumed to have been determined already since this analysis is completed mid-year 2020 and was not considered. A more detailed version of the accounts historical data and projections is provided in **Appendix A**.

Aeronautical Revenue

This pro forma analysis assumes that commercial passenger service will not return to LMT within the five-year period. The City of Klamath Falls 2019-2021 Adopted Biennial Budget 2019-2021 goal is to find a replacement airline to provide scheduled passenger air carrier service. If this occurs, adjustments will need to be made to the pro forma analysis that will reflect the new airline activity.

Non-passenger aeronautical revenues are generated from aeronautical activity. These include landing fees, hangar rentals, fuel tax and sales, and FBO revenues. These revenues have been escalated at the appropriate rate based on the forecast activity. For example, landing fees for cargo aircraft are escalated at a rate of 1.4 percent to reflect the forecast annual percent for air cargo operation landing weight (total pounds). Landing fees from general aviation and military operations are escalated at 0.6 percent to reflect forecast activity for annual operations (civilian and military).

The non-aeronautical revenues include revenues generated by terminal services, rental cars, taxes (hotel, motel, other), and utilities. Revenue from terminal services and retail has decreased because of the cessation of commercial air service at LMT; therefore, the projections remain constant from the 2019 revenue recorded. Other items, such as taxes and utilities, increase each year using the CIP inflation rate of one percent.

Operating Expenses

Operating expenses include items such as compensation, benefits, supplies, insurance, maintenance, and contractual services. These expenses are not driven by the forecast operations activities and have been escalated at the CIP pro forma analysis rate of one percent.

The non-operating revenue expenses and capital include interest income, grants, sales of surplus equipment, and customer facility charges. Interest income is escalated at the CIP inflation of one percent. All other non-operating revenue expenses except for grants receipts have been kept at a consistent amount based on the 2019 historical data. If commercial service returns, these will need to be re-evaluated to escalate at a designated rate. The grants projections are calculated using the CIP and the anticipated AIP funding participation for each year for the five-year planning period. Each year varies depending on the grant needs for each specific year. Escalation after the year 2020 has already been included in the cost estimates.

Capital Expenditures and Construction in Progress

The capital expenditures and construction-in-progress CATS category in the pro forma analysis is based on the programmed five-year CIP. These account for airfield capital projects for each year for LMT. Carryover years are years in which LMT will not be funding projects with AIP funds but is carrying over their non-primary entitlements into the next year that has a programmed project. As stated previously, LMT has the option to carry over non-primary entitlements for up to three years for use in the fourth year. For years 2023 and 2025, no amount is shown for construction-in-progress and capital expenditures due to LMT carrying over non-primary entitlements.

Using the data provided and the forecast activity escalations, a summary of the pro forma projected operating budget has been formed. The analysis of the cash flow provides insight into ways to reduce operating costs or steps to accelerate revenues. End of year cash values are calculated using the cash at the beginning of the year plus the net increase or decrease in cash experienced throughout each year. **Table 5-9** provides a summary of the cash flow balances. LMT year-end cash is trending positive, averaging approximately one million dollars each year for the five-year period. This allows LMT to contribute its match for any AIP non-primary entitlement grants and favorably positions them to maximize discretionary grants or contribute to non-AIP eligible projects.

Table 5-9 : LMT Forecasted Operating Budget Summary

Budget	Forecast				
	2021	2022	2023	2024	2025
Cash Flow from Operating Activities					
Total Aeronautical Revenue	\$459,300	\$462,700	\$466,100	\$469,500	\$472,900
Total Non-Aeronautical Revenue	\$1,115,200	\$1,126,200	\$1,136,200	\$1,146,200	\$1,159,200
Total Operating Expenses ¹	\$(1,424,000)	\$(1,437,900)	\$(1,453,900)	\$(1,468,000)	\$(1,482,200)
Subtotal	\$150,500	\$151,000	\$148,400	\$147,700	\$149,900
Cash Flow from Non-Operating Activities					
Total Non-Operating Revenue (Expenses) ²	\$187,916	\$10,523,748	\$38,381	\$8,066,017	\$38,855
Total Capital Expenditures and Construction-in-Progress ³	\$(160,000)	\$(11,184,600)	\$ -	\$(8,562,600)	\$ -
Local Match ⁴	\$10,000	\$699,000	\$ -	\$535,200	\$ -
AIP Non-Primary Entitlement Funds ⁵	\$150,000	\$150,000	\$ -	\$300,000	\$ -
AIP Discretionary Funds ⁶	\$ -	\$10,335,600	\$ -	\$7,727,400	\$ -
Subtotal	\$ 27,916	\$ (660,852)	\$38,381	\$ (496,583)	\$38,855
Cash at End of Year					
Net Increase (Decrease) in Cash	\$178,416	\$(509,852)	\$186,781	\$(348,883)	\$188,755
Cash at Beginning of Year ⁷	\$1,252,877	\$1,431,293	\$921,441	\$1,108,222	\$759,339
Total	\$1,431,293	\$921,441	\$1,108,222	\$759,339	\$948,094
<p>¹ Depreciation expense (CATS line 6.8) is not a cash transaction, so it has been removed. Depreciation averaged \$1.6 million per year from 2015-2019.</p> <p>² Includes FAA and state grants.</p> <p>³ These are capital projects reported on the capital improvement plan. Funding for these projects, including FAA and State grants, is included in Total Non-Operating Revenue.</p> <p>⁴ 2021 local match includes 6.25 percent of \$160,000 of the total design cost (Project 1). 2022 local match includes the 6.25 percent of the remaining \$615,860 of design cost (Project 1) and the total construction cost (Project 2).</p> <p>⁵ AIP NPE of \$150,000 is granted to LMT yearly. Year 2023 and 2025 show a zero-balance due to the funds being rolled over to the next year.</p> <p>⁶ AIP Discretionary are not guaranteed, and their approval is established through a project priority ranking methodology used by the FAA to award grants</p> <p>⁷ 2015 Cash at Beginning of Year comes from 2014 CATS form.</p>					

SUMMARY

The 20-year CIP project costs, including inflation, are expected to total approximately \$97 million. The pro forma analysis projects that LMT can generate additional revenue by escalating non-passenger operating revenues with the associated rates that have been forecasted through the planning period of 2038. This analysis indicates that LMT can maintain a consistent positive cash flow balance at the end of each year. LMT may choose to adjust rates as demand changes. It is a worthy and feasible goal that LMT become as financially self-sufficient as possible. In fact, FAA Grant Assurance #24 indicates that airport sponsors should maintain fee and rental structures for facilities and services that make airports as self-sustaining as possible given local circumstances.

The development plan for LMT is aggressive; the monetary commitments are significant. However, it is a solid plan that represents LMT's best opportunity for meeting its current and future obligations. The plan also represents a series of choices and alternatives for the City of Klamath Falls. The ultimate success of LMT does not rely upon the completion of every single project contained in the development plan. To meet realistic funding expectations, it may be necessary to weigh the projects in a thoughtful and economical manner. In other words, to keep from being short-sighted in its choices, the City may be required to selectively implement the projects. Knowing the full scope of development possibilities enables the City to capitalize on opportunities, respond to financial realities, and select projects that are in harmony with the Airport's overall development plan and strategic vision. The project improvements are depicted on the ALP so that LMT can respond to changing demand quickly and illustrate to the FAA that should the need for a particular facility arise earlier than expected, its size and location have been considered in relation to the rest of the Airport.

If aviation demand continues to indicate that improvements are required, and if the proposed improvements prove to be environmentally acceptable, the financial implications presented here are likely to be acceptable for the FAA, ODA, and the City of Klamath Falls. However, this is a programming analysis and not a financial commitment on the part of any entity (i.e., the FAA, ODA, or the City). If the cost of an improvement project is not considered financially feasible at the time, it should not be pursued

Appendix A

Airport Layout Plan



CRATER LAKE

**KLAMATH REGIONAL
AIRPORT**

Appendix A: Airport Layout Plan/Exhibit A

Attachment A1: Airport Layout Plan (ALP)

Attachment A2: Exhibit 'A' Airport Property Map

Attachment A3: SOP No. 2.00, ALP Review Checklist

Attachment A4: SOP No. 3.00, Review of Exhibit 'A' Airport Property Inventory Maps

** Standard Operating Procedure (SOP)*

Crater Lake-Klamath Regional Airport Airport Layout Plan

Klamath Falls, Oregon

February 2021

AIP Grant #3-41-0030-038-2018

Mead & Hunt

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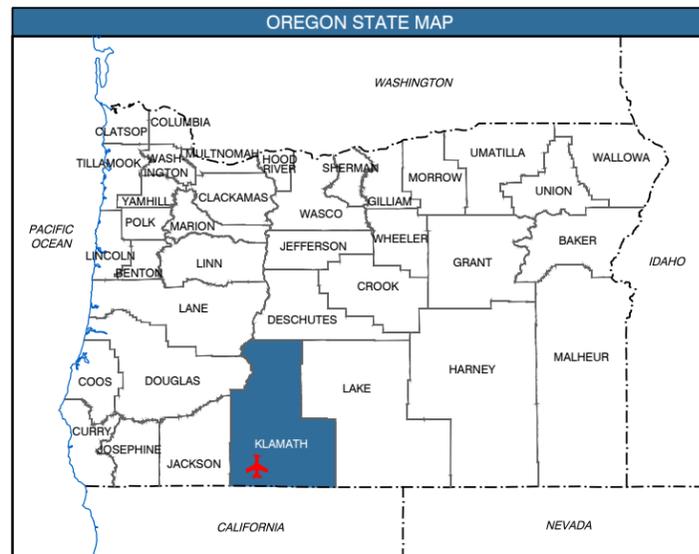
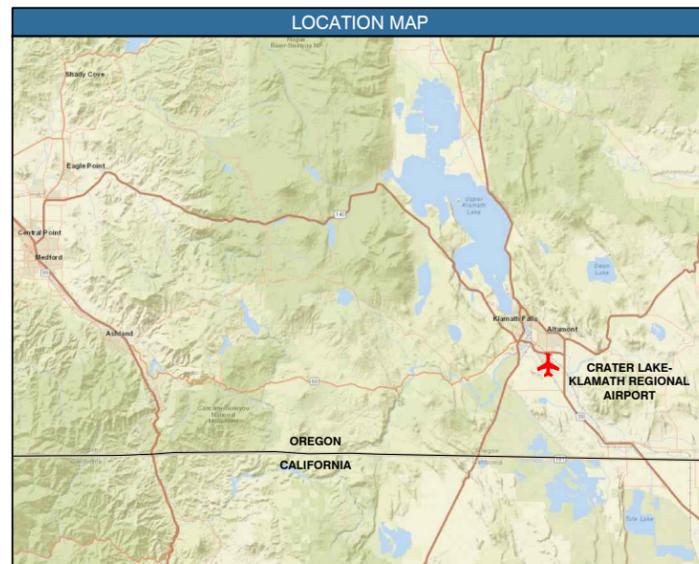
The preparation of this document may have been supported, in part, through the Airport Improvement Program financial assistance from the Federal Aviation Administration as provided under Title 49 U.S.C. Section 47104. The contents do not in any way constitute a commitment on the part of the United States to participate in any development depicted therein nor does it indicate that the proposed development is environmentally acceptable or would have justification in accordance with appropriate public laws.

CRATER LAKE - KLAMATH REGIONAL AIRPORT
KLAMATH FALLS, OREGON

REVISIONS

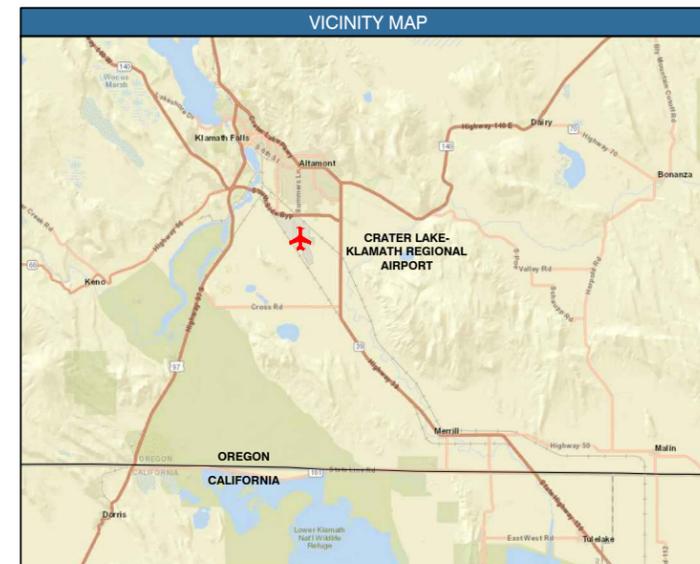
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DATE: FEBRUARY 2021
DESIGNED BY: MT
DRAWN BY: TE, DL
CHECKED BY: MT, KM
DO NOT SCALE DRAWINGS
SHEET CONTENTS

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NOT FOR CONSTRUCTION



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20.	BUILDING AREA PLAN - EAST
21.	LAND USE MAP
22.	ALP & EXHIBIT 'A' ACCEPTANCE LETTER

REVISION BLOCK			
#	DESCRIPTION	BY	DATE
1	2018 Master Plan	M&H	02/21



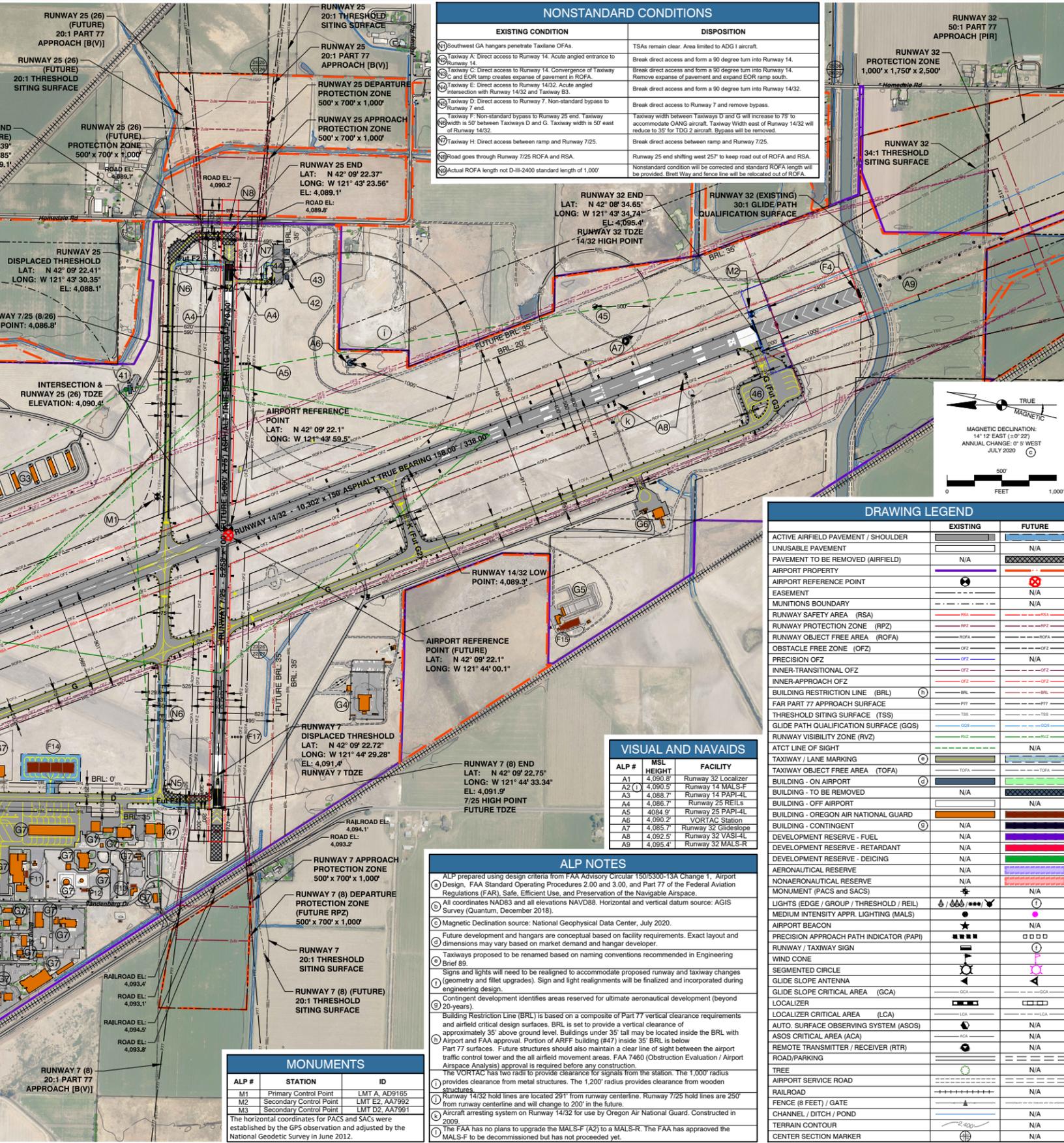
ALP APPROVAL & EXHIBIT A ACCEPTANCE
Crater Lake-Klamath Regional Airport (LMT), Klamath Falls, OR
February 19, 2021
Background (EXCERPT: SEE SHEET 22 FOR FULL LETTER)
Airport Improvement Program (AIP) Grant No. 3-41-0030-038-2018 funded the update of the Crater Lake-Klamath Regional Airport (LMT) Master Plan, Airport Layout Plan (ALP), and Exhibit A Property Map (Exhibit A). The LMT Aviation Forecasts were approved by the FAA on February 11, 2019, and the conclusions of the updated Master Plan serves as the basis of the 2021 ALP and Exhibit A. The 2021 ALP (Sheets 1 through 21) and Exhibit A (Sheets 1 through 10) were approved by the FAA on February 19, 2021.
An aeronautical study (no. 2020-ANM-3007-NRA) was conducted on the proposed ALP development. The FAA issued an ALP 7460 No Objection Letter (Final Determination) on February 8, 2021. This determination does not constitute FAA approval or disapproval of the physical development involved in the proposal. It is a determination with respect to the safe and efficient use of navigable airspace by aircraft and with respect to the safety of persons and property on the ground.
Signature Blocks
The FAA signature below acknowledges approval of the ALP and acceptance of the Exhibit A.
FAA:
BENJAMIN JOSEPH MELLO Digitally signed by BENJAMIN JOSEPH MELLO
Date: 2021.02.19 08:20:43 -08'00'
Airport Sponsor:
John T. Barsalou Digitally signed by John T. Barsalou
Date: 2021.02.18 10:07:16 -08'00'
Consultant:
Maranda Thompson Digitally signed by Maranda Thompson
Date: 2021.02.18 09:22:25 -08'00'

I:\CORP\M\MEADHUNT\COM\SHARED\FOLDERS\ENTP\1115200\170983.01\TECH\CA\DRAWINGS\ALP\2020\LMT-ALP-AIRPORT LAYOUT-2020.DWG
02/20/2021 3:44 PM

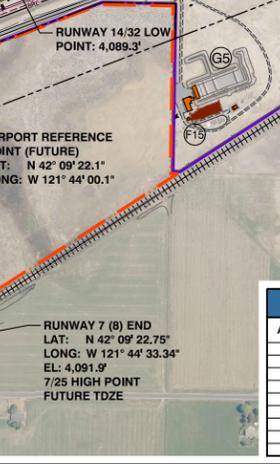
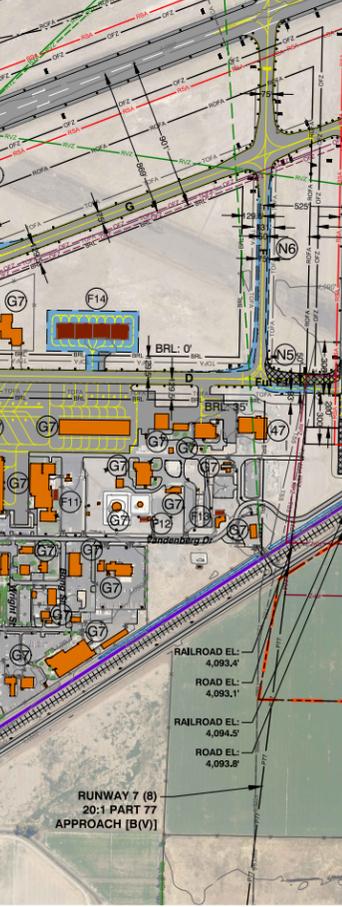
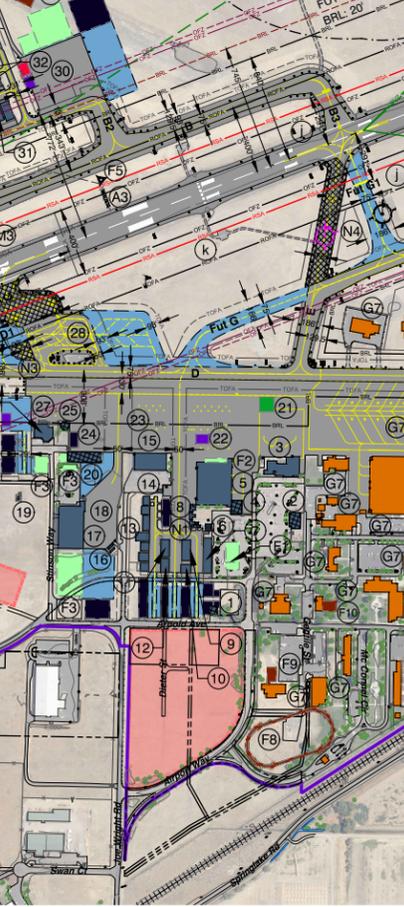
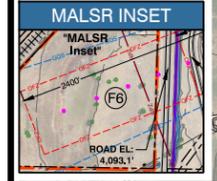
EXISTING FACILITIES			
ALP #	BLDG #	MSL HEIGHT	FACILITY
1	27	4,103.5'	Administration Building
2	3	4,111.4'	Airport Maintenance Building
3	1	4,113.7'	Passenger Terminal
4	4-C	4,130.0'	FBO Hangar
4-A, 4-B	4,142.0'	Corporate Hangar	
6	24(A-C)	4,100.0' - 4,101.0'	Fuel Tanks
7	23	4,115.2'	Conventional Hangars
8	25, 26	4,099.3' - 4,101.5'	T-Hangars
9	22	4,102.2'	T-Hangars
10	21	4,111.9'	Conventional Hangars
11	20	4,102.6'	T-Hangars
12	19	4,102.40'	T-Hangars
12-18	4,104.9' - 4,114.4'	Conventional Hangars	
14	5, 6	4,104.9'	Car Wash / Aircraft Wash
15	7	4,121.2'	Corporate Hangar
16	8-A, 8-D	4,103.7' - 4,103.8'	Fuel Tanks
17	8-A, 8-B	4,136.2'	Corporate Hangar
18	N/A	N/A	West FBO Ramp (65,000 Sq Ft)
19	N/A	4,102.2'	City Water Pump Station
20	39	4,117.8'	Corporate Hangar
21	N/A	N/A	Airline Ramp (50,000 Sq Ft)
22	N/A	N/A	South FBO Ramp (165,000 Sq Ft)
23	N/A	N/A	Cargo & FBO Ramp (130,000 Sq Ft)
24	N/A	N/A	North FBO Ramp (100,000 Sq Ft)
25	19	4,119.8'	Office
26	11-A, 11-B	4,112.1'	Flight School
27	N/A	N/A	Flight School Ramp (45,000 Sq Ft)
28	N/A	N/A	North Arm / De-Arm Apron
29	N/A	N/A	Northeast Aircraft Tiedown (45,000 Sq Ft)
30	N/A	N/A	Hangar Ramp (138,500 Sq Ft)
31	28-30	4,106.1' - 4,107.2'	Portable Hangars
32	31-32	4,103.3' - 4,105.8'	T-Hangars
33	34	4,098.5' - 4,099.0'	T-Hangars
34	N/A	N/A	USFS Ramp (60,000 Sq Ft)
35	38	4,112.5'	USFS Memorial
36	37	4,116.0'	USFS Administration Building
37	36	4,109.7'	USFS Operational Building
38	35	4,113.3'	USFS Warehouse Building
39	N/A	4,098.3'	USFS Storage
40	N/A	4,100.8' - 4,103.6'	USFS Facilities/Retardant
41	N/A	4,167.9'	Air Traffic Control Tower (ATCT)
42	N/A	4,100.4'	Agricultural Spray Operations
43	N/A	4,100.4'	Agricultural Spray Operations
44	N/A	N/A	Agricultural Spray Ops Ramp (35,000 Sq Ft)
45	42	4,114.7'	ASOS
46	N/A	N/A	South Arm / De-Arm Apron
47	43	4,118.6'	ARFF Building (OANG Owned)

OANG FACILITIES			
ALP #	BLDG #	MSL HEIGHT	FACILITY
G1	400	4,121.5'	Phase Maintenance Hangar / Wash Rack
G2	404	4,101.3'	Phase Administration
G3	535 - 541	4,102.1' - 4,111.7'	Munitions Admin / Maintenance / Magazines
G4	573	4,115.5'	270th ATCS
G5	585 / 4086	4,105.8'	CATM Facility / Rifle Range Storage
G6	585 / 4086	4,111.7'	Hush House
G7	See Sheets 18 - 20 for Details		OANG Facilities

FUTURE FACILITIES		
ALP #	OWNER	FACILITY
F1	Airport	Airport Operations Building
F2	Airport	Building 4-B Expansion
F3	Airport	Hangar
F4	OANG/FAA	Runway 14 Localizer
F5	OANG/FAA	Runway 14 Glideslope
F6	OANG/FAA	Runway 14 MALS-R
F7	OANG	OANG Building / Hangar
F8	OANG	1/4 Mile Track
F9	OANG	Building 127 Addition
F10	OANG	Building 210 Addition
F11	OANG	Operations Patio
F12	OANG	Pump House & Maintenance
F13	OANG	POL
F14	OANG	Delta Barns
F15	OANG	Indoor Range
F16	OANG	Shaft Shelter
F17	Airport	Runway 8 PAPI-4L



NONSTANDARD CONDITIONS	
EXISTING CONDITION	DISPOSITION
(N1) Southwest GA hangars penetrate Taxilane OFAs.	TSAs remain clear. Area limited to ADG 1 aircraft.
(N2) Taxiway A: Direct access to Runway 14. Acute angled entrance to Runway 14.	Break direct access and form a 90 degree turn into Runway 14.
(N3) Taxiway B: Direct access to Runway 14. Convergence of taxiway and EOR ramp creates expanse of pavement in ROFA.	Break direct access and form a 90 degree turn into Runway 14. Remove expanse of pavement and expand EOR ramp south.
(N4) Taxiway E: Direct access to Runway 14/32. Acute angled intersection with Runway 14/32 and Taxiway B3.	Break direct access and form a 90 degree turn into Runway 14/32.
(N5) Taxiway D: Direct access to Runway 7. Non-standard bypass to Runway 7 end.	Break direct access to Runway 7 and remove bypass.
(N6) Taxiway F: Non-standard bypass to Runway 25 end. Taxiway accommodates OANG aircraft. Taxiway width east of Runway 14/32 will reduce to 35' for TDG 2 aircraft. Bypass will be removed.	Break direct access to Runway 7 and remove bypass.
(N7) Taxiway H: Direct access between ramp and Runway 7/25.	Break direct access between ramp and Runway 7/25.
(N8) Road goes through Runway 7/25 ROFA and RSA.	Runway 25 end shifting west 25' to keep road out of ROFA and RSA.
(N9) Actual ROFA length not D-III-2400 standard length of 1,000'	Nonstandard condition will be corrected and standard ROFA length will be provided. Brest Way and fence line will be relocated out of ROFA.



ALP #	MSL HEIGHT	FACILITY
A1	4,090.5'	Runway 32 Localizer
A2 (1)	4,090.5'	Runway 14 MALS-F
A3	4,088.7'	Runway 14 PAPI-4L
A4	4,086.7'	Runway 25 REILS
A5	4,084.9'	Runway 25 PAPI-4L
A6	4,090.2'	VORTAC Station
A7	4,085.7'	Runway 32 Glideslope
A8	4,092.5'	Runway 32 VASI-4L
A9	4,095.4'	Runway 32 MALS-R

ALP NOTES		
(1) ALP prepared using design criteria from FAA Advisory Circular 150/5300-13A Change 1, Airport Design, FAA Standard Operating Procedures 2.00 and 3.00, and Part 77 of the Federal Aviation Regulations (FAR), Safe, Efficient Use, and Preservation of the Navigable Airspace.		
(2) All coordinates NAD83 and all elevations NAVD83. Horizontal and vertical datum source: AGIS Survey (Quantum, December 2018).		
(3) Magnetic Declination source: National Geophysical Data Center, July 2020.		
(4) Future development and hangars are conceptual based on facility requirements. Exact layout and dimensions may vary based on market demand and hangar developer.		
(5) Taxiways proposed to be renamed based on naming conventions recommended in Engineering Brief 89.		
(6) Signs and lights will need to be realigned to accommodate proposed runway and taxiway changes (geometry and flight upgrades). Sign and light realignments will be finalized and incorporated during engineering design.		
(7) Contingent development identifies areas reserved for ultimate aeronautical development (beyond 20-years).		
(8) Building Restriction Line (BRL) is based on a composite of Part 77 vertical clearance requirements and airfield critical design surfaces. BRL is set to provide a vertical clearance of approximately 35' above ground level. Buildings under 35' tall may be located inside the BRL with Airport and FAA approval. Portion of ARFF building (#47) inside 35' BRL is below Part 77 surfaces. Future structures should also maintain a clear line of sight between the airport traffic control tower and the all airfield movement areas. FAA 7460 (Obstruction Evaluation / Airport Airspace Analysis) approval is required before any construction.		
(9) The VORTAC has two radii to provide clearance for signals from the station. The 1,000' radius provides clearance from metal structures. The 1,200' radius provides clearance from wooden structures.		
(10) Runway 14/32 hold lines are located 291' from runway centerline. Runway 7/25 hold lines are 250' from runway centerline and will change to 200' in the future.		
(11) Aircraft arresting system on Runway 14/32 for use by Oregon Air National Guard. Constructed in 2009.		
(12) The FAA has no plans to upgrade the MALS-F (A2) to a MALS-R. The FAA has approved the MALS-F to be decommissioned but has not proceeded yet.		

MONUMENTS		
ALP #	STATION	ID
M1	Primary Control Point	LMT A, AD9165
M2	Secondary Control Point	LMT E2, AA7962
M3	Secondary Control Point	LMT D2, AA7991

The horizontal coordinates for PACS and SACs were established by the GPS observation and adjusted by the National Geodetic Survey in June 2012.

DRAWING LEGEND		
	EXISTING	FUTURE
ACTIVE AIRFIELD PAVEMENT / SHOULDER	[Symbol]	[Symbol]
UNUSABLE PAVEMENT	[Symbol]	[Symbol]
PAVEMENT TO BE REMOVED (AIRFIELD)	[Symbol]	[Symbol]
AIRPORT PROPERTY	[Symbol]	[Symbol]
AIRPORT REFERENCE POINT	[Symbol]	[Symbol]
EASEMENT	[Symbol]	[Symbol]
MUNITIONS BOUNDARY	[Symbol]	[Symbol]
RUNWAY SAFETY AREA (RSA)	[Symbol]	[Symbol]
RUNWAY PROTECTION ZONE (RPZ)	[Symbol]	[Symbol]
RUNWAY OBJECT FREE AREA (ROFA)	[Symbol]	[Symbol]
OBSTACLE FREE ZONE (OFZ)	[Symbol]	[Symbol]
PRECISION OFZ	[Symbol]	[Symbol]
INNER-TRANSITIONAL OFZ	[Symbol]	[Symbol]
INNER-APPROACH OFZ	[Symbol]	[Symbol]
BUILDING RESTRICTION LINE (BRL)	[Symbol]	[Symbol]
FAR PART 77 APPROACH SURFACE	[Symbol]	[Symbol]
THRESHOLD SITING SURFACE (TSS)	[Symbol]	[Symbol]
GLIDE PATH QUALIFICATION SURFACE (GQS)	[Symbol]	[Symbol]
RUNWAY VISIBILITY ZONE (RVZ)	[Symbol]	[Symbol]
ATCT LINE OF SIGHT	[Symbol]	[Symbol]
TAXIWAY / LANE MARKING	[Symbol]	[Symbol]
TAXIWAY OBJECT FREE AREA (TOFA)	[Symbol]	[Symbol]
BUILDING - ON AIRPORT	[Symbol]	[Symbol]
BUILDING - TO BE REMOVED	[Symbol]	[Symbol]
BUILDING - OFF AIRPORT	[Symbol]	[Symbol]
BUILDING - OREGON AIR NATIONAL GUARD	[Symbol]	[Symbol]
BUILDING - CONTINGENT	[Symbol]	[Symbol]
DEVELOPMENT RESERVE - FUEL	[Symbol]	[Symbol]
DEVELOPMENT RESERVE - RETARDANT	[Symbol]	[Symbol]
DEVELOPMENT RESERVE - DEICING	[Symbol]	[Symbol]
AERONAUTICAL RESERVE	[Symbol]	[Symbol]
NONAERONAUTICAL RESERVE	[Symbol]	[Symbol]
MONUMENT (PACS and SACs)	[Symbol]	[Symbol]
LIGHTS (EDGE / GROUP / THRESHOLD / REIL)	[Symbol]	[Symbol]
MEDIUM INTENSITY APPR. LIGHTING (MALS)	[Symbol]	[Symbol]
AIRPORT BEACON	[Symbol]	[Symbol]
PRECISION APPROACH PATH INDICATOR (PAPI)	[Symbol]	[Symbol]
RUNWAY / TAXIWAY SIGN	[Symbol]	[Symbol]
WIND CONE	[Symbol]	[Symbol]
SEGMENTED CIRCLE	[Symbol]	[Symbol]
GLIDE SLOPE ANTENNA	[Symbol]	[Symbol]
GLIDE SLOPE CRITICAL AREA (GCA)	[Symbol]	[Symbol]
LOCALIZER	[Symbol]	[Symbol]
LOCALIZER CRITICAL AREA (LCA)	[Symbol]	[Symbol]
AUTO. SURFACE OBSERVING SYSTEM (ASOS)	[Symbol]	[Symbol]
ASOS CRITICAL AREA (ACA)	[Symbol]	[Symbol]
REMOTE TRANSMITTER / RECEIVER (RTR)	[Symbol]	[Symbol]
ROAD/PARKING	[Symbol]	[Symbol]
TREE	[Symbol]	[Symbol]
AIRPORT SERVICE ROAD	[Symbol]	[Symbol]
RAILROAD	[Symbol]	[Symbol]
FENCE (8 FEET) / GATE	[Symbol]	[Symbol]
CHANNEL / DITCH / POND	[Symbol]	[Symbol]
TERRAIN CONTOUR	[Symbol]	[Symbol]
CENTER SECTION MARKER	[Symbol]	[Symbol]

Mead & Hunt
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9600 NE Cascades Parkway,
Suite 100
Portland, OR 97220
Phone: 503-548-1494
meadhunt.com

CRATER LAKE - KLAMATH REGIONAL AIRPORT
KLAMATH FALLS, OREGON

MMX NO.: 1115200170983.01
DATE: FEBRUARY 2021
DESIGNED BY: MT
DRAWN BY: TE, DL
CHECKED BY: MT, KM
DO NOT SCALE DRAWINGS

AIRPORT LAYOUT PLAN
SHEET NO. 2 of 22
NOT FOR CONSTRUCTION

RUNWAY DATA										
	RUNWAY 14		RUNWAY 32		RUNWAY 7	RUNWAY 8	RUNWAY 25	RUNWAY 26		
	EXISTING	FUTURE	EXISTING	FUTURE	EXISTING	FUTURE	EXISTING	FUTURE		
FAA RUNWAY CLASSIFICATION	PRIMARY		PRIMARY		CROSSWIND		CROSSWIND			
RUNWAY DESIGN CODE	D-III-2400	D-IV-2400	D-III-2400	D-IV-2400	B-II-VIS	SAME	B-II-VIS	SAME		
RUNWAY REFERENCE CODE	D-III-2400	D-IV-2400	D-III-2400	D-IV-2400	B-II-VIS	SAME	B-II-VIS	SAME		
STRENGTH BY WHEEL LOADING (IN 1000 LBS.)	315,000 LBS DTWG		315,000 LBS DTWG		17,500 LBS (S) 50,000 LBS (DWG)		17,500 LBS (S) 50,000 LBS (DWG)			
STRENGTH BY PCN	41/F/A/X/T		41/F/A/X/T		19/F/B/Y/U		19/F/B/Y/U			
RUNWAY SURFACE TYPE	GROOVED ASPHALT		GROOVED ASPHALT		ASPHALT		ASPHALT			
EFFECTIVE RUNWAY GRADIENT %	0.04%		-0.04%		0.03%		-0.03%			
RUNWAY LENGTH AND WIDTH	10,302' X 150'		10,302' X 150'		5,258' X 100'		5,000' X 75'		5,258' X 100'	
RUNWAY SHOULDER WIDTH	20'		25'		NONE		10'			
DISPLACED THRESHOLD COORDINATES	NONE		NONE		42° 09' 22.72" N		42° 09' 22.41" N		NONE	
DISPLACED THRESHOLD ELEVATION	N/A		N/A		121° 44' 29.28" W		121° 43' 30.35" W		NONE	
RUNWAY SAFETY AREA LENGTH BEYOND RW END	1,000' BEYOND x 500' WIDE		1,000' BEYOND x 500' WIDE		300' BEYOND x 150' WIDE		300' BEYOND x 150' WIDE			
RUNWAY SAFETY AREA WIDTH	500'		500'		150'		150'			
RUNWAY END COORDINATES	42° 10' 09.14" N 121° 44' 25.46" W		42° 08' 34.65" N 121° 43' 34.74" W		42° 09' 22.75" N 121° 44' 33.34" W		42° 09' 22.37" N 121° 43' 23.56" W		42° 09' 22.39" N 121° 43' 26.85" W	
RUNWAY END ELEVATIONS	4091.0'		4095.4'		4091.9'		4,089.1'		4,089.1'	
RUNWAY LIGHTING TYPE	HIRL		HIRL		MIRL		MIRL			
RUNWAY PROTECTION ZONE DIMENSIONS (APPROACH)	1,000' X 1,700' X 1,510'		1,000' X 1,700' X 2,500'		1,000' X 500' X 700'		1,000' X 500' X 700'			
RUNWAY PROTECTION ZONE DIMENSIONS (DEPARTURE)	500' X 1,010' X 1,700'		500' X 1,010' X 1,700'		1,000' X 500' X 700'		1,000' X 500' X 700'			
RUNWAY MARKING TYPE	PRECISION		PRECISION		VISUAL-BASIC		VISUAL-BASIC			
14 CFR PART 77 APPROACH CATEGORY	NONPRECISION (D)		PRECISION (PIR)		PRECISION (PIR)		PRECISION (PIR)			
14 CFR PART 77 APPROACH SLOPE	34:1 (50:1 MILITARY)		50:1 @ 10,000' / 40:1 @ 40,000'		50:1 @ 10,000' / 40:1 @ 40,000'		20:1		20:1	
APPROACH VISIBILITY MINIMUMS	3/4 MILE		SAME		1/2 MILE		SAME		SAME	
TYPE OF AERONAUTICAL SURVEY REQUIRED	VERTICALLY GUIDED		SAME		VERTICALLY GUIDED		SAME		NON-VERTICALLY GUIDED	
RUNWAY DEPARTURE SURFACE	TYPE 7 (40:1)		SAME		TYPE 7 (40:1)		SAME		N/A	
RUNWAY OBJECT FREE AREA LENGTH BEYOND RW END	715'		1,000'		1,000'		300'		300'	
RUNWAY OBJECT FREE AREA WIDTH	800'		SAME		800'		SAME		800'	
OBSTACLE FREE ZONE LENGTH BEYOND RW END	200'		SAME		200'		SAME		200'	
OBSTACLE FREE ZONE WIDTH	400'		SAME		400'		SAME		400'	
THRESHOLD SITING SURFACE	TYPE 4 / (6 VERTICAL)		SAME		TYPE 5 / (6 VERTICAL)		SAME		TYPE 3	
THRESHOLD SITING SURFACE SLOPE	20:1 (30:1)		SAME		34:1 (30:1)		SAME		20:1	
INNER APPROACH OBSTACLE FREE ZONE LENGTH (BEYOND LAST LIGHT UNIT IN ALS)	200'		SAME		200'		SAME		N/A	
INNER APPROACH OBSTACLE FREE ZONE WIDTH	400'		SAME		400'		SAME		N/A	
INNER-TRANSITIONAL OBSTACLE FREE ZONE WIDTH	N/A		SAME		869'		901'		N/A	
PRECISION OBSTACLE FREE ZONE DIMENSIONS	NONE		SAME		200' X 800'		SAME		N/A	
VISUAL AND INSTRUMENT NAVAIDS	MAL-S (FAA) PAPI-4L (FAA)		MAL-S-R Localizer Glideslope (OANG/FAA)		MAL-S-R VASI-4L (FAA) Localizer Glideslope (FAA)		Same		NONE	
TOUCHDOWN ZONE ELEVATIONS	4,091.0'		SAME		4,095.4'		SAME		4,090.4'	
TAXIWAY DESIGN GROUP	TDG 3		TDG 5		TDG 3		TDG 5		TDG 2	
PARALLEL/CONNECTOR TAXIWAY WIDTH	75'		SAME		75'		SAME		35'	
RUNWAY CL TO TAXIWAY CL SEPARATION	787'		SAME		787'		SAME		525'	
RUNWAY CL TO HOLDLINE SEPARATIONS	291'		SAME		291'		SAME		200'	
RUNWAY CL TO AIRCRAFT PARKING SEPARATIONS	500 FEET		SAME		500 FEET		SAME		500 FEET	
VERTICAL AND HORIZONTAL DATUM	NAVD88, NAD83									
CRITICAL AIRCRAFT	F-15 (D-II) BOEING MD-87 SERIES (C-III)		F-15 (D-II) DC-10-30 SERIES (D-IV)		F-15 (D-II) BOEING MD-87 SERIES (C-III)		F-15 (D-II) DC-10-30 SERIES (D-IV)		KING AIR 350 / 1900 SERIES	
WINGSPAN	107.85'		165'		107.85'		165'		58'	
TAIL HEIGHT	31.17'		57'		31.17'		57'		16'	
APPROACH SPEED	CATEGORY D (141 TO <166 KNOTS)		SAME		CATEGORY D (141 TO <166 KNOTS)		SAME		CATEGORY B (91 TO <121 KNOTS)	
MAIN GEAR WIDTH	20.4'		35'		20.4'		35'		17'	
COCKPIT TO MAIN GEAR	62.92'		88'		62.92'		88'		16'	
MAXIMUM TAKEOFF WEIGHT	149,500 LBS		555,000 LBS		149,500 LBS		555,000 LBS		17,200 LBS	

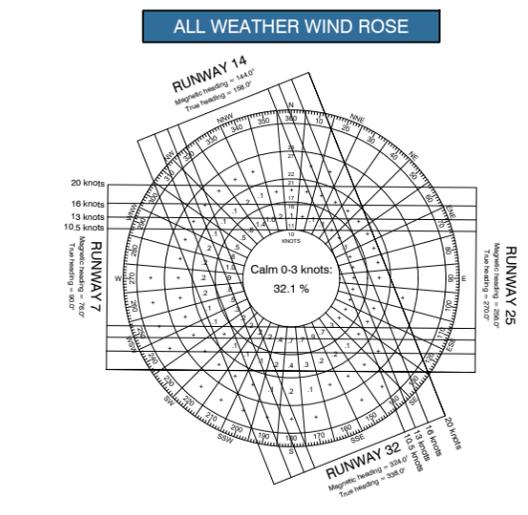
EXISTING TAXIWAY DATA										
NAME	WIDTH	SHOULDER	ADG	TDG	TSA	TOFA	TESM	LIGHTING	OBJECTS INSIDE TSA AND TOFA	SEPARATION FROM TAXIWAY CL TO FIXED MOVABLE OBJECT
TAXIWAY A	75'	0'	III	5	118'	186'	15'	MITL	N/A	93'
TAXIWAY B	75'	30'	III	5	118'	186'	15'	MITL	N/A	93'
TAXIWAY B1	75'	30'	III	5	118'	186'	15'	MITL	N/A	93'
TAXIWAY B2	75'	30'	III	5	118'	186'	15'	MITL	N/A	93'
TAXIWAY B3	75'	30'	III	5	118'	186'	15'	MITL	N/A	93'
TAXIWAY C	75'	30'	III	5	118'	186'	15'	MITL	N/A	N/A
TAXIWAY D	75'	30'	III	5	118'	186'	15'	MITL	N/A	93'
TAXIWAY E	75'	20'	III	5	118'	186'	15'	MITL	N/A	93'
TAXIWAY F (BETWEEN TWY D and TWY G)	50'	0'	III	3	118'	186'	15'	MITL	N/A	N/A
TAXIWAY F (BETWEEN TWY G AND 14/32)	75'	10'	III	5	118'	186'	15'	MITL	N/A	N/A
TAXIWAY F (EAST OF RWY 14/32)	50'	10'	II	2	79'	131'	7.5'	MITL	N/A	65.5'
TAXIWAY G	75'	15'	III	5	118'	186'	15'	MITL	N/A	93'
TAXIWAY H	35'	7.5'	II	2	79'	131'	7.5'	NONE	N/A	N/A
TAXIWAY K	75'	20'	III	5	118'	186'	15'	MITL	N/A	93'

FUTURE TAXIWAY DATA										
NAME	WIDTH	SHOULDER	ADG	TDG	TSA	TOFA	TESM	LIGHTING	OBJECTS INSIDE TSA AND TOFA	SEPARATION FROM TAXIWAY CL TO FIXED MOVABLE OBJECT
TAXIWAY A	75'	0'	III	5	118'	186'	15'	MITL	N/A	93'
TAXIWAY B	75'	30'	IV	5	171'	259'	15'	MITL	N/A	129.5'
TAXIWAY B (BETWEEN TAXIWAYS B1 AND B2)	75'	30'	IV	5	171'	225'	15'	MITL	N/A	112.5'
TAXIWAY B1	75'	30'	IV	5	171'	259'	15'	MITL	N/A	129.5'
TAXIWAY B2	75'	30'	IV	5	171'	259'	15'	MITL	N/A	129.5'
TAXIWAY B3	75'	30'	IV	5	171'	259'	15'	MITL	N/A	129.5'
TAXIWAY D	75'	30'	III	5	118'	186'	15'	MITL	N/A	93'
TAXIWAY D1*	75'	30'	III	5	118'	186'	15'	MITL	N/A	N/A
TAXIWAY E	75'	20'	III	5	118'	186'	15'	MITL	N/A	93'
TAXIWAY F* (BETWEEN TWY D AND RWY 14/32)	75'	10'	III	5	118'	186'	15'	MITL	N/A	N/A
TAXIWAY F (BETWEEN RWY 14/32 AND RWY 25)	35'	10'	II	2	79'	131'	7.5'	MITL	N/A	65.5'
TAXIWAY F1*	50'	10'	III	3	118'	186'	10'	MITL	N/A	93'
TAXIWAY F2*	35'	10'	II	2	79'	131'	7.5'	MITL	N/A	65.5'
TAXIWAY G*	75'	30'	III	5	118'	186'	15'	MITL	N/A	93'
TAXIWAY G2*	75'	31'	III	5	118'	186'	15'	MITL	N/A	93'
TAXIWAY G3*	75'	32'	III	5	118'	186'	15'	MITL	N/A	93'
TAXIWAY H	35'	15'	II	2	79'	131'	7.5'	NONE	N/A	65.5'

* Future Taxiway/Taxilanes will be renamed following conventions in FAA Engineering Brief No. 89

ALP NOTES	
1	ALP prepared using design criteria from FAA Advisory Circular 150/5300-13A Change 1, Airport Design, FAA Standard Operating Procedures 2.00 and 3.00, and Part 77 of the Federal Aviation Regulations (FAR), Safe, Efficient Use, and Preservation of the Navigable Airspace.
2	All coordinates NAD83 and all elevations NAVD88. Horizontal and vertical datum source: AGIS Survey (Quantum, December 2016).
3	Temperature data source: National Weather Service (NWS), Climate Meteorological Summary, Klamath Falls Station (2007-2016).
4	Design aircraft based on Chapter 2 - Aviation Activity Forecasts, of the Master Plan update. Forecasts approved February 11, 2019.
5	Magnetic Declination source: National Geophysical Data Center, July 2020.
6	Service level sources: FAA National Plan of Integrated Airport Systems (NPIAS), 2019-2023 Report, and Oregon Department of Transportation (ODOT), Oregon Aviation System Airports map.
7	Property calculations based on 2021 LMT Exhibit 'X' and Klamath County title records. Fee simple total excludes a 60-acre offsite wetlands mitigation area.
8	Existing approach minimums, approach category and departure procedures based on published approach plates (FAA Airport/Facility Directory and FAA Instrument Flight Procedures Information Gateway) on July 29, 2020.
9	Pavement Design Strength Source: FAA 5010.
10	Because of magnetic declination, runway end numbers will change in the future.
11	Runway 14/32 hold lines are located 291' from runway centerline. Runway 7/25 hold lines are 250' from runway centerline and will change to 200' in the future.

NONSTANDARD CONDITIONS	
EXISTING CONDITION	DISPOSITION
12	Southwest GA hangars penetrate Taxilane OFAs. TSAs remain clear. Area limited to ADG I aircraft.
13	Taxiway A Direct access to Runway 14. Acute angled entrance to Runway 14. Break direct access and form a 90 degree turn into Runway 14.
14	Taxiway C Direct access to Runway 14. Convergence of Taxiway G and EOR ramp creates expansion of pavement in ROFA. Break direct access and form a 90 degree turn into Runway 14. Remove expansion of pavement and expand EOR ramp south.
15	Taxiway E Direct access to Runway 14/32. Acute angled intersection with Runway 14/32 and Taxiway B3. Break direct access and form a 90 degree turn into Runway 14/32.
16	Taxiway D Direct access to Runway 7. Non-standard bypass to Runway 7 end. Break direct access to Runway 7 and remove bypass.
17	Taxiway F Non-standard bypass to Runway 25 end. Taxiway width is 50' between Taxiways D and G. Taxiway width is 50' east of Runway 14/32. Taxiway width will reduce to 35' for TDG 2 aircraft. Bypass will be removed.
18	Taxiway H Direct access between ramp and Runway 7/25. Break direct access between ramp and Runway 7/25.
19	Road goes through Runway 7/25 ROFA and RSA. Runway 25 end shifting west 25' to keep road out of ROFA and RSA. Non-standard condition will be corrected and standard ROFA length will be provided. Brett Way and fence line will be relocated out of ROFA.
20	Actual ROFA length not D-III-2400 standard length of 1,000'.



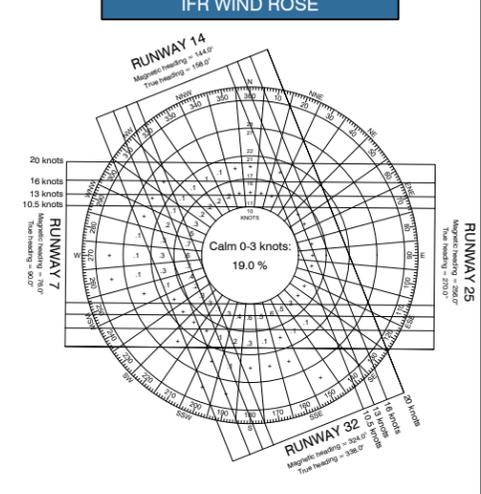
ALL WEATHER WIND COVERAGE				
RUNWAY	10.5 KNOTS (12 M.P.H.)	13 KNOTS (15 M.P.H.)	16 KNOTS (18.5 M.P.H.)	20 KNOTS (23 M.P.H.)
14/32	93.80%	96.50%	98.80%	99.70%
7/25	90.10%	93.90%	97.40%	99.10%
Combined	99.00%	99.60%	99.90%	100.00%
Number of Observations: 102,488				

Wind Data Source: Klamath Falls Airport (Station # 725895)
Period of Time: 2007 - 2016
Note: Windrose compass headings are true north.

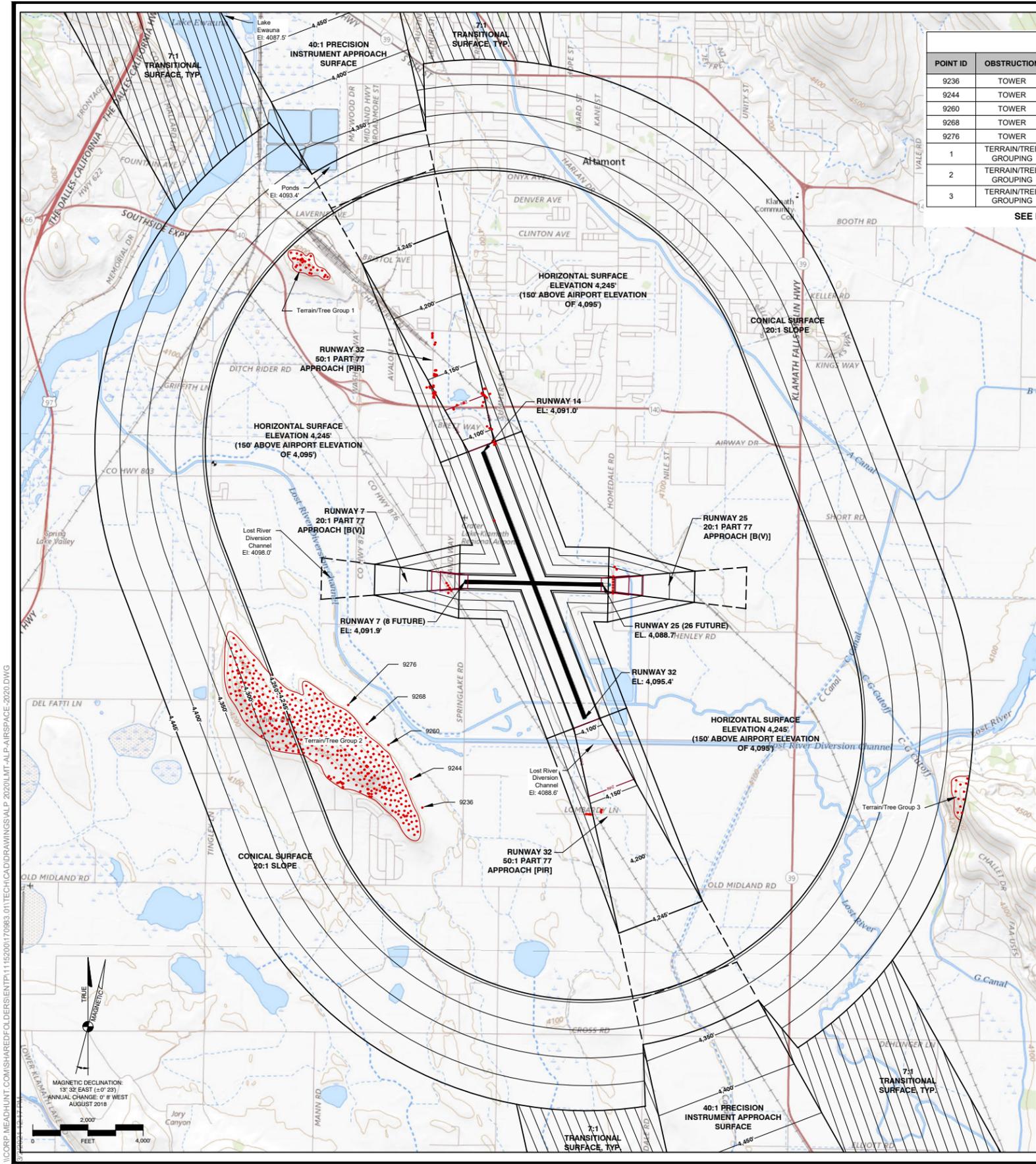
AIRPORT DATA		
	EXISTING	FUTURE
AIRPORT REFERENCE CODE	D-III (LARGE AIRCRAFT)	D-IV (HEAVY AIRCRAFT)
MEAN MAX. TEMPERATURE (HOTTEST MONTH)	83.0° (JULY)	N/A
AIRPORT ELEVATION (AMSL NAVD88)	4,095.4' (RUNWAY AGIS SURVEY / RUNWAY 32 HIGH POINT)	4,095.4' (RUNWAY AGIS SURVEY / RUNWAY 32 HIGH POINT)
ELECTRONIC NAVIGATION AIDS	ILS, RNAV GPS, VOR, NDB (offsite)	SAME
UNICOM (MHz)	122.950	SAME
CONTROL TOWER (MHz)*	121.9 348.6 (GRND) / 133.975 257.8 (TWR) / 123.675 270.8 (APPCHD/DEP)	SAME
AIRPORT REFERENCE POINT (ARP)	42° 09' 22.1" N 121° 43' 59.5" W	42° 09' 22.1" N 121° 44' 00.1" W
MISCELLANEOUS FACILITIES	PAPI, VASI, REL. ASOS, WINDCONE	PAPI, REL. ASOS, WINDCONE
CRITICAL AIRCRAFT	F-15 (D-II) / MD-87 (C-III)	F-15 (D-II) / DC-10-30 (D-IV)
AIRPORT MAGNETIC VARIATION (JULY 2020)	14° 11' EAST (40° 22' JULY 2000)	MOVING 0° WEST / YEAR
NPIAS CATEGORY	REGIONAL	SAME
STATE EQUIVALENT SERVICE ROLE	COMMERCIAL SERVICE	SAME
AIRPORT ACREAGE	FEE SIMPLE: 1,250.74 EASEMENTS: 670.25	FEE SIMPLE: 1,783.29 (+472.55) EASEMENTS: 670.25 (+0)

DECLARED DISTANCES					
EXISTING	RUNWAY 14	RUNWAY 32	RUNWAY 7	RUNWAY 25	
TAKEOFF RUN AVAILABLE (TORA)	10,302'	10,302'	5,258'	5,258'	
TAKEOFF DISTANCE AVAILABLE (TODA)	10,302'	10,302'	5,258'	5,258'	
ACCELERATE-STOP DISTANCE AVAILABLE (ASDA)	10,302'	10,302'	5,258'	5,258'	
LANDING DISTANCE AVAILABLE (LDA)	10,302'	10,302'	4,952'	4,746'	
FUTURE	RUNWAY 14	RUNWAY 32	RUNWAY 7	RUNWAY 25	
TAKEOFF RUN AVAILABLE (TORA)	10,302'	10,302'	5,000'	5,000'	
TAKEOFF DISTANCE AVAILABLE (TODA)	10,302'	10,302'	5,000'	5,000'	
ACCELERATE-STOP DISTANCE AVAILABLE (ASDA)	10,302'	10,302'	5,000'	5,000'	
LANDING DISTANCE AVAILABLE (LDA)	10,302'	10,302'	5,000'	5,000'	

MODIFICATION TO STANDARDS	
STANDARD TO BE MODIFIED	DESCRIPTION
285	Future Glideslope antenna and equipment shelter set 200' east of Runway 14/32 centerline and within ROFA and TOFA. Most of antenna to be sited 110.5' from Taxiway B centerline. Portion of Taxiway B between Taxiways B1 and B2 reclassified as a taxiway for aircraft with a wingspan over 132'.
	Pending FAA approval.



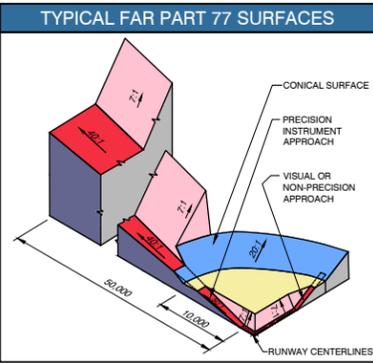
IFR WIND COVERAGE				
RUNWAY	10.5 KNOTS (12 M.P.H.)	13 KNOTS (15 M.P.H.)	16 KNOTS (18.5 M.P.H.)	20 KNOTS (23 M.P.H.)
14/32	94.60%	96.70%	98.70%	99.60%
7/25	94.70%	96.70%	98.60%	99.60%
Combined	99.10%	99.70%	99.90%	



PART 77 OBSTRUCTIONS

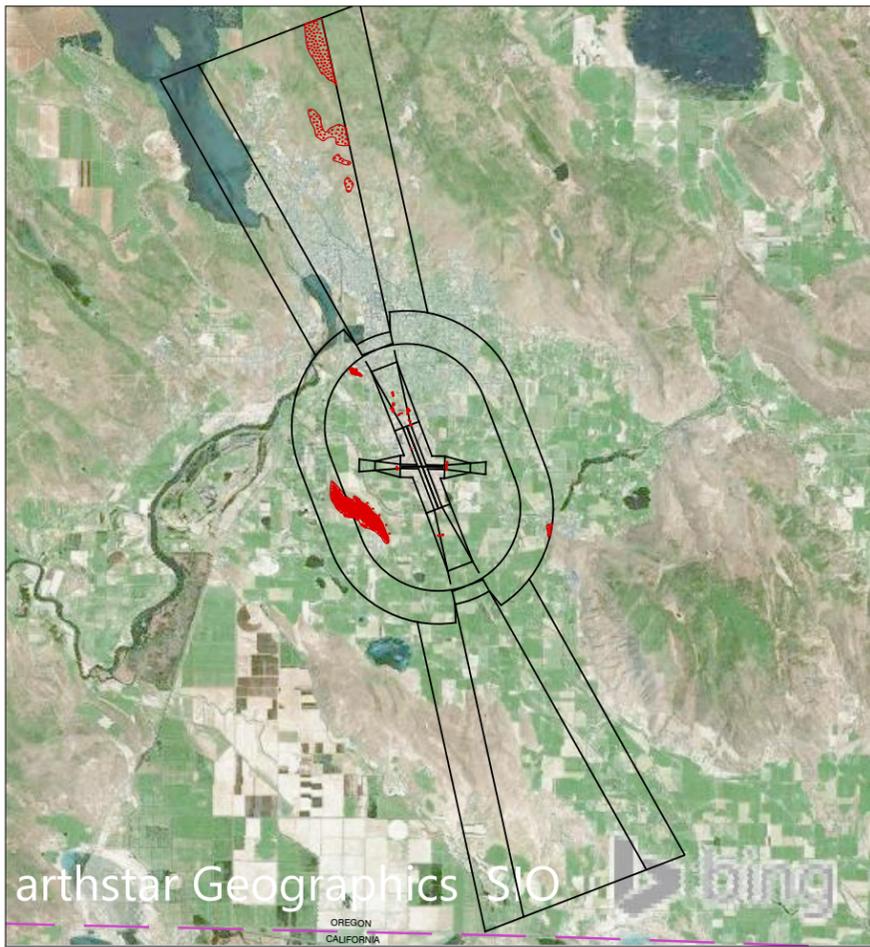
POINT ID	OBSTRUCTION	SURFACE PENETRATED	TOP ELEVATION	PENETRATION	ABOVE GROUND	PROPOSED ACTION
9236	TOWER	HORIZONTAL	4258.0	12.6	122.8	*TO BE DETERMINED
9244	TOWER	HORIZONTAL	4260.8	15.4	124.9	*TO BE DETERMINED
9260	TOWER	HORIZONTAL	4266.7	21.3	123.5	*TO BE DETERMINED
9268	TOWER	HORIZONTAL	4267.8	22.4	107.3	*TO BE DETERMINED
9276	TOWER	HORIZONTAL	4257.7	12.3	104.7	*TO BE DETERMINED
1	TERRAIN/TREE GROUPING	HORIZONTAL	4247-4351	1-105		TO REMAIN
2	TERRAIN/TREE GROUPING	HORIZONTAL/ CONICAL	4247-4657	1-353		TO REMAIN
3	TERRAIN/TREE GROUPING	CONICAL	4457-4679	15-239		TO REMAIN

SEE INNER APPROACH SHEETS FOR CLOSE-IN OBSTRUCTIONS



- LEGEND**
- Runway
 - Existing Airport Property Boundary
 - Future Airport Property Boundary
 - Existing Aviation Easement
 - Part 77 Surfaces
 - Part 77 Surface Contour
 - Threshold Sling Surface
 - Glideslope Qualification Surface
 - Terrain Contours
 - Terrain/Tree Group Penetration

- NOTES:**
- Runway ends, Part 77 surface contours and obstruction elevations are shown in NAD83 and NAVD88. All elevations in feet above mean sea level (MSL).
 - Horizontal and vertical datum source: Quantum Spatial (December 2016).
 - Basemap source: USGS Topographic maps (7.5 Minute Series).
 - Airspace surfaces associated with future runway ends and instrument approach procedures are illustrated and analyzed; removal of displaced thresholds on Runway 7/25 and relocating Runway 25 End for a future total length of 5,000'.
 - For outer approach plans: see Sheets 5 and 6.
 - For close-in obstruction detail near each runway end, see Inner-Approach Plans.
 - For departure surfaces, see Sheets 15 and 16.
 - * To be further studied in individual airspace case.
 - ** Per Part 77, 15 feet vertical clearance added to road elevations and 23 feet added to railroads.



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CRATER LAKE KLAMATH REGIONAL AIRPORT

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CRATER LAKE - KLAMATH REGIONAL AIRPORT
 KLAMATH FALLS, OREGON

REVISIONS

NO.	DATE	DESCRIPTION

M&H NO: 1115200-170983.01
 DATE: FEBRUARY 2021
 DESIGNED BY: MT
 DRAWN BY: TE, DL
 CHECKED BY: MT, KM
 DO NOT SCALE DRAWINGS

SHEET CONTENTS

AIRPORT AIRSPACE DRAWING

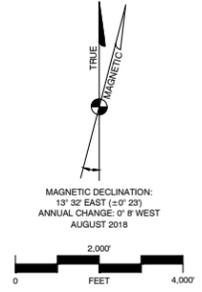
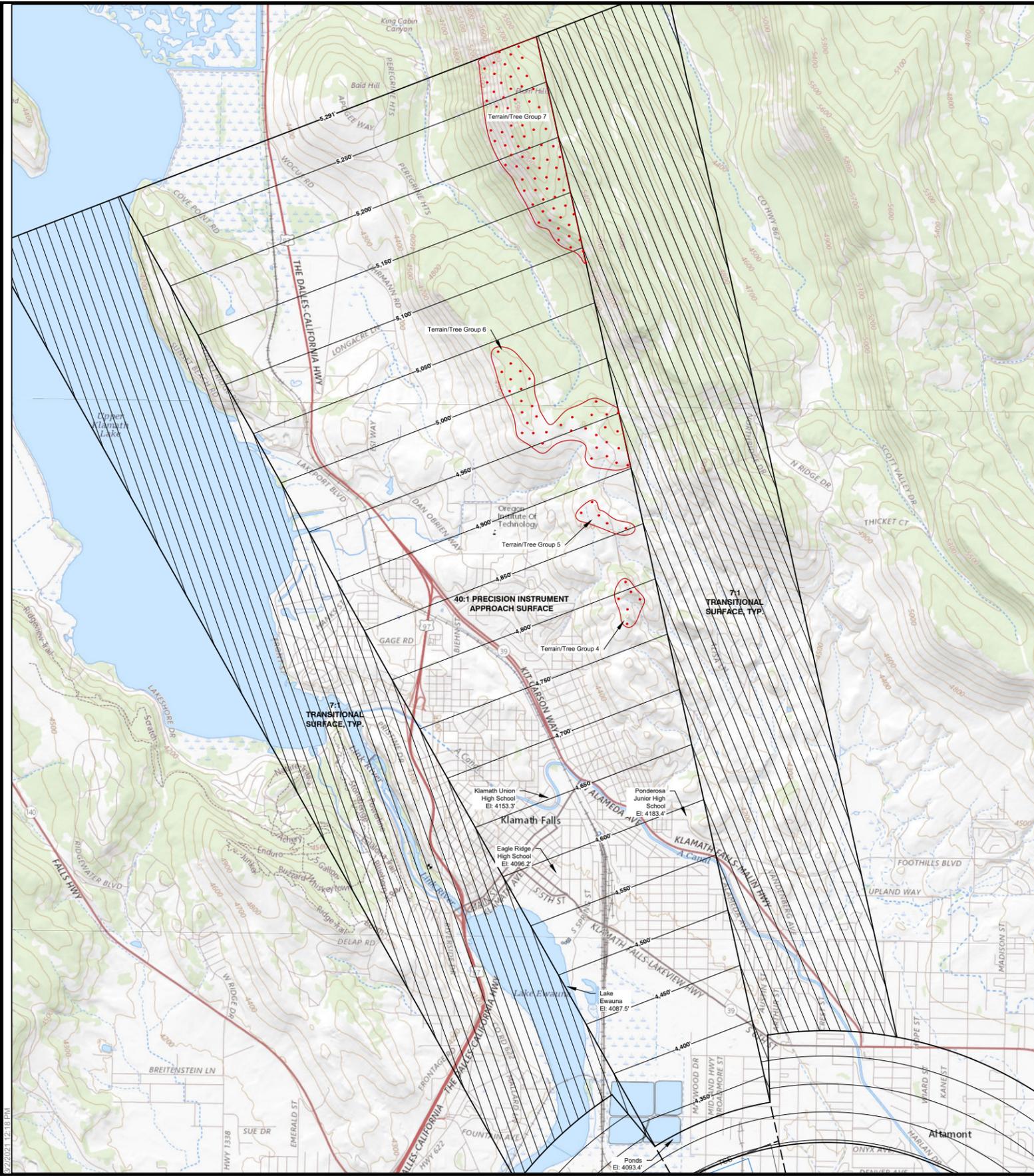
SHEET NO.

4 of 22

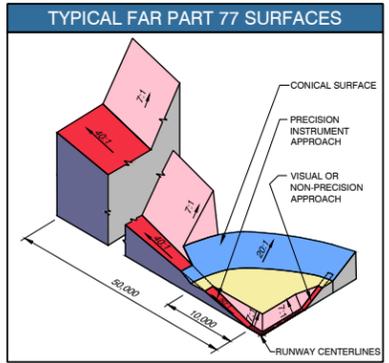
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- LEGEND**
- Runway
 - Existing Airport Property Boundary
 - Future Airport Property Boundary
 - Existing Aviation Easement
 - Part 77 Surfaces
 - Part 77 Surface Contour
 - Threshold Siting Surface
 - Glideslope Qualification Surface
 - Terrain Contours
 - Terrain/Tree Group Penetration



- NOTES:**
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PART 77 OBSTRUCTIONS						
POINT ID	OBSTRUCTION	SURFACE PENETRATED	TOP ELEVATION	PENETRATION	ABOVE GROUND	PROPOSED ACTION
4	TERRAIN/TREE GROUPING	RUNWAY 14 APPROACH	4820-4925	35-128		TO REMAIN
5	TERRAIN/TREE GROUPING	RUNWAY 14 APPROACH	4862-4932	4-47		TO REMAIN
6	TERRAIN/TREE GROUPING	RUNWAY 14 APPROACH	4939-5102	1-110		TO REMAIN
7	TERRAIN/TREE GROUPING	RUNWAY 14 APPROACH	5118-5983	4-737		TO REMAIN

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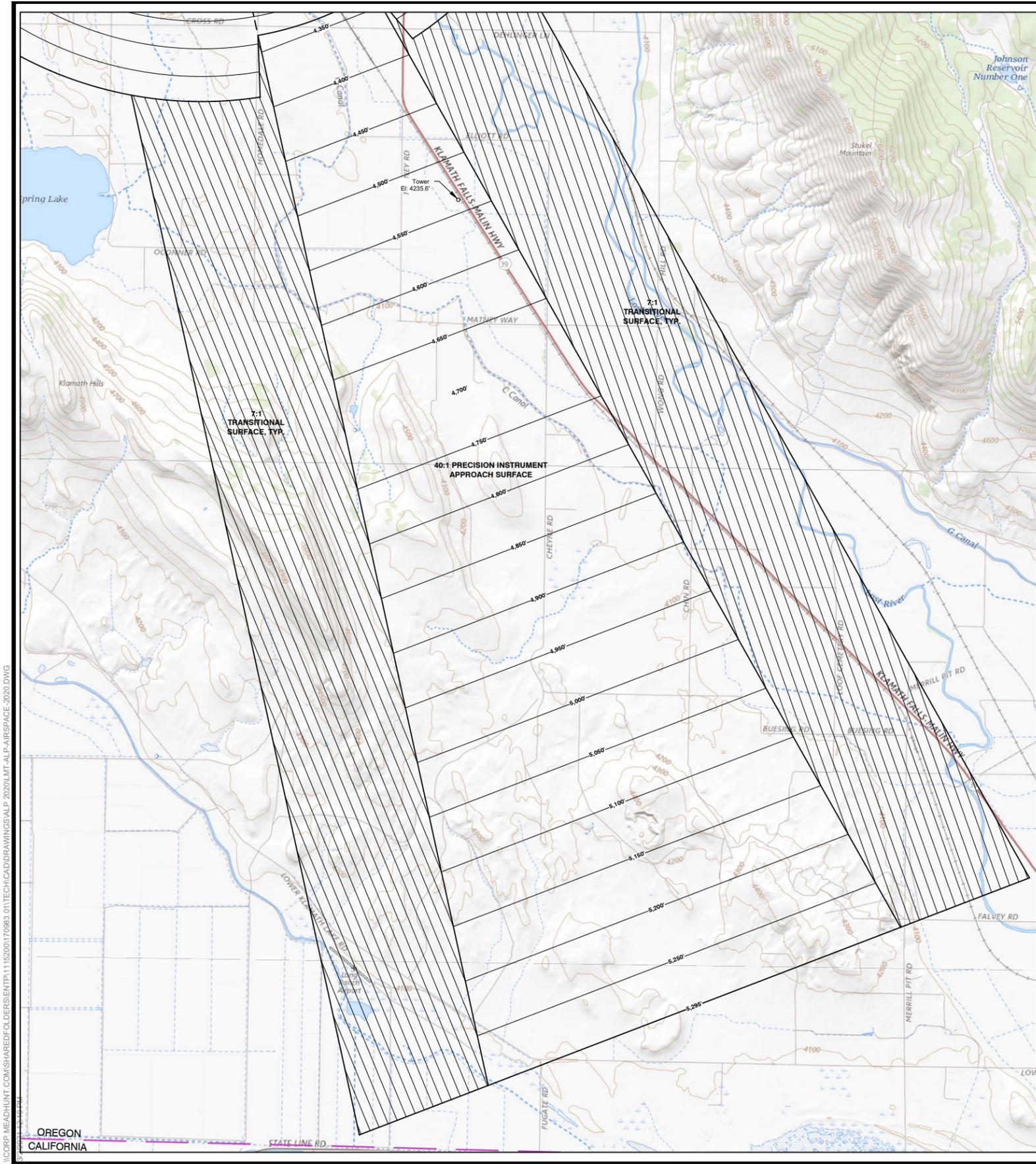
CRATER LAKE - KLAMATH REGIONAL AIRPORT
KLAMATH FALLS, OREGON

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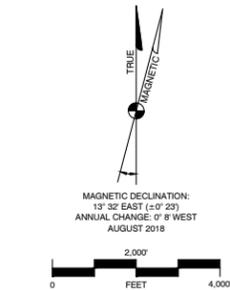
SHEET CONTENTS
RUNWAY 14 OUTER APPROACH PLAN
SHEET NO.



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OREGON
CALIFORNIA

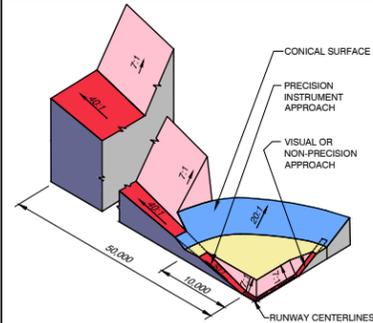
STATE LINE RD



LEGEND: PLAN VIEW

- Runway
- Existing Airport Property Boundary
- Future Airport Property Boundary
- Existing Aviation Easement
- State Boundary
- Part 77 Surfaces
- Part 77 Surface Contour
- Threshold Sling Surface
- Glideslope Qualification Surface
- Terrain Contours
- Terrain/Tree Group Penetration

TYPICAL FAR PART 77 SURFACES



NOTES:

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- Basemap source: USGS Topographic maps (7.5 Minute Series).
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**CRATER LAKE - KLAMATH
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KLAMATH FALLS, OREGON

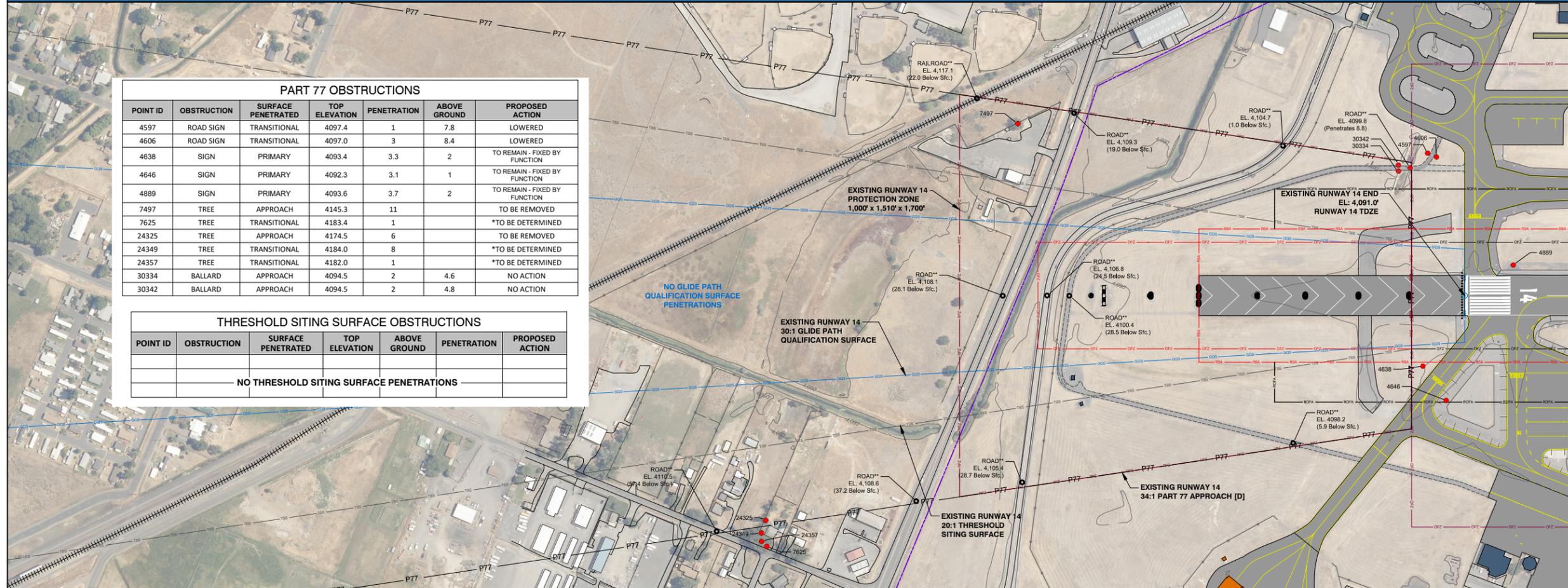
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SHEET CONTENTS
**RUNWAY 32
 OUTER
 APPROACH PLAN**

SHEET NO.
6 of 22
 NOT FOR CONSTRUCTION

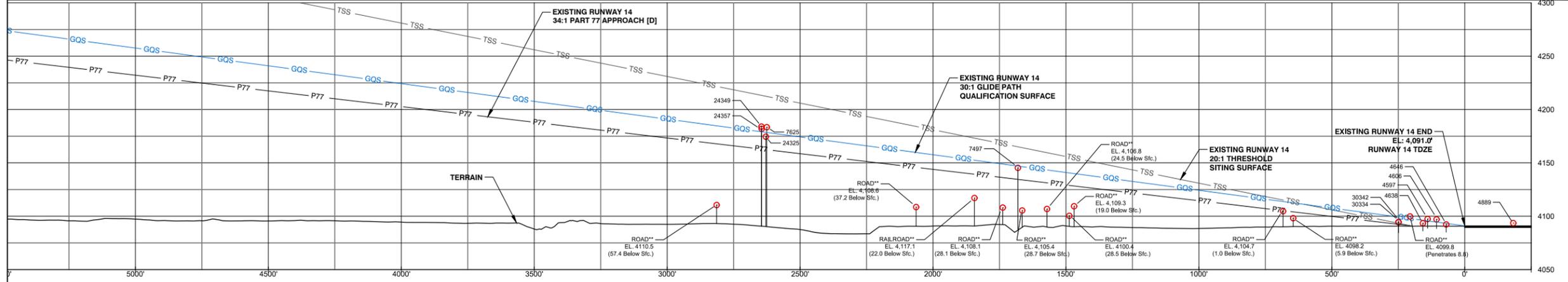
EXISTING RUNWAY 14 INNER APPROACH PLAN



PART 77 OBSTRUCTIONS						
POINT ID	OBSTRUCTION	SURFACE PENETRATED	TOP ELEVATION	PENETRATION	ABOVE GROUND	PROPOSED ACTION
4597	ROAD SIGN	TRANSITIONAL	4097.4	1	7.8	LOWERED
4606	ROAD SIGN	TRANSITIONAL	4097.0	3	8.4	LOWERED
4638	SIGN	PRIMARY	4093.4	3.3	2	TO REMAIN - FIXED BY FUNCTION
4646	SIGN	PRIMARY	4092.3	3.1	1	TO REMAIN - FIXED BY FUNCTION
4889	SIGN	PRIMARY	4093.6	3.7	2	TO REMAIN - FIXED BY FUNCTION
7497	TREE	APPROACH	4145.3	11		TO BE REMOVED
7625	TREE	TRANSITIONAL	4183.4	1		*TO BE DETERMINED
24325	TREE	APPROACH	4174.5	6		TO BE REMOVED
24349	TREE	TRANSITIONAL	4184.0	8		*TO BE DETERMINED
24357	TREE	TRANSITIONAL	4182.0	1		*TO BE DETERMINED
30334	BALLARD	APPROACH	4094.5	2	4.6	NO ACTION
30342	BALLARD	APPROACH	4094.5	2	4.8	NO ACTION

THRESHOLD SITING SURFACE OBSTRUCTIONS						
POINT ID	OBSTRUCTION	SURFACE PENETRATED	TOP ELEVATION	ABOVE GROUND	PENETRATION	PROPOSED ACTION
NO THRESHOLD SITING SURFACE PENETRATIONS						

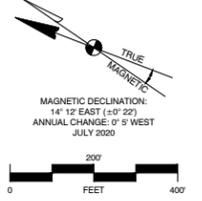
EXISTING RUNWAY 14 INNER APPROACH PROFILE



LEGEND

- Airport Property Boundary
- Future Airport Property
- Part 77 Approach Surface (P77)
- Threshold Siting Surface (TSS)
- 30:1 Glide Path Qualification Surface
- Part 77 Obstruction
- Non Penetrating Obstacle
- Runway Protection Zone (RPZ)
- Runway Safety Area (RSA)
- Obstacle Free Zone (OFZ)
- Terrain Contours

- NOTES:**
- Runway ends, Part 77 surface contours and obstruction elevations are shown in NAD83 and NAVD88. All elevations in feet above mean sea level (MSL).
 - Horizontal and vertical datum source: Quantum Spatial (December 2018).
 - Aerial Source: Quantum Spatial (December 2018).
 - * To be further studied in individual airspace case.
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CRATER LAKE - KLAMATH REGIONAL AIRPORT
 KLAMATH FALLS, OREGON

REVISIONS

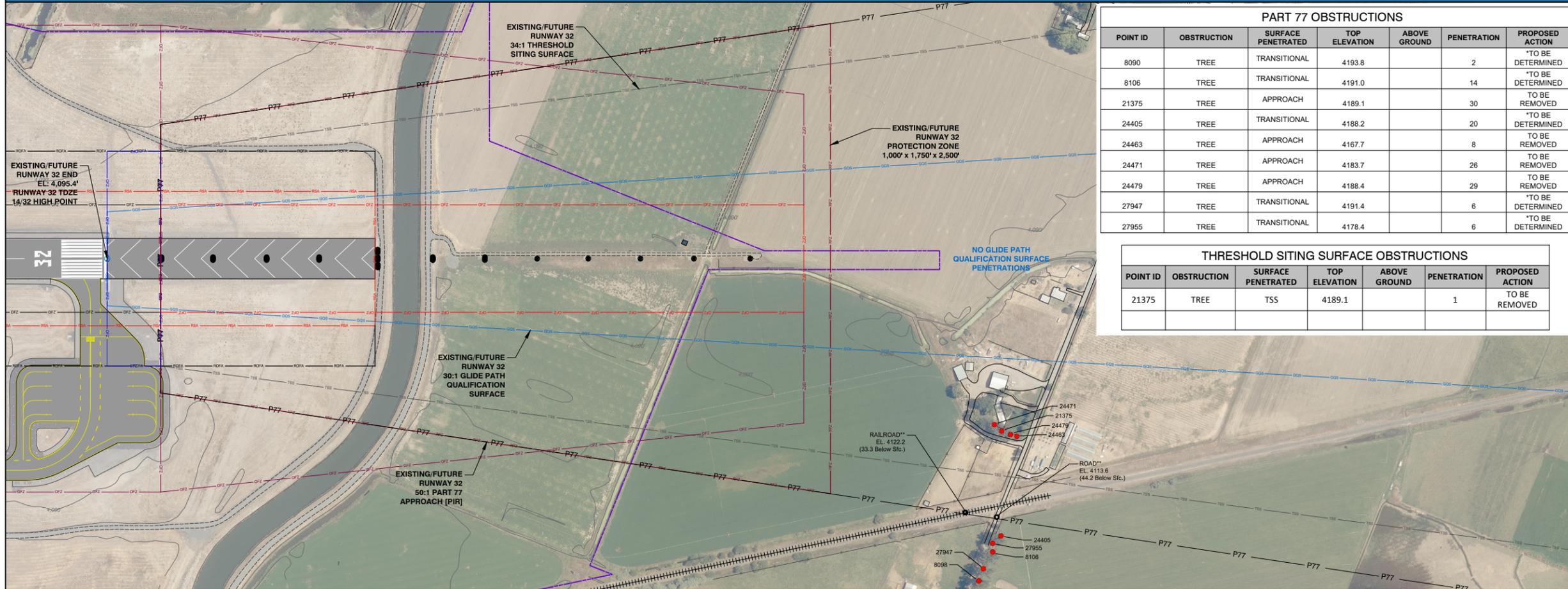
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SHEET CONTENTS
 INNER APPROACH PLAN AND PROFILE
 RUNWAY 14

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EXISTING/FUTURE RUNWAY 32 INNER APPROACH PLAN



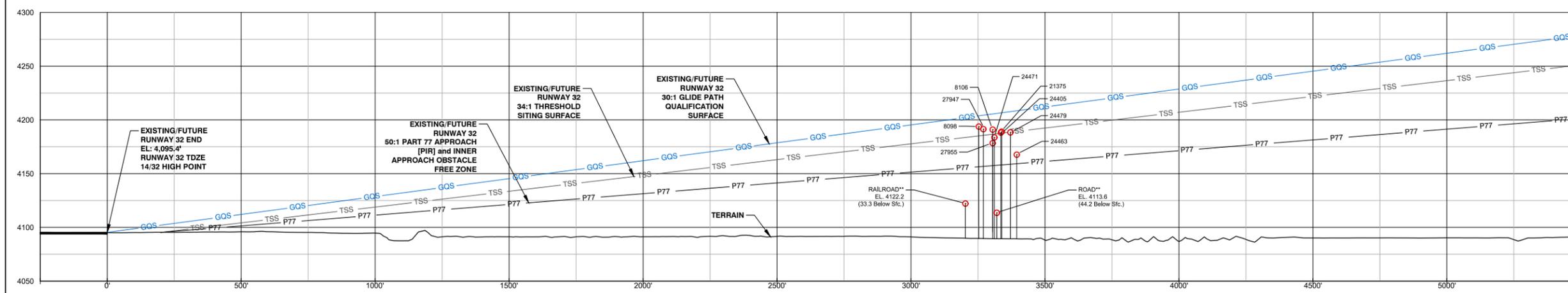
PART 77 OBSTRUCTIONS

POINT ID	OBSTRUCTION	SURFACE PENETRATED	TOP ELEVATION	ABOVE GROUND	PENETRATION	PROPOSED ACTION
8090	TREE	TRANSITIONAL	4193.8		2	*TO BE DETERMINED
8106	TREE	TRANSITIONAL	4191.0		14	*TO BE DETERMINED
21375	TREE	APPROACH	4189.1		30	TO BE REMOVED
24405	TREE	TRANSITIONAL	4188.2		20	*TO BE DETERMINED
24463	TREE	APPROACH	4167.7		8	TO BE REMOVED
24471	TREE	APPROACH	4183.7		26	TO BE REMOVED
24479	TREE	APPROACH	4188.4		29	TO BE REMOVED
27947	TREE	TRANSITIONAL	4191.4		6	*TO BE DETERMINED
27955	TREE	TRANSITIONAL	4178.4		6	*TO BE DETERMINED

THRESHOLD SITING SURFACE OBSTRUCTIONS

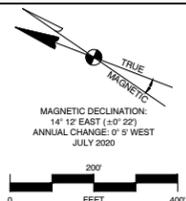
POINT ID	OBSTRUCTION	SURFACE PENETRATED	TOP ELEVATION	ABOVE GROUND	PENETRATION	PROPOSED ACTION
21375	TREE	TSS	4189.1		1	TO BE REMOVED

EXISTING/FUTURE RUNWAY 32 INNER APPROACH PROFILE



- LEGEND**
- Airport Property Boundary
 - Future Airport Property
 - Part 77 Approach Surface (P77)
 - Threshold Siting Surface (TSS)
 - 30:1 Glide Path Qualification Surface
 - Part 77 Obstruction
 - Non Penetrating Obstacle
 - Runway Protection Zone (RPZ)
 - Runway Safety Area (RSA)
 - Obstacle Free Zone (OFZ)
 - Terrain Contours

- NOTES:**
- Runway ends, Part 77 surface contours and obstruction elevations are shown in NAD83 and NAVD88. All elevations in feet above mean sea level (MSL).
 - Horizontal and vertical datum source: Quantum Spatial (December 2018).
 - Aerial Source: Quantum Spatial (December 2018).
 - * To be further studied in individual airspace case.
 - ** Per Part 77, 15 feet vertical clearance added to road elevations and 23 feet added to railroads.



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9600 NE Cascades Parkway,
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CRATER LAKE - KLAMATH REGIONAL AIRPORT
KLAMATH FALLS, OREGON

REVISIONS

NO.	DATE	DESCRIPTION

MSH NO.: 1115200-170983.01
DATE: FEBRUARY 2021
DESIGNED BY: MT
DRAWN BY: TE, DL
CHECKED BY: MT, KM
DO NOT SCALE DRAWINGS

SHEET CONTENTS
INNER APPROACH PLAN AND PROFILE RUNWAY 32

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EXISTING RUNWAY 7 INNER APPROACH PLAN



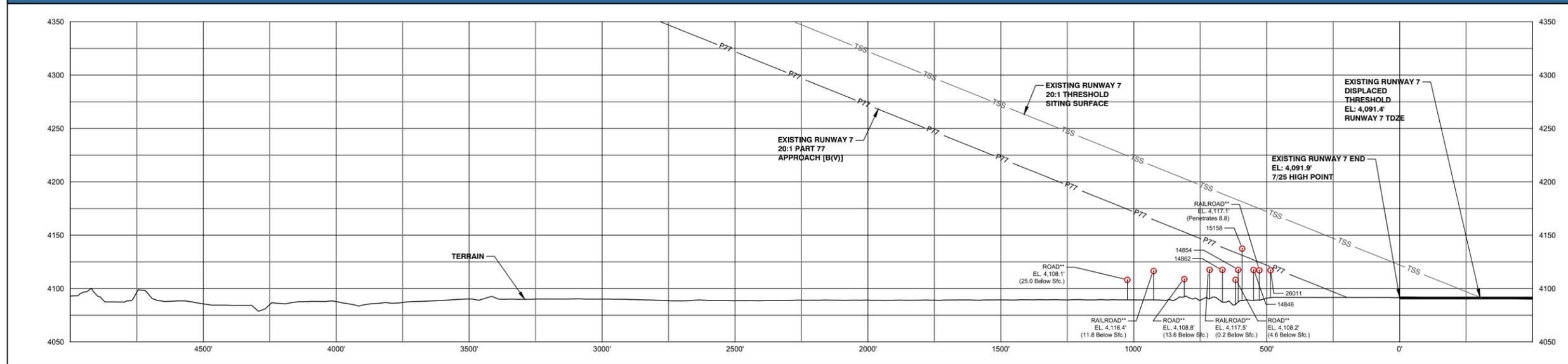
PART 77 OBSTRUCTIONS

POINT ID	OBSTRUCTION	SURFACE PENETRATED	TOP ELEVATION	ABOVE GROUND	PENETRATION	PROPOSED ACTION
14862	RAILROAD	APPROACH	4117.5	23	2	TO REMAIN
14854	RAILROAD	APPROACH	4117.4	23	5	TO REMAIN
14846	RAILROAD	APPROACH	4117.4	23	8	TO REMAIN
15158	TREE	TRANSITIONAL	4137.4		7	*TO BE DETERMINED
26011	RAILROAD	TRANSITIONAL	4117.1	23	3	TO REMAIN

THRESHOLD SITING SURFACE OBSTRUCTIONS

POINT ID	OBSTRUCTION	SURFACE PENETRATED	TOP ELEVATION	ABOVE GROUND	PENETRATION	PROPOSED ACTION
NO THRESHOLD SITING SURFACE PENETRATIONS						

EXISTING RUNWAY 7 INNER APPROACH PROFILE

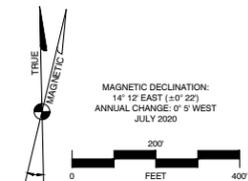


LEGEND:

- Airport Property Boundary
- Future Airport Property
- Part 77 Approach Surface (P77)
- Threshold Siting Surface (TSS)
- Part 77 Obstruction
- Non Penetrating Obstacle
- Runway Protection Zone (RPZ)
- Runway Safety Area (RSA)
- Obstacle Free Zone (OFZ)
- Terrain Contours

NOTES:

- Runway ends, Part 77 surface contours and obstruction elevations are shown in NAD83 and NAVD88. All elevations in feet above mean sea level (MSL).
- Horizontal and vertical datum source: Quantum Spatial (December 2018).
- Aerial Source: Quantum Spatial (December 2018).
- * To be further studied in individual airspace case.
- ** Per Part 77, 15 feet vertical clearance added to road elevations and 23 feet added to railroads.



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CRATER LAKE - KLAMATH
REGIONAL AIRPORT

KLAMATH FALLS, OREGON

NO.	DATE	DESCRIPTION

MMH NO.: 1115200-170983.01
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DRAWN BY: TE, DL
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SHEET CONTENTS
INNER APPROACH
PLAN AND PROFILE
RUNWAY 7
EXISTING

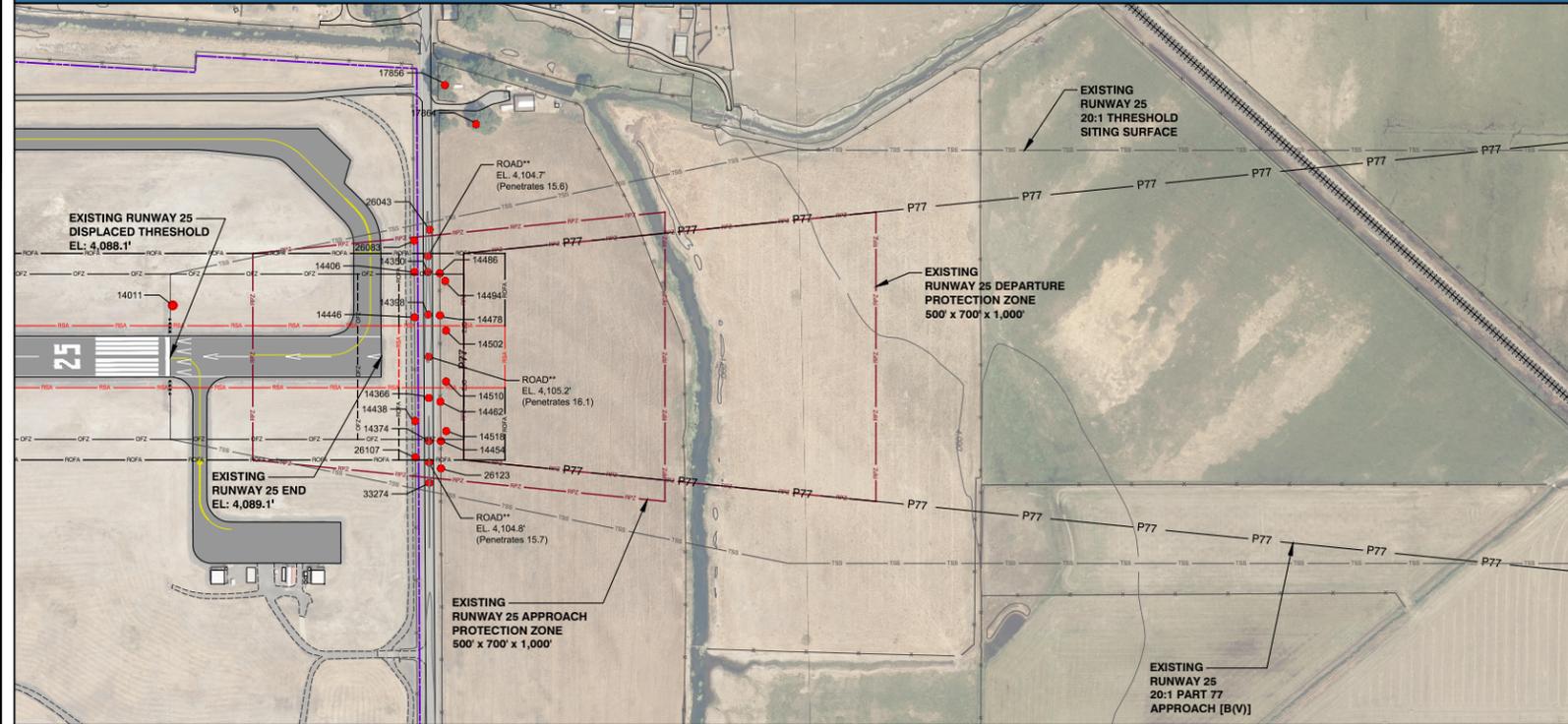
SHEET NO.

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EXISTING RUNWAY 25 INNER APPROACH PLAN



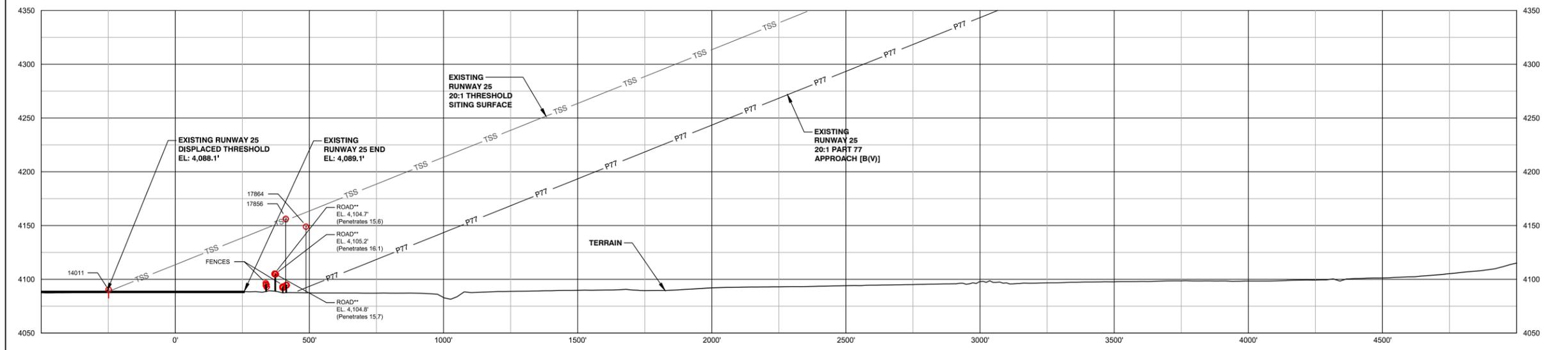
PART 77 OBSTRUCTIONS

POINT ID	OBSTRUCTION	SURFACE PENETRATED	TOP ELEVATION	ABOVE GROUND	PENETRATION	PROPOSED ACTION
14011	FENCE	PRIMARY	4090.4	3.6	1	TO BE REMOVED WITH FUTURE RWY 25 RELOCATION
14350	ROAD	PRIMARY	4105.1	15	16	TO BE REMOVED WITH FUTURE RWY 25 RELOCATION
14356	ROAD	PRIMARY	4105.0	15.0	16	TO BE REMOVED WITH FUTURE RWY 25 RELOCATION
14374	ROAD	PRIMARY	4105.0	15.0	16	TO BE REMOVED WITH FUTURE RWY 25 RELOCATION
14398	ROAD	PRIMARY	4105.1	15.0	16	TO BE REMOVED WITH FUTURE RWY 25 RELOCATION
14406	FENCE	PRIMARY	4094.3	6.4	5	TO BE REMOVED WITH FUTURE RWY 25 RELOCATION
14438	FENCE	PRIMARY	4095.1	7.4	6	TO BE REMOVED WITH FUTURE RWY 25 RELOCATION
14446	FENCE	PRIMARY	4095.1	7.3	6	TO BE REMOVED WITH FUTURE RWY 25 RELOCATION
14454	FENCE	PRIMARY	4092.1	4.7	3	TO BE REMOVED WITH FUTURE RWY 25 RELOCATION
14462	FENCE	PRIMARY	4092.8	5.3	4	TO BE REMOVED WITH FUTURE RWY 25 RELOCATION
14478	FENCE	PRIMARY	4092.2	5.1	3	TO BE REMOVED WITH FUTURE RWY 25 RELOCATION
14486	FENCE	PRIMARY	4093.0	5.3	4	TO BE REMOVED WITH FUTURE RWY 25 RELOCATION
14494	AG. EQUIP.	PRIMARY	4094.5	6.4	5	TO BE REMOVED WITH FUTURE RWY 25 RELOCATION
14502	AG. EQUIP.	PRIMARY	4094.8	6.9	6	TO BE REMOVED WITH FUTURE RWY 25 RELOCATION
14510	AG. EQUIP.	PRIMARY	4094.3	6.9	5	TO BE REMOVED WITH FUTURE RWY 25 RELOCATION
14518	AG. EQUIP.	PRIMARY	4094.4	7.4	5	TO BE REMOVED WITH FUTURE RWY 25 RELOCATION
17856	TREE	TRANSITIONAL	4156.2		9	**TO BE DETERMINED
17864	TREE	TRANSITIONAL	4148.9		14	**TO BE DETERMINED
26043	ROAD	TRANSITIONAL	4104.7	15.0	7	**TO BE DETERMINED
26083	FENCE	TRANSITIONAL	4096.4	7.8	3	TO BE REMOVED WITH FUTURE RWY 25 RELOCATION
26107	FENCE	PRIMARY	4092.8	5.2	4	TO BE REMOVED WITH FUTURE RWY 25 RELOCATION
26123	FENCE	TRANSITIONAL	4093.2	5.3	1	TO BE REMOVED WITH FUTURE RWY 25 RELOCATION
33274	ROAD	TRANSITIONAL	4104.8	15.0	8	TO BE REMOVED WITH FUTURE RWY 25 RELOCATION
	ROAD	PRIMARY	4104.7	15.0	15.6	**TO BE DETERMINED
	ROAD	PRIMARY	4105.2	15.0	16.1	**TO BE DETERMINED
	ROAD	PRIMARY	4104.8	15.0	15.7	**TO BE DETERMINED

THRESHOLD SITING SURFACE OBSTRUCTIONS

POINT ID	OBSTRUCTION	SURFACE PENETRATED	TOP ELEVATION	ABOVE GROUND	PENETRATION	PROPOSED ACTION
14011	FENCE	TSS	4090.4	3.6	1	TO BE RELOCATED

RUNWAY 25 INNER APPROACH PROFILE



LEGEND

- Airport Property Boundary
- Future Airport Property
- Part 77 Approach Surface (P77)
- Threshold Siting Surface (TSS)
- Part 77 Obstruction
- Non Penetrating Obstacle
- Runway Protection Zone (RPZ)
- Runway Safety Area (RSA)
- Obstacle Free Zone (OFZ)
- Terrain Contours

NOTES:

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- * To be further studied in individual airspace case.
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CRATER LAKE - KLAMATH
REGIONAL AIRPORT

KLAMATH FALLS, OREGON

REVISIONS

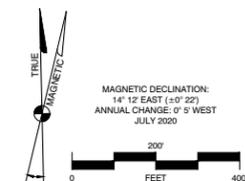
MSH NO: 1115200-170983.01
DATE: FEBRUARY 2021
DESIGNED BY: MT
DRAWN BY: TE, DL
CHECKED BY: MT, KM
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SHEET CONTENTS
INNER APPROACH
PLAN AND PROFILE
RUNWAY 25
EXISTING

SHEET NO.

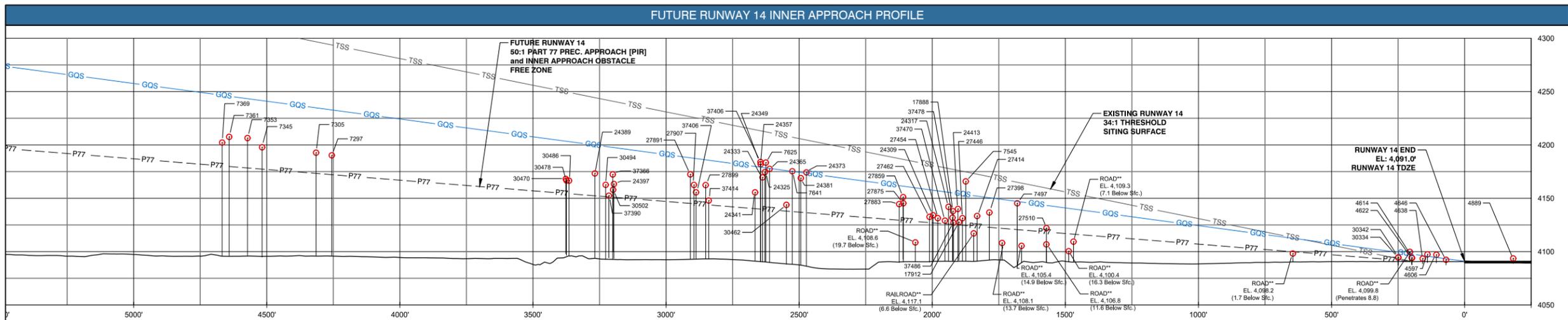
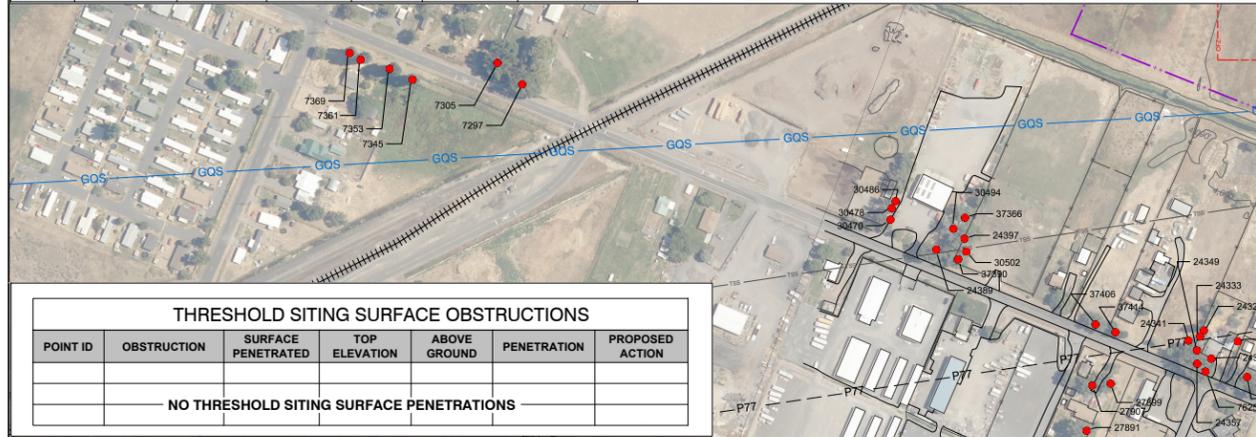
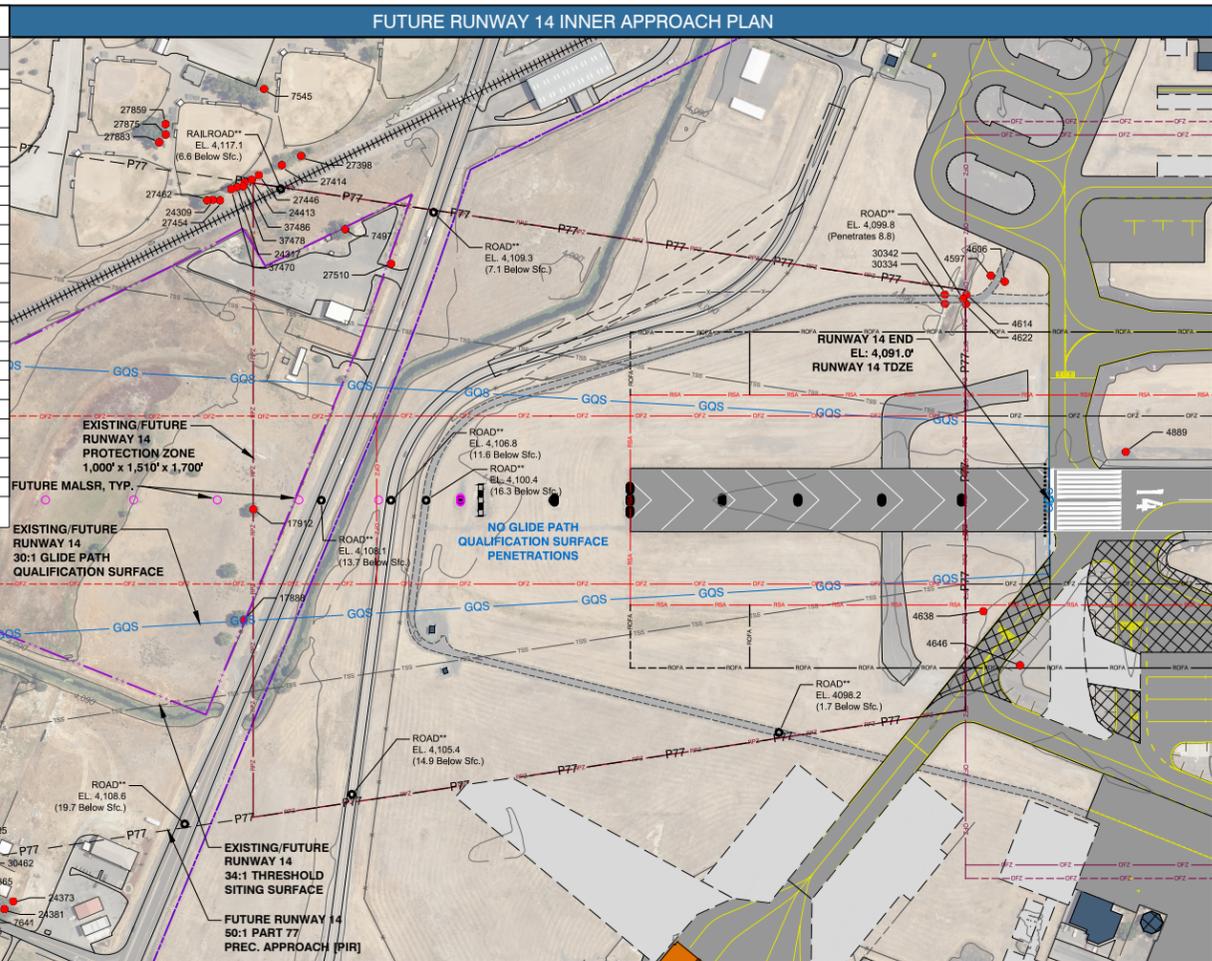
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NOT FOR CONSTRUCTION



PART 77 OBSTRUCTIONS						
POINT ID	OBSTRUCTION	SURFACE PENETRATED	TOP ELEVATION	ABOVE GROUND	PENETRATION	PROPOSED ACTION
4597	ROAD SIGN	TRANSITIONAL	4097.4	7.8	1	LOWERED
4606	ROAD SIGN	TRANSITIONAL	4097.0	8.4	3	LOWERED
4614	ROAD SIGN	PRIMARY	4094.0	4.4	2	TO REMAIN
4622	ROAD SIGN	PRIMARY	4094.3	4.6	3	TO REMAIN
4638	SIGN	APPROACH	4093.4	3.3	2	TO REMAIN - FIXED BY FUNCTION
4646	SIGN	APPROACH	4092.3	3.1	1	TO REMAIN - FIXED BY FUNCTION
4889	SIGN	APPROACH	4093.6	3.7	2	TO REMAIN - FIXED BY FUNCTION
7297	TREE	APPROACH	4190.3	18	18	TO BE REMOVED
7305	TREE	APPROACH	4192.8	19	19	TO BE REMOVED
7345	TREE	APPROACH	4197.8	20	20	TO BE REMOVED
7353	TREE	APPROACH	4206.5	28	28	TO BE REMOVED
7361	TREE	APPROACH	4207.6	27	27	TO BE REMOVED
7369	TREE	APPROACH	4202.2	21	21	TO BE REMOVED
7497	TREE	APPROACH	4145.3	24	24	TO BE REMOVED
7545	TREE	TRANSITIONAL	4165.8	8	8	*TO BE DETERMINED
7625	TREE	TRANSITIONAL	4183.4	32	32	*TO BE DETERMINED
7641	TREE	TRANSITIONAL	4175.3	22	22	*TO BE DETERMINED
17888	TREE	APPROACH	4137.9	12	12	TO BE REMOVED
17912	TREE	APPROACH	4127.6	2	2	TO BE REMOVED
24309	TREE	APPROACH	4134.1	7	7	TO BE REMOVED
24317	TREE	APPROACH	4142.0	16	16	TO BE REMOVED
24325	TREE	APPROACH	4174.5	34	34	TO BE REMOVED

PART 77 OBSTRUCTIONS CONT'D						
POINT ID	OBSTRUCTION	SURFACE PENETRATED	TOP ELEVATION	ABOVE GROUND	PENETRATION	PROPOSED ACTION
24333	TREE	APPROACH	4169.6	29	29	TO BE REMOVED
24341	TREE	APPROACH	4155.6	15	15	TO BE REMOVED
24389	TREE	APPROACH	4173.3	20	20	TO BE REMOVED
24397	TREE	APPROACH	4172.3	21	21	TO BE REMOVED
27454	TREE	APPROACH	4131.4	4	4	TO BE REMOVED
27462	TREE	APPROACH	4132.6	5	5	TO BE REMOVED
27510	POLE UTIL	APPROACH	4122.0	29	3	TO BE LIGHTED
30334	BALLARD	APPROACH	4094.5	5	2	NO ACTION
30342	BALLARD	APPROACH	4094.5	5	2	NO ACTION
30470	TREE	APPROACH	4168.2	13	13	TO BE REMOVED
30478	TREE	APPROACH	4166.7	12	12	TO BE REMOVED
30486	TREE	APPROACH	4166.5	12	12	TO BE REMOVED
30502	TREE	APPROACH	4163.4	12	12	TO BE REMOVED
37366	TREE	APPROACH	4158.0	6	6	TO BE REMOVED
37390	TREE	APPROACH	4152.5	1	1	TO BE REMOVED
37406	TREE	APPROACH	4155.6	10	10	TO BE REMOVED
37414	TREE	APPROACH	4147.8	4	4	TO BE REMOVED
37470	TREE	APPROACH	4129.0	2	2	TO BE REMOVED
37478	TREE	APPROACH	4131.8	6	6	TO BE REMOVED
37486	TREE	APPROACH	4127.1	1	1	TO BE REMOVED



LEGEND

- Airport Property Boundary
- Future Airport Property
- Part 77 Approach Surface (P77)
- Threshold Siting Surface (TSS)
- 30:1 Glide Path Qualification Surface
- Part 77 Obstruction
- Non Penetrating Obstruction
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- Runway Safety Area (RSA)
- Obstacle Free Zone (OFZ)
- Terrain Contours

NOTES:

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- Horizontal and vertical datum source: Quantum Spatial (December 2018).
- Aerial Source: Quantum Spatial (December 2018).
- To be further studied in individual airspace case.
- ** Per Part 77, 15 feet vertical clearance added to road elevations and 23 feet added to railroads.

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CRATER LAKE KLAMATH REGIONAL AIRPORT
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CRATER LAKE - KLAMATH REGIONAL AIRPORT
KLAMATH FALLS, OREGON

REVISIONS

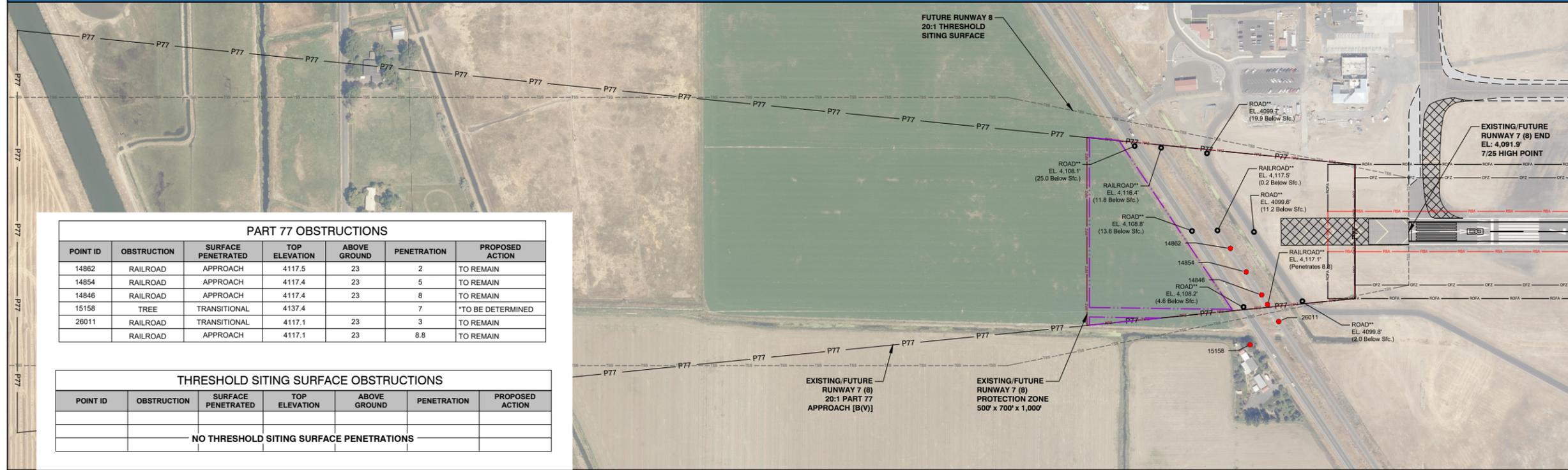
NO.	DATE	DESCRIPTION

MMH NO.: 1115200-170983.01
DATE: FEBRUARY 2021
DESIGNED BY: MT
DRAWN BY: TE, DL
CHECKED BY: MT, KM
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SHEET CONTENTS
INNER APPROACH PLAN AND PROFILE
RUNWAY 14
FUTURE

\CORP\MHADHUNT\COM\SHARED\FOLDERS\ENTP1115200\170983.01\TECH\CA\DRAWINGS\MALP 2020\LIMIT-ALP-AIRSPACE-INNER-14-FUTR.DWG
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FUTURE RUNWAY 8 INNER APPROACH PLAN



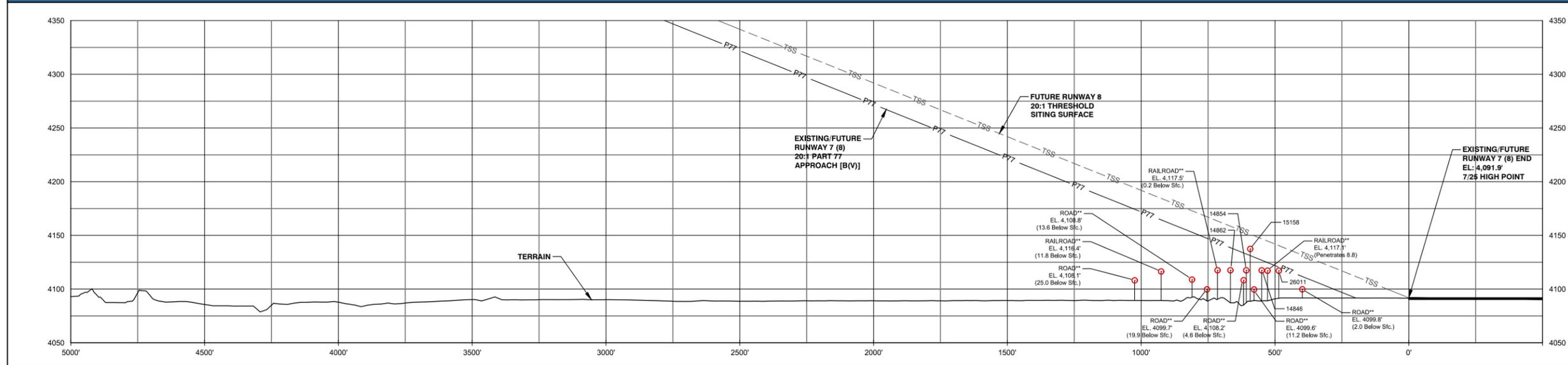
PART 77 OBSTRUCTIONS

POINT ID	OBSTRUCTION	SURFACE PENETRATED	TOP ELEVATION	ABOVE GROUND	PENETRATION	PROPOSED ACTION
14862	RAILROAD	APPROACH	4117.5	23	2	TO REMAIN
14854	RAILROAD	APPROACH	4117.4	23	5	TO REMAIN
14846	RAILROAD	APPROACH	4117.4	23	8	TO REMAIN
15158	TREE	TRANSITIONAL	4137.4		7	*TO BE DETERMINED
26011	RAILROAD	TRANSITIONAL	4117.1	23	3	TO REMAIN
	RAILROAD	APPROACH	4117.1	23	8.8	TO REMAIN

THRESHOLD SITING SURFACE OBSTRUCTIONS

POINT ID	OBSTRUCTION	SURFACE PENETRATED	TOP ELEVATION	ABOVE GROUND	PENETRATION	PROPOSED ACTION
NO THRESHOLD SITING SURFACE PENETRATIONS						

FUTURE RUNWAY 8 INNER APPROACH PROFILE



LEGEND

- Airport Property Boundary
- Future Airport Property
- Part 77 Approach Surface (P77)
- Future Threshold Siting Surface (TSS)
- Part 77 Obstruction
- Non Penetrating Obstacle
- Runway Protection Zone (RPZ)
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NOTES:

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**CRATER LAKE
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CRATER LAKE - KLAMATH REGIONAL AIRPORT

KLAMATH FALLS, OREGON

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CHECKED BY: MT, KM
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SHEET CONTENTS
**INNER APPROACH
PLAN AND PROFILE
RUNWAY 7
FUTURE**

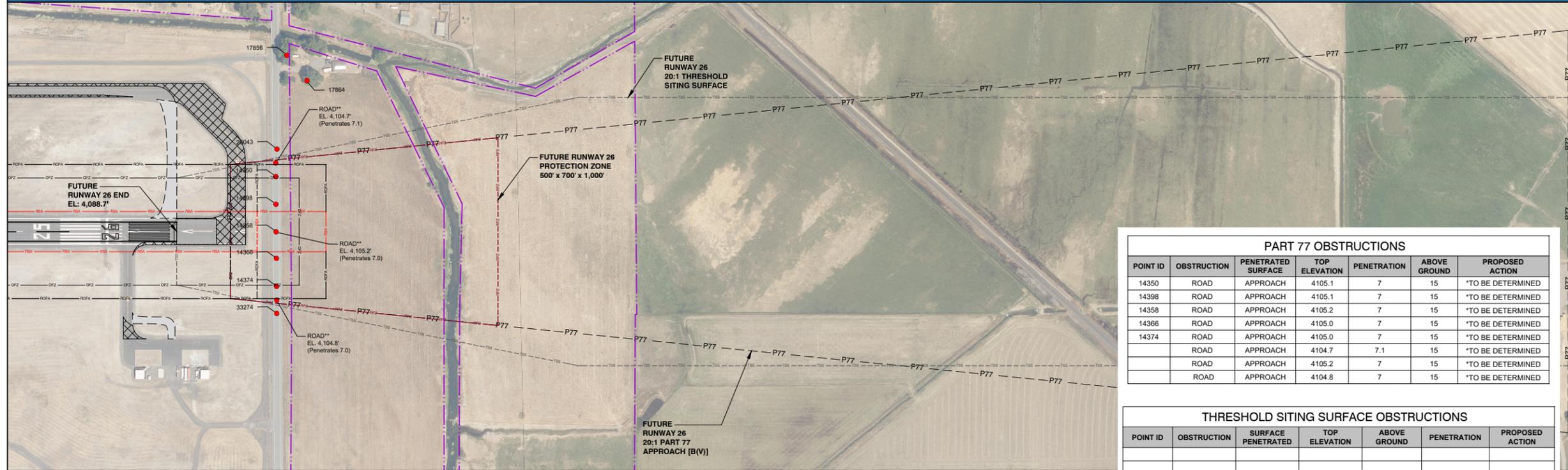
SHEET NO.

13 of 22

NOT FOR CONSTRUCTION

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FUTURE RUNWAY 26 INNER APPROACH PLAN



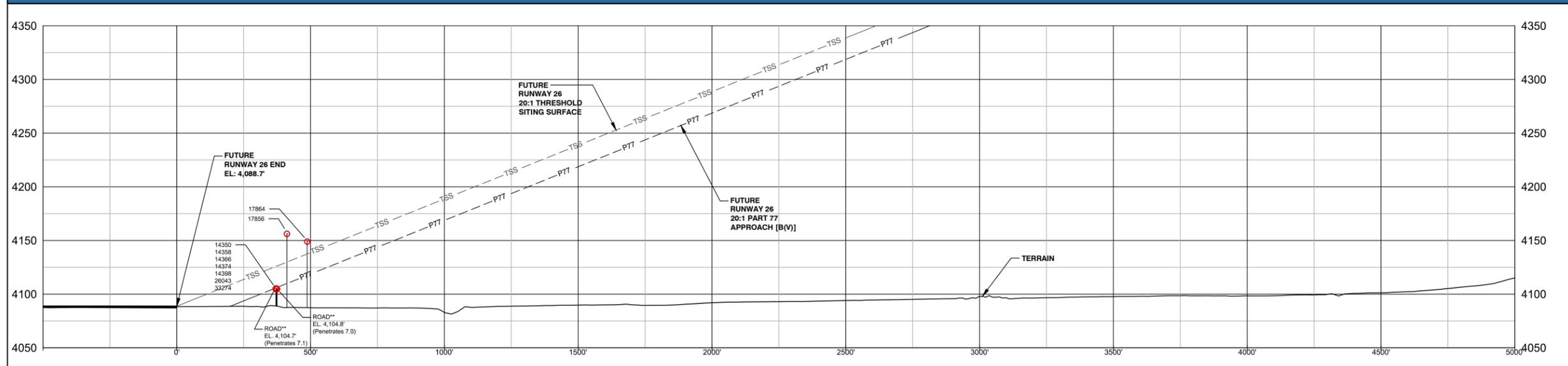
PART 77 OBSTRUCTIONS

POINT ID	OBSTRUCTION	PENETRATED SURFACE	TOP ELEVATION	PENETRATION	ABOVE GROUND	PROPOSED ACTION
14350	ROAD	APPROACH	4105.1	7	15	*TO BE DETERMINED
14398	ROAD	APPROACH	4105.1	7	15	*TO BE DETERMINED
14358	ROAD	APPROACH	4105.2	7	15	*TO BE DETERMINED
14366	ROAD	APPROACH	4105.0	7	15	*TO BE DETERMINED
14374	ROAD	APPROACH	4105.0	7	15	*TO BE DETERMINED
	ROAD	APPROACH	4104.7	7.1	15	*TO BE DETERMINED
	ROAD	APPROACH	4105.2	7	15	*TO BE DETERMINED
	ROAD	APPROACH	4104.8	7	15	*TO BE DETERMINED

THRESHOLD SITING SURFACE OBSTRUCTIONS

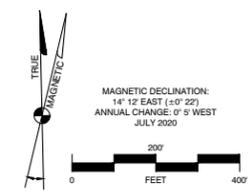
POINT ID	OBSTRUCTION	SURFACE PENETRATED	TOP ELEVATION	ABOVE GROUND	PENETRATION	PROPOSED ACTION
NO THRESHOLD SITING SURFACE PENETRATIONS						

FUTURE RUNWAY 26 INNER APPROACH PROFILE



- LEGEND**
- Airport Property Boundary
 - Future Airport Property
 - Future Part 77 Approach Surface (P77)
 - Future Threshold Siting Surface (TSS)
 - Part 77 Obstruction
 - Non Penetrating Obstacle
 - Runway Protection Zone (RPZ)
 - Runway Safety Area (RSA)
 - Obstacle Free Zone (OFZ)
 - Terrain Contours

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CRATER LAKE - KLAMATH REGIONAL AIRPORT
 KLAMATH FALLS, OREGON

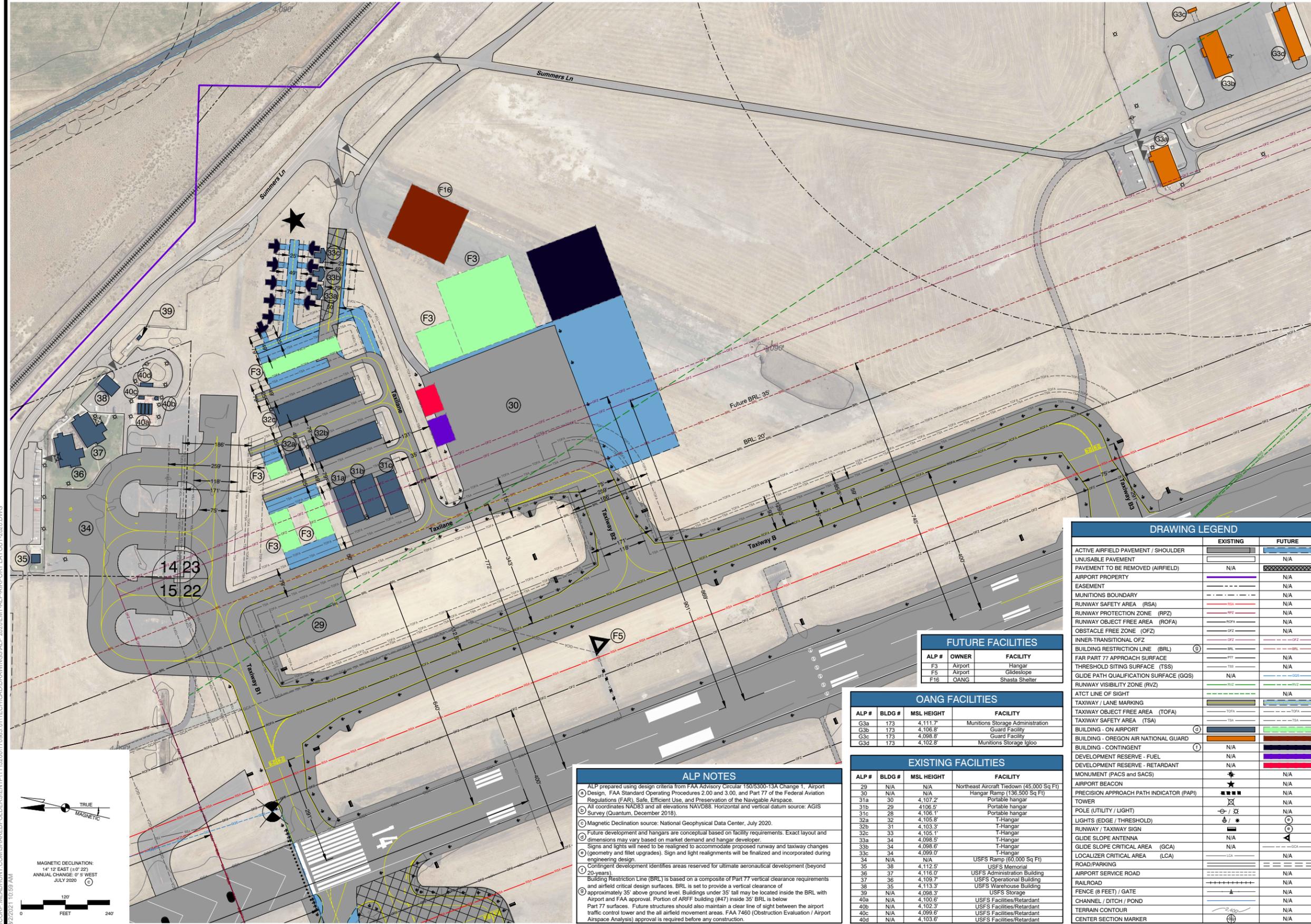
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SHEET CONTENTS
 INNER APPROACH
 PLAN AND PROFILE
 RUNWAY 25
 FUTURE
 SHEET NO.

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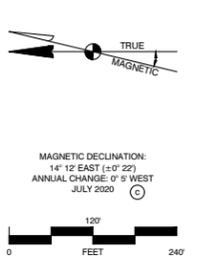
Mead & Hunt
 Mead and Hunt, Inc.
 9600 NE Cascades Parkway,
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 Portland, OR 97220
 phone: 503-548-1494
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The preparation of this document may have been supported, in part, through the Airport Improvement Program financial assistance from the Federal Aviation Administration as provided under Title 49 U.S.C. Section 47104. The contents do not in any way constitute a commitment on the part of the United States to participate in any development depicted therein nor does it indicate that the proposed development is environmentally acceptable or would have justification in accordance with appropriate public laws.

CRATER LAKE - KLAMATH REGIONAL AIRPORT
 KLAMATH FALLS, OREGON

I:\CORP\MEADHUNT\COM\SHARED\FOLDERS\ENTP\115200170983.01\TECH\CA\DRAWINGS\ALP 2020\ALP-AIRPORT LAYOUT-2020.DWG 02/20/21 10:59 AM



FUTURE FACILITIES		
ALP #	OWNER	FACILITY
F3	Airport	Hangar
F5	Airport	Glideslope
F16	OANG	Shasta Shelter

OANG FACILITIES			
ALP #	BLDG #	MSL HEIGHT	FACILITY
G3a	173	4,111.7'	Munitions Storage Administration
G3b	173	4,106.8'	Guard Facility
G3c	173	4,098.8'	Guard Facility
G3d	173	4,102.8'	Munitions Storage Igloo

ALP NOTES

ALP prepared using design criteria from FAA Advisory Circular 150/5300-13A Change 1, Airport Design, FAA Standard Operating Procedures 2.00 and 3.00, and Part 77 of the Federal Aviation Regulations (FAR), Safe, Efficient Use, and Preservation of the Navigable Airspace.

All coordinates NAD83 and all elevations NAVD88. Horizontal and vertical datum source: AGIS Survey (Quantum, December 2018).

Magnetic Declination source: National Geophysical Data Center, July 2020.

Future development and hangars are conceptual based on facility requirements. Exact layout and dimensions may vary based on market demand and hangar developer.

Signs and lights will need to be realigned to accommodate proposed runway and taxiway changes (geometry and fillet upgrades). Sign and light realignments will be finalized and incorporated during engineering design.

Contingent development identifies areas reserved for ultimate aeronautical development (beyond 20-years).

Building Restriction Line (BRL) is based on a composite of Part 77 vertical clearance requirements and airfield critical design surfaces. BRL is set to provide a vertical clearance of approximately 35' above ground level. Buildings under 35' tall may be located inside the BRL with Airport and FAA approval. Portion of ARFF building (#47) inside 35' BRL is below Part 77 surfaces. Future structures should also maintain a clear line of sight between the airport traffic control tower and the all airfield movement areas. FAA 7460 (Obstruction Evaluation / Airport Airspace Analysis) approval is required before any construction.

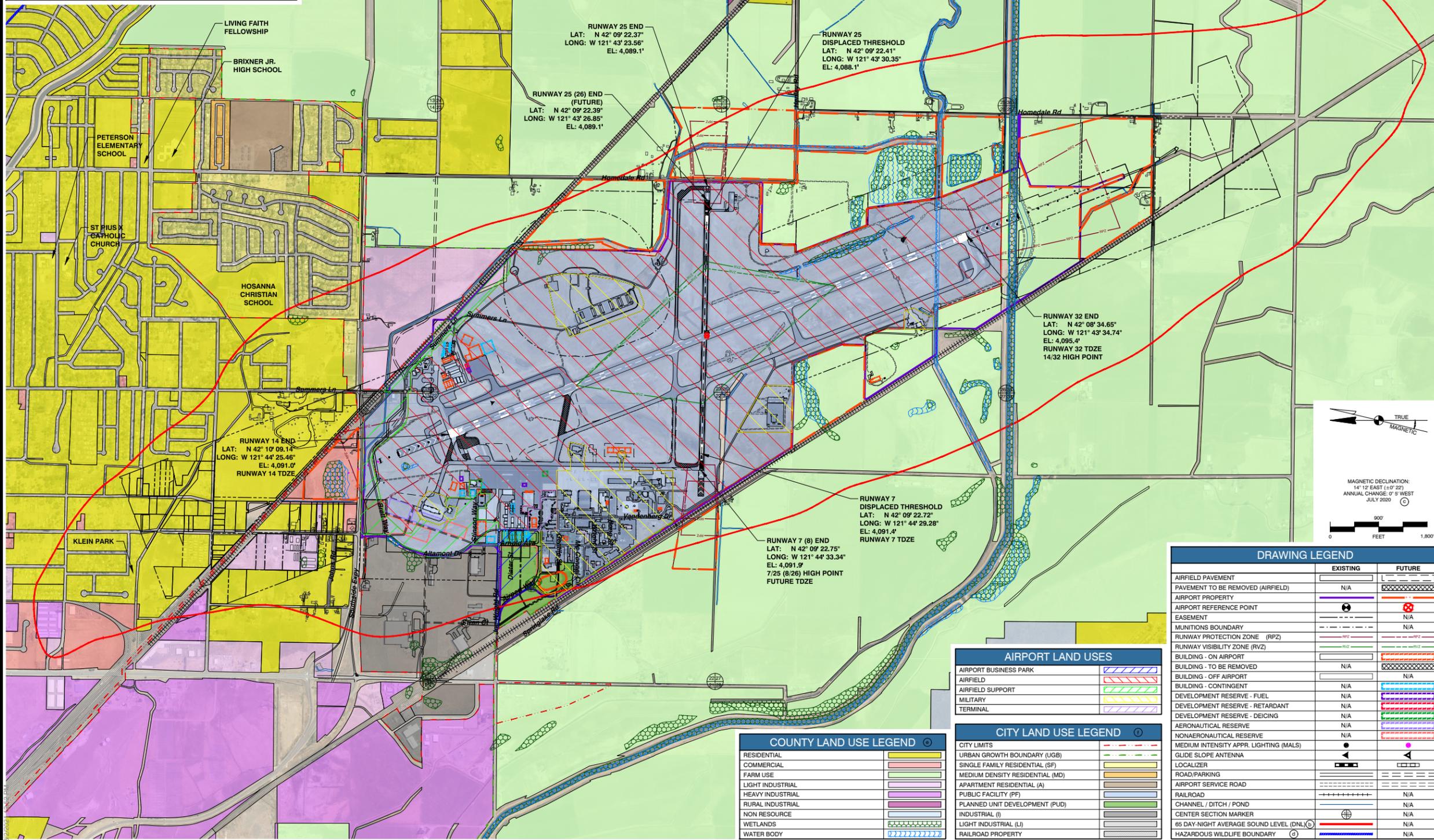
EXISTING FACILITIES			
ALP #	BLDG #	MSL HEIGHT	FACILITY
29	N/A	N/A	Northeast Aircraft Tiedown (45,000 Sq Ft)
30	N/A	N/A	Hangar Ramp (136,500 Sq Ft)
31a	30	4,107.2'	Portable hangar
31b	29	4,106.5'	Portable hangar
31c	28	4,106.1'	Portable hangar
32a	32	4,105.8'	T-Hangar
32b	31	4,103.3'	T-Hangar
32c	33	4,105.1'	T-Hangar
33a	34	4,098.5'	T-Hangar
33b	34	4,098.6'	T-Hangar
33c	34	4,099.0'	T-Hangar
34	N/A	N/A	USFS Ramp (60,000 Sq Ft)
35	38	4,112.5'	USFS Memorial
36	37	4,116.0'	USFS Administration Building
37	36	4,109.7'	USFS Operational Building
38	35	4,113.3'	USFS Warehouse Building
39	N/A	4,098.3'	USFS Storage
40a	N/A	4,100.6'	USFS Facilities/Retardant
40b	N/A	4,102.3'	USFS Facilities/Retardant
40c	N/A	4,099.6'	USFS Facilities/Retardant
40d	N/A	4,103.6'	USFS Facilities/Retardant

DRAWING LEGEND		
	EXISTING	FUTURE
ACTIVE AIRFIELD PAVEMENT / SHOULDER		
UNUSABLE PAVEMENT		
PAVEMENT TO BE REMOVED (AIRFIELD)		
AIRPORT PROPERTY		
EASEMENT		
MUNITIONS BOUNDARY		
RUNWAY SAFETY AREA (RSA)		
RUNWAY PROTECTION ZONE (RPZ)		
RUNWAY OBJECT FREE AREA (ROFA)		
OBSTACLE FREE ZONE (OFZ)		
INNER-TRANSITIONAL OFZ		
BUILDING RESTRICTION LINE (BRL)		
FAR PART 77 APPROACH SURFACE		
THRESHOLD SITING SURFACE (TSS)		
GLIDE PATH QUALIFICATION SURFACE (GQS)		
RUNWAY VISIBILITY ZONE (RVZ)		
ATCT LINE OF SIGHT		
TAXIWAY / LANE MARKING		
TAXIWAY OBJECT FREE AREA (TOFA)		
TAXIWAY SAFETY AREA (TSA)		
BUILDING - ON AIRPORT		
BUILDING - OREGON AIR NATIONAL GUARD		
BUILDING - CONTINGENT		
DEVELOPMENT RESERVE - FUEL		
DEVELOPMENT RESERVE - RETARDANT		
MONUMENT (PACS and SACS)		
AIRPORT BEACON		
PRECISION APPROACH PATH INDICATOR (PAPI)		
TOWER		
POLE (UTILITY / LIGHT)		
LIGHTS (EDGE / THRESHOLD)		
RUNWAY / TAXIWAY SIGN		
GLIDE SLOPE ANTENNA		
GLIDE SLOPE CRITICAL AREA (GCA)		
LOCALIZER CRITICAL AREA (LCA)		
ROAD/PARKING		
AIRPORT SERVICE ROAD		
RAILROAD		
FENCE (8 FEET) / GATE		
CHANNEL / DITCH / POND		
TERRAIN CONTOUR		
CENTER SECTION MARKER		

MMH NO.: 1115200-170983.01
 DATE: FEBRUARY 2021
 DESIGNED BY: MT
 DRAWN BY: TE, DL
 CHECKED BY: MT, KM
 DO NOT SCALE DRAWINGS
 SHEET CONTENTS
BUILDING AREA PLAN - EAST
 SHEET NO.
20 of 22
 NOT FOR CONSTRUCTION

ALP & LAND USE NOTES

- ① ALP prepared using design criteria from FAA Advisory Circular 150/5300-13A Change 1, Airport Design, FAA Standard Operating Procedures 2.00 and 3.00, and Part 77 of the Federal Aviation Regulations (FAR), Safe, Efficient Use, and Preservation of the Navigable Airspace.
- ② Noise Source: City of Klamath Falls, Kingsley Field Noise Impact Boundary Study, December 1980.
- ③ Noise contour reflected in current land use plans (e.g., Airport Safety and Hazard Prevention Overlay District and 2016 Kingsley Field Joint Land Use Study) and used by City and Oregon Air National Guard for local land use planning purposes.
- ④ Magnetic Declination source: National Geophysical Data Center, July 2020.
- ⑤ Perimeter B is based on guidance in Advisory Circular 150/5200-33C, Hazardous Wildlife Attractants on or near Airports, for an airport serving turbine-powered aircraft, and it is recommended that hazardous wildlife attractants be 10,000 feet from the nearest aircraft operations area. It is recommended that the Airport also follow guidance for Perimeter C, a 5-mile range to protect approach, departure, and circling airspace. To ensure that agricultural crops do not create airfield obstructions or other safety hazards, it is recommended that the Airport follow guidance in Advisory Circular 150/5300-13A, Airport Design, to prevent agricultural crops from growing or penetrating any design surfaces for runways, taxiways, or Part 77 airspace. Design surfaces will set the Crop Restriction Line (CRL) for the Airport.
- ⑥ Source: Klamath County Land Use Zoning Map, August 2018. Visit Klamath County GIS Portal for current zoning data.
- ⑦ Source: City of Klamath Falls, December 2015. Visit City of Klamath Falls Web Map for current zoning data.

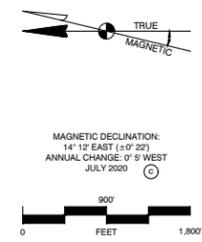


RUNWAY 25 END (FUTURE)
 LAT: N 42° 09' 22.37"
 LONG: W 121° 43' 23.56"
 EL: 4,089.1'
RUNWAY 25 DISPLACED THRESHOLD
 LAT: N 42° 09' 22.41"
 LONG: W 121° 43' 30.35"
 EL: 4,088.1'
RUNWAY 25 (26) END (FUTURE)
 LAT: N 42° 09' 22.39"
 LONG: W 121° 43' 26.85"
 EL: 4,089.1'

RUNWAY 32 END
 LAT: N 42° 08' 34.65"
 LONG: W 121° 43' 34.74"
 EL: 4,095.4'
RUNWAY 32 TDZE
 14/32 HIGH POINT

RUNWAY 14 END
 LAT: N 42° 10' 09.14"
 LONG: W 121° 44' 25.46"
 EL: 4,091.0'
RUNWAY 14 TDZE

RUNWAY 7 DISPLACED THRESHOLD
 LAT: N 42° 09' 22.72"
 LONG: W 121° 44' 29.28"
 EL: 4,091.4'
RUNWAY 7 TDZE
RUNWAY 7 (8) END
 LAT: N 42° 09' 22.75"
 LONG: W 121° 44' 33.34"
 EL: 4,091.9'
 7/25 (8/26) HIGH POINT
 FUTURE TDZE



DRAWING LEGEND		
	EXISTING	FUTURE
AIRFIELD PAVEMENT	[Symbol]	[Symbol]
PAVEMENT TO BE REMOVED (AIRFIELD)	N/A	[Symbol]
AIRPORT PROPERTY	[Symbol]	[Symbol]
AIRPORT REFERENCE POINT	[Symbol]	[Symbol]
EASEMENT	[Symbol]	N/A
MUNITIONS BOUNDARY	[Symbol]	N/A
RUNWAY PROTECTION ZONE (RPZ)	[Symbol]	[Symbol]
RUNWAY VISIBILITY ZONE (RVZ)	[Symbol]	[Symbol]
BUILDING - ON AIRPORT	[Symbol]	[Symbol]
BUILDING - TO BE REMOVED	N/A	[Symbol]
BUILDING - OFF AIRPORT	[Symbol]	N/A
BUILDING - CONTINGENT	N/A	[Symbol]
DEVELOPMENT RESERVE - FUEL	N/A	[Symbol]
DEVELOPMENT RESERVE - RETARDANT	N/A	[Symbol]
DEVELOPMENT RESERVE - DEICING	N/A	[Symbol]
AERONAUTICAL RESERVE	N/A	[Symbol]
NONAERONAUTICAL RESERVE	N/A	[Symbol]
MEDIUM INTENSITY APPR. LIGHTING (MALS)	[Symbol]	[Symbol]
GLIDE SLOPE ANTENNA	[Symbol]	[Symbol]
LOCALIZER	[Symbol]	[Symbol]
ROAD/PARKING	[Symbol]	[Symbol]
AIRPORT SERVICE ROAD	[Symbol]	[Symbol]
RAILROAD	[Symbol]	N/A
CHANNEL / DITCH / POND	[Symbol]	N/A
CENTER SECTION MARKER	[Symbol]	N/A
65 DAY-NIGHT AVERAGE SOUND LEVEL (DNL)	[Symbol]	N/A
HAZARDOUS WILDLIFE BOUNDARY	[Symbol]	N/A

AIRPORT LAND USES	
AIRPORT BUSINESS PARK	[Symbol]
AIRFIELD	[Symbol]
AIRFIELD SUPPORT	[Symbol]
MILITARY	[Symbol]
TERMINAL	[Symbol]

CITY LAND USE LEGEND	
CITY LIMITS	[Symbol]
URBAN GROWTH BOUNDARY (UGB)	[Symbol]
SINGLE FAMILY RESIDENTIAL (SF)	[Symbol]
MEDIUM DENSITY RESIDENTIAL (MD)	[Symbol]
APARTMENT RESIDENTIAL (A)	[Symbol]
PUBLIC FACILITY (PF)	[Symbol]
PLANNED UNIT DEVELOPMENT (PUD)	[Symbol]
INDUSTRIAL (I)	[Symbol]
LIGHT INDUSTRIAL (LI)	[Symbol]
RAILROAD PROPERTY	[Symbol]

COUNTY LAND USE LEGEND	
RESIDENTIAL	[Symbol]
COMMERCIAL	[Symbol]
FARM USE	[Symbol]
LIGHT INDUSTRIAL	[Symbol]
HEAVY INDUSTRIAL	[Symbol]
RURAL INDUSTRIAL	[Symbol]
NON RESOURCE	[Symbol]
WETLANDS	[Symbol]
WATER BODY	[Symbol]

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CRATER LAKE - KLAMATH REGIONAL AIRPORT
 KLAMATH FALLS, OREGON

REVISIONS	

M&H NO.: 11152001-170983.01
 DATE: FEBRUARY 2021
 DESIGNED BY: MT
 DRAWN BY: TE, DL
 CHECKED BY: MT, KM
 DO NOT SCALE DRAWINGS
 SHEET CONTENTS

LAND USE MAP

SHEET NO.

\CORP\MEADHUNT\COM\SHARED\FOLDERS\ENTP\11152001\170983.01\TECH\CA\DRAWINGS\ALP\2020\LAND USE\2021.DWG

ALP APPROVAL & EXHIBIT A ACCEPTANCE

Crater Lake-Klamath Regional Airport (LMT), Klamath Falls, OR

February 19, 2021

Background

Airport Improvement Program (AIP) Grant No. 3-41-0030-038-2018 funded the update of the Crater Lake-Klamath Regional Airport (LMT) Master Plan, Airport Layout Plan (ALP), and Exhibit A Property Map (Exhibit A). The LMT Aviation Forecasts were approved by the FAA on February 11, 2019, and the conclusions of the updated Master Plan serves as the basis of the 2021 ALP and Exhibit A. The 2021 ALP (Sheets 1 through 21) and Exhibit A (Sheets 1 through 10) were approved by the FAA on February 19, 2021.

An aeronautical study (no. 2020-ANM-3007-NRA) was conducted on the proposed ALP development. The FAA issued an ALP 7460 No Objection Letter (Final Determination) on February 8, 2021. This determination does not constitute FAA approval or disapproval of the physical development involved in the proposal. It is a determination with respect to the safe and efficient use of navigable airspace by aircraft and with respect to the safety of persons and property on the ground.

ALP

The 2021 ALP (Sheets 1 through 21) was prepared in accordance with FAA Advisory Circular 150/5300-13A, *Airport Design* (September 2012), and FAA Standard Operating Procedure (SOP) 2.00, *Standard Procedures for FAA Review and Approval of Airport Layout Plans* (October 2013). Major differences in this 2021 ALP from the previous FAA-approved ALP (January 2015) include:

→ Airport

- Updated base mapping (new aerial photo and AGIS survey approved by FAA June 13, 2019).
- Downgraded NPIAS category from Primary Commercial Service (Non-Hub) to Regional.
- Downgraded existing Airport Reference Code (ARC) from D-IV to D-III (Large Aircraft). Future ARC D-IV (Heavy Aircraft) is identical in both ALPs.
- Reduced future land acquisition footprint east of the airport to coincide with the future reduction of the crosswind runway length. Expanded the footprint north of the airport to protect for the future Runway 14 ILS and MALS-R.

→ Runway 14/32 (Primary)

- Increased runway length from 10,301' to 10,302' because of new AGIS survey.
- Downgraded existing Critical Aircraft/ARC from DC-10 (D-IV) to F-15 (D-III) and Boeing MD-87 (C-III). Revised future Critical Aircraft to F-15 (D-II) and DC-10-30 (D-IV).
- Identified Runway 14 ROFA length as nonstandard. Brett Way (public road) and airport perimeter fence and road realigned outside of ROFA.
- Proposed future Runway 14 ILS and MALS-R (Oregon Air National Guard 'OANG' project). Future glideslope antenna and equipment shelter located inside ROFA. FAA approval of a Modification to Standard is pending.

→ Runway 7/25 (Crosswind)

- Downgraded existing Critical Aircraft/ARC from Q-200 (B-II) to King Air 300 (B-II).
- Reduced future runway length and width from 5,259'x100' to 5,000'x75'. Existing displaced thresholds to be eliminated. Future Threshold Siting Surface (TSS) and Runway Protection Zone (RPZ) shift to new runway ends. Future runway to be renumbered as Runway 8/26 due to magnetic deviation.
- Omitted previous ALP's future Runway 25 RPZ for ¼ mile approach minimums; FAA airspace study identified high terrain east of LMT as limiting factor to lowering instrument approach minimums.

Page 1 of 3

→ Taxiway System

- Updated future taxiway naming per FAA Engineering Brief No. 89, *Taxiway Nomenclature Convention* (March 2012).
- Proposed future Taxiway D1 to correct convergence of Taxiway A and Taxiway C within RSA. Issues with direct access, acute angles, nonstandard TDG 5 radius, OFZ and future POFZ penetrations, and crossing alignment with Taxiway B1 are also corrected.
- Reduced future Taxiway G extension to north to accommodate future expansion of OANG north arm/de-arm apron.
- Proposed future Taxiway G1 to replace Taxiway E to correct acute angle and direct access issues.
- Reduced future Taxiway F width (east of Runway 14/32) from 50' to 35' (TDG 2).
- Increased future Taxiway F width (between Taxiways D and G) from 50' to 75' (TDG 5).
- Relocated future Taxiway F1 and F2 to new Runway 7/25 (8/26) thresholds and to correct direct access issues. Reduced Taxiway F1 connector from 75' to 50' (TDG 3).
- Realigned future Taxiway H to correct direct access issues.
- Omitted previous ALP's future Taxiway J (full length parallel east of Runway 14/32).

→ Building Area (BA)

- Northwest BA (Bldg. 400 site):
 - Retained OANG Alert Hangar (Bldg. 400). Previous ALP identified removal of hangar.
 - Replaced GA hangars with mix of OANG and nonaeronautical development.
- West BA:
 - Expanded future small GA hangars further west into Airport Business Park.
 - Consolidated future Airport Administration and Operations Building nearer to terminal parking lot.
 - Proposed SASO, common hangars, fuel farm, flight training school, and remarking of aircraft parking areas.
- Northeast BA:
 - Omitted prior ALP's proposal to remove OANG munitions area and provide significant future aviation development.
 - Proposed limited future development including mix of individual, common hangars, and fuel/retardant tanks.

→ Oregon Air National Guard (OANG)

- Reflected 5-year capital improvement plan in ALP to streamline FAA review process. Major projects include:
 - Future Runway 14 ILS (glideslope antenna and localizer).
 - Replacing Runway 14 MALS-F with future MALS-R.
 - North arm/de-arm ramp expansion.
 - Corrosion Control and Delta Barns on west side and Shasta Shelter (temporary) on east side, and
 - Miscellaneous improvements in main leasehold area west of airfield.

This ALP approval is conditioned on the acknowledgement that any development on airport property requiring Federal environmental approval must receive such written approval from FAA prior to commencement of the subject development. This ALP approval is also conditioned on acceptance of the plan under local land use laws. The FAA recognizes that the City of Klamath is adopting land use and height restrictive zoning (Airport Safety and Hazard Prevention Overlay) based on this ALP.

Approval of the plan does not indicate that the United States will participate in the cost of any development proposed. AIP funding requires evidence of eligibility and justification at the time a funding request is ripe for consideration. When construction of any proposed structure or development indicated on the plan is undertaken, such construction requires normal 45-day advance notification to the FAA for review in accordance with applicable Federal Aviation Regulations (i.e., Parts 77, 157, 152, etc.). More notice is generally beneficial to ensure that all statutory, regulatory, technical, and operational issues can be addressed in a timely manner.

Page 2 of 3

Exhibit A

The 2021 Exhibit A Property Map (Sheets 1 through 10) has been prepared in accordance with FAA Standard Operating Procedure (SOP) 3.00, *Standard Procedures for FAA Review of Exhibit 'A' Airport Property Inventory Maps*. Major differences in this 2021 Exhibit A from the previous version (May 2009) include:

- Missing parcel data from the 2009 Exhibit A has been updated based on research from title records (Klamath County Clerk's office and Amerititle, November 2018). Data gaps are shaded yellow. Updated data are shown in red.
- Missing parcels records for four parcels are identified on Exhibit A Sheet 10. Presumed parcel condition is provided based on best available data and professional opinion.
- New parcel data are shown in blue (see Exhibit A Sheet 8 for fourteen new parcel entries).
- Future airport property interests have been added consistent with the 2021 ALP.
- Existing and future airfield development have been updated consistent with the 2021 ALP.

Signature Blocks

The FAA signature below acknowledges approval of the ALP and acceptance of the Exhibit A.

FAA:

BENJAMIN JOSEPH MELLO Digitally signed by BENJAMIN JOSEPH MELLO
Date: 2021.02.19 08:20:43 -08'00'

Airport Sponsor:

John T. Barsalou Digitally signed by John T. Barsalou
Date: 2021.02.18 10:07:16 -08'00'

Consultant:

Maranda Thompson Digitally signed by Maranda Thompson
DN: cn=Maranda Thompson
Date: 2021.02.18 09:22:25-08'00'

Page 3 of 3

Mead & Hunt

Mead and Hunt, Inc.
9600 NE Cascades Parkway,
Suite 100
Portland, OR 97220
phone: 503-548-1494
meadhunt.com

**CRATER LAKE
KLAMATH
REGIONAL AIRPORT**

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CRATER LAKE - KLAMATH
REGIONAL AIRPORT

KLAMATH FALLS, OREGON

REVISIONS

MSH NO.: 1115200-170983.01
DATE: FEBRUARY 2021
DESIGNED BY: MT
DRAWN BY: TE, DL
CHECKED BY: MT, KM
DO NOT SCALE DRAWINGS

SHEET CONTENTS

ALP & EXHIBIT 'A'
ACCEPTANCE
LETTER

SHEET NO.

22 of 22

NOT FOR CONSTRUCTION

CRATER LAKE - KLAMATH REGIONAL AIRPORT

EXHIBIT 'A'

CITY OF KLAMATH FALLS, OREGON
FEBRUARY 2021

ALP APPROVAL & EXHIBIT A ACCEPTANCE

Crater Lake-Klamath Regional Airport (LMT), Klamath Falls, OR
February 19, 2021

Background

Airport Improvement Program (AIP) Grant No. 3-41-0030-038-2018 funded the update of the Crater Lake-Klamath Regional Airport (LMT) Master Plan, Airport Layout Plan (ALP), and Exhibit A Property Map (Exhibit A). The LMT Aviation Forecasts were approved by the FAA on February 11, 2019, and the conclusions of the updated Master Plan serves as the basis of the 2021 ALP and Exhibit A. The 2021 ALP (Sheets 1 through 21) and Exhibit A (Sheets 1 through 10) were approved by the FAA on February 19, 2021.

An aeronautical study (no. 2020-ANM-3007-NRA) was conducted on the proposed ALP development. The FAA issued an ALP 7460 No Objection Letter (Final Determination) on February 8, 2021. This determination does not constitute FAA approval or disapproval of the physical development involved in the proposal. It is a determination with respect to the safe and efficient use of navigable airspace by aircraft and with respect to the safety of persons and property on the ground.

Exhibit A

The 2021 Exhibit A Property Map (Sheets 1 through 10) has been prepared in accordance with FAA Standard Operating Procedure (SOP) 3.00, *Standard Procedures for FAA Review of Exhibit 'A' Airport Property Inventory Maps*. Major differences in this 2021 Exhibit A from the previous version (May 2009) include:

- Missing parcel data from the 2009 Exhibit A has been updated based on research from title records (Klamath County Clerk's office and Amerititle, November 2018). Data gaps are shaded yellow. Updated data are shown in red.
- Missing parcels records for four parcels are identified on Exhibit A Sheet 10. Presumed parcel condition is provided based on best available data and professional opinion.
- New parcel data are shown in blue (see Exhibit A Sheet 8 for fourteen new parcel entries).
- Future airport property interests have been added consistent with the 2021 ALP.
- Existing and future airfield development have been updated consistent with the 2021 ALP.

Signature Blocks

The FAA signature below acknowledges approval of the ALP and acceptance of the Exhibit A.

FAA:

BENJAMIN JOSEPH MELLO	Digitally signed by BENJAMIN JOSEPH MELLO Date: 2021.02.19 08:20:43 -08'00'
--------------------------	--

Airport Sponsor:

John T. Barsalou	Digitally signed by John T. Barsalou Date: 2021.02.18 10:07:16 -08'00'
------------------	---

Consultant:

Maranda Thompson	Digitally signed by Maranda Thompson DN: cN=Maranda Thompson Date: 2021.02.18 09:22:25 -08'00'
------------------	--



SHEET INDEX

SHEET NUMBER	SHEET TITLE
1	COVER SHEET
2	EXHIBIT 'A' PROPERTY MAP - NORTH
3	EXHIBIT 'A' PROPERTY MAP - SOUTH
4	EXHIBIT 'A' PROPERTY MAP - OFFSITE
5	EXHIBIT 'A' PROPERTY MAP - DATA TABLE
6	EXHIBIT 'A' PROPERTY MAP - DATA TABLE (CONTINUED)
7	EXHIBIT 'A' PROPERTY MAP - DATA TABLE (CONTINUED)
8	EXHIBIT 'A' PROPERTY MAP - DATA TABLE (CONTINUED)
9	EXHIBIT 'A' PROPERTY MAP - DATA TABLE (CONTINUED)
10	EXHIBIT 'A' PROPERTY MAP - MISSING PARCEL RECORDS



1435 ESPLANADE AVENUE
KLAMATH FALLS, OR 97601

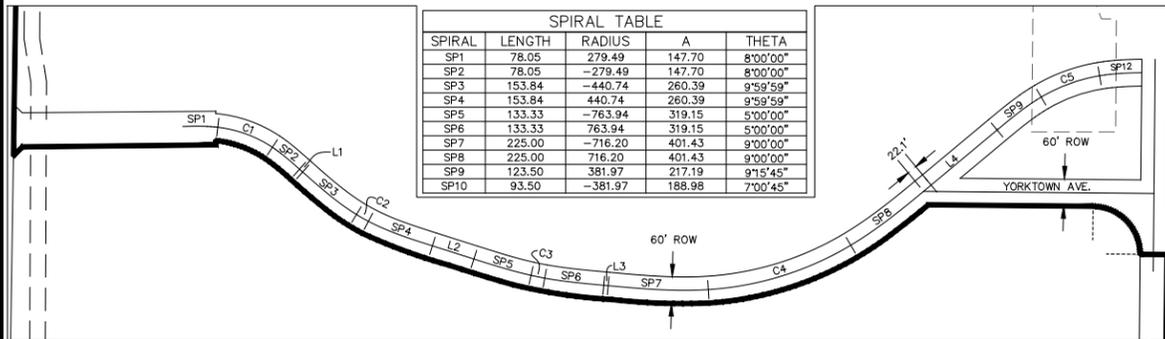
o / 541.884.4666
w / AdkinsEngineering.com

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LINE	LENGTH	BEARING
L1	9.46	N41°34'30"E
L2	97.58	N17°34'38"E
L3	10.00	N05°14'23"E
L4	192.49	N39°45'37"W

CURVE	LENGTH	RADIUS	CH BEARING	CHORD	DELTA
C1	131.70	279.49	N20°04'32"E	130.48	26°59'55"
C2	30.76	440.74	S29°34'34"W	30.75	3°59'56"
C3	31.17	763.94	S11°24'30"W	31.17	2°20'16"
C4	337.50	716.20	S17°15'37"E	334.39	27°00'00"
C5	140.00	381.97	N19°59'51"W	139.22	21°00'00"

SPIRAL	LENGTH	RADIUS	A	THETA
SP1	78.05	279.49	147.70	8°00'00"
SP2	78.05	-279.49	147.70	8°00'00"
SP3	153.84	-440.74	260.39	9°59'59"
SP4	153.84	440.74	260.39	9°59'59"
SP5	133.33	-763.94	319.15	5°00'00"
SP6	133.33	763.94	319.15	5°00'00"
SP7	225.00	-716.20	401.43	9°00'00"
SP8	225.00	716.20	401.43	9°00'00"
SP9	123.50	381.97	217.19	9°15'45"
SP10	93.50	-381.97	188.98	7°00'45"



ALTAMONT DRIVE CENTERLINE DETAIL
(NOT TO SCALE)

SEE SHEET 3 FOR CONTINUATION

LEGEND	
AIRPORT PROPERTY BOUNDARY	—
PARCEL BOUNDARY	- - - -
SECTION & 1/4 SECTION LINES	- - - -
FEE SIMPLE	(123)
EASEMENT	▨
USA (United States of America) - IN FEE	■
FUTURE AIRPORT PROPERTY	■
RUNWAY PROTECTION ZONE	- - - -
RUNWAY SAFETY AREAS	- - - -
RUNWAY OBJECT FREE AREAS	- - - -

GENERAL NOTES:

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SOURCE NOTES:

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RUNWAY SAFETY AREA DIMENSIONS (EXISTING/FUTURE CONDITIONS):

RUNWAY PROTECTION ZONE (RPZ) DIMENSION (INNER WIDTH x LENGTH x OUTER WIDTH):
 RWY 14 RPZ: 1,000' x 1,700' x 1,510'
 RWY 32 RPZ: 1,000' x 2,500' x 1,750'
 RWY 7 RPZ: 500' x 1,000' x 700'
 RWY 25 RPZ: 500' x 1,000' x 700'

RUNWAY SAFETY AREA (RSA) DIMENSION (LENGTH BEYOND RUNWAY END x WIDTH):
 RWY 14 RSA: 1,000' x 500'
 RWY 32 RSA: 1,000' x 500'
 RWY 7 RSA: 300' x 150'
 RWY 25 RSA: 300' x 150'

RUNWAY OBJECT FREE AREA (ROFA) DIMENSION (LENGTH BEYOND RUNWAY END x WIDTH):
 RWY 14 ROFA: 1,000' x 800'
 RWY 32 ROFA: 1,000' x 800'
 RWY 7 ROFA: 300' x 500'
 RWY 25 ROFA: 300' x 500'

SURVEY COORDINATES (EXISTING CONDITION):

RUNWAY END COORDINATES (2018 AGIS SURVEY):
 RWY 14 END: 42° 10' 09.1377" N | 121° 44' 25.4597" W
 RWY 32 END: 42° 08' 34.6486" N | 121° 43' 34.7355" W
 RWY 7 END: 42° 09' 22.7471" N | 121° 44' 33.3444" W
 RWY 25 END: 42° 09' 22.3725" N | 121° 43' 30.3501" W

RUNWAY SURVEY MONUMENTS (PAC AND SACS):

PAC: 42° 09' 28.5577" N | 121° 43' 55.6486" W
 SAC: 42° 10' 09.9820" N | 121° 44' 23.4036" W
 SAC: 42° 08' 35.0930" N | 121° 43' 32.4680" W



Mead and Hunt, Inc.
 9600 NE Cascades Parkway,
 Suite 100
 Portland, OR 97220
 phone: 503-548-1494
 meadhunt.com



1435 EPLANADE AVENUE
 KLAMATH FALLS, OR 97601

ENGINEERING-PLANNING-SURVEYING
 The preparation of this document may have been supported, in part, through the Airport Improvement Program financial assistance from the Federal Aviation Administration as provided under Title 49 U.S.C. Section 47104. The contents do not in any way constitute a commitment on the part of the United States to participate in any development depicted therein nor does it indicate that the proposed development is environmentally acceptable or would have justification in accordance with appropriate public laws.



CRATER LAKE
 KLAMATH
 REGIONAL AIRPORT

CRATER LAKE - KLAMATH
 REGIONAL AIRPORT
 EXHIBIT 'A' PROPERTY MAP
 KLAMATH FALLS, OREGON

DATE	BY	REVISIONS
May 2009	Mead & Hunt	Initial Survey
Apr 2011	Mead & Hunt	Final Survey
Apr 2018	Mead & Hunt	Final Survey

M&H NO.: 1115200-170983.01
 DATE: FEBRUARY 2021
 DESIGNED BY: JS
 DRAWN BY: AP
 CHECKED BY: MH

EXHIBIT 'A'
 PROPERTY MAP -
 NORTH

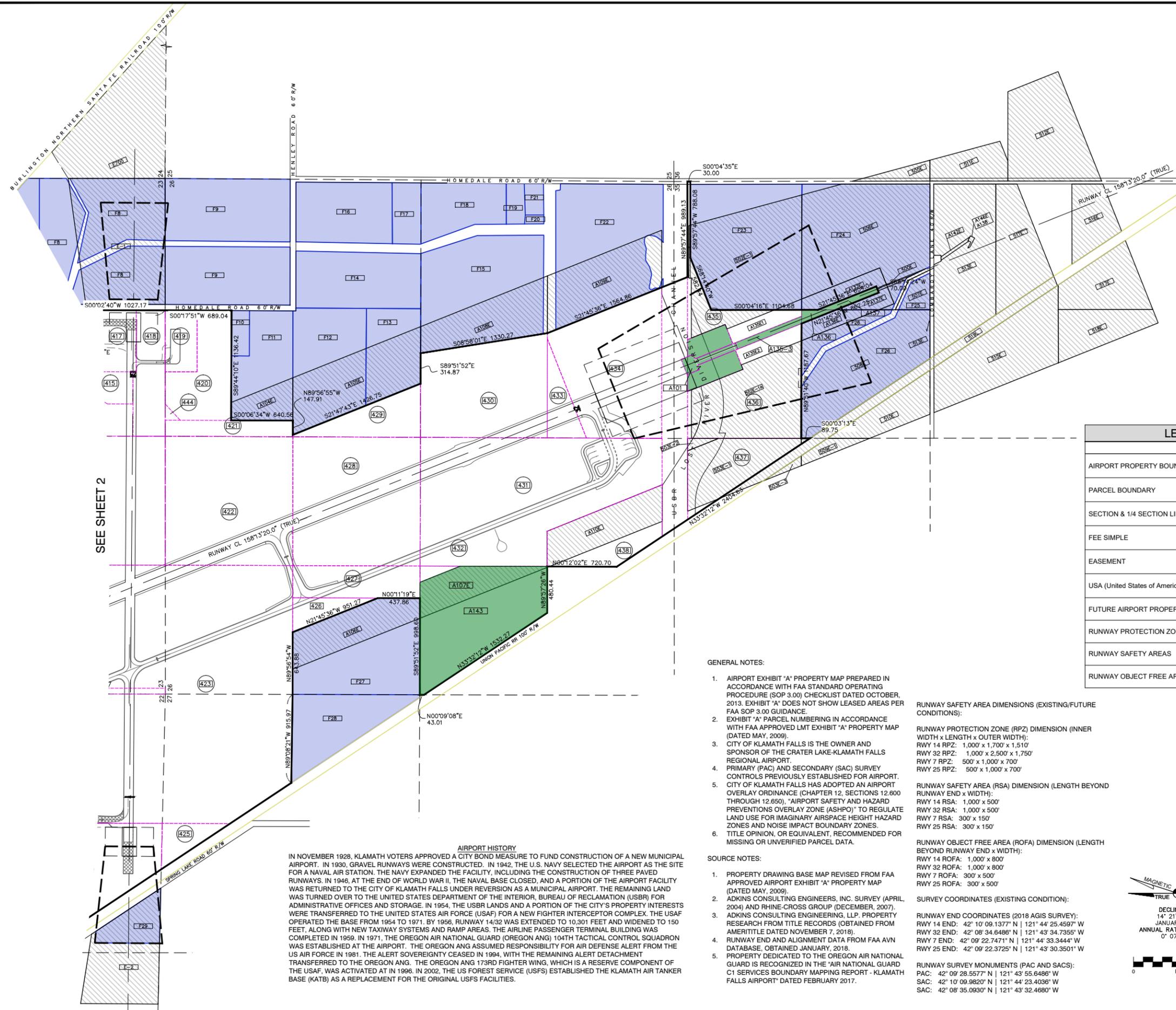
SHEET NO.

2 of 10

NOT FOR CONSTRUCTION

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**CRATER LAKE - KLAMATH
REGIONAL AIRPORT
EXHIBIT 'A' PROPERTY MAP**
KLAMATH FALLS, OREGON



LEGEND	
AIRPORT PROPERTY BOUNDARY	—
PARCEL BOUNDARY	- - - - -
SECTION & 1/4 SECTION LINES	- - - - -
FEE SIMPLE	(123)
EASEMENT	▨
USA (United States of America) - IN FEE	■
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RUNWAY SAFETY AREAS	- - - - -
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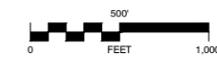
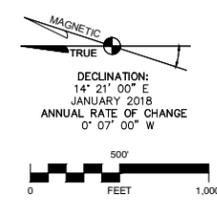
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 SAC: 42° 08' 35.0930" N | 121° 43' 32.4680" W

AIRPORT HISTORY
 IN NOVEMBER 1928, KLAMATH VOTERS APPROVED A CITY BOND MEASURE TO FUND CONSTRUCTION OF A NEW MUNICIPAL AIRPORT. IN 1930, GRAVEL RUNWAYS WERE CONSTRUCTED. IN 1942, THE U.S. NAVY SELECTED THE AIRPORT AS THE SITE FOR A NAVAL AIR STATION. THE NAVY EXPANDED THE FACILITY, INCLUDING THE CONSTRUCTION OF THREE PAVED RUNWAYS. IN 1946, AT THE END OF WORLD WAR II, THE NAVAL BASE CLOSED, AND A PORTION OF THE AIRPORT FACILITY WAS RETURNED TO THE CITY OF KLAMATH FALLS UNDER REVERSION AS A MUNICIPAL AIRPORT. THE REMAINING LAND WAS TURNED OVER TO THE UNITED STATES DEPARTMENT OF THE INTERIOR, BUREAU OF RECLAMATION (USBR) FOR ADMINISTRATIVE OFFICES AND STORAGE. IN 1954, THE USBR LANDS AND A PORTION OF THE CITY'S PROPERTY INTERESTS WERE TRANSFERRED TO THE UNITED STATES AIR FORCE (USAF) FOR A NEW FIGHTER INTERCEPTOR COMPLEX. THE USAF OPERATED THE BASE FROM 1954 TO 1971. BY 1956, RUNWAY 14/32 WAS EXTENDED TO 10,301 FEET AND WIDENED TO 150 FEET, ALONG WITH NEW TAXIWAY SYSTEMS AND RAMP AREAS. THE AIRLINE PASSENGER TERMINAL BUILDING WAS COMPLETED IN 1959. IN 1971, THE OREGON AIR NATIONAL GUARD (OREGON ANG) 104TH TACTICAL CONTROL SQUADRON WAS ESTABLISHED AT THE AIRPORT. THE OREGON ANG ASSUMED RESPONSIBILITY FOR AIR DEFENSE ALERT FROM THE US AIR FORCE IN 1981. THE ALERT SOVEREIGNTY CEASED IN 1994, WITH THE REMAINING ALERT DETACHMENT TRANSFERRED TO THE OREGON ANG. THE OREGON ANG 173RD FIGHTER WING, WHICH IS A RESERVE COMPONENT OF THE USAF, WAS ACTIVATED AT IN 1996. IN 2002, THE US FOREST SERVICE (USFS) ESTABLISHED THE KLAMATH AIR TANKER BASE (KATB) AS A REPLACEMENT FOR THE ORIGINAL USFS FACILITIES.

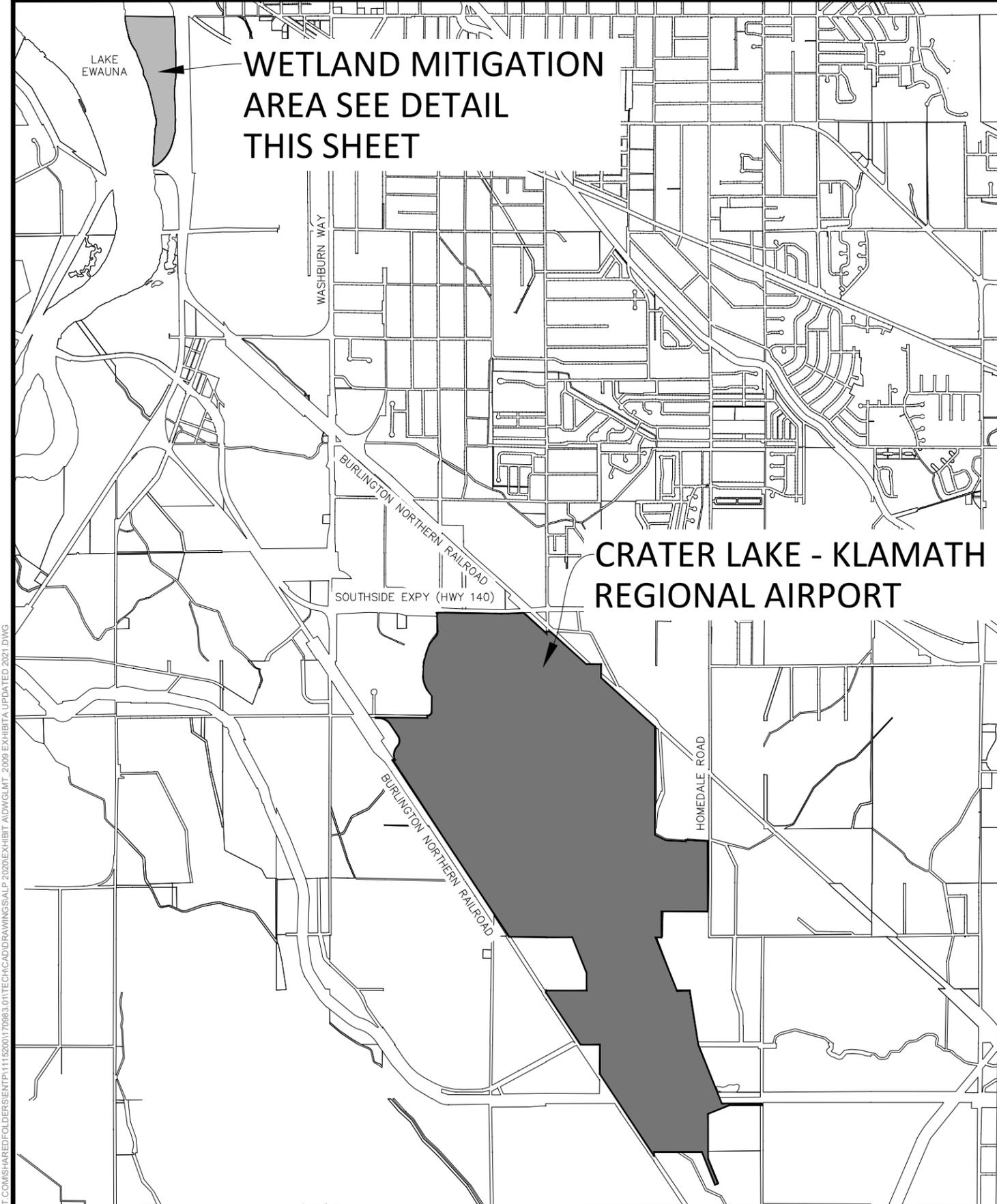


DATE	BY	REVISIONS
May 2009	Mead & Hunt	Initial Survey
April 2012	Mead & Hunt/Adkins	Final Update

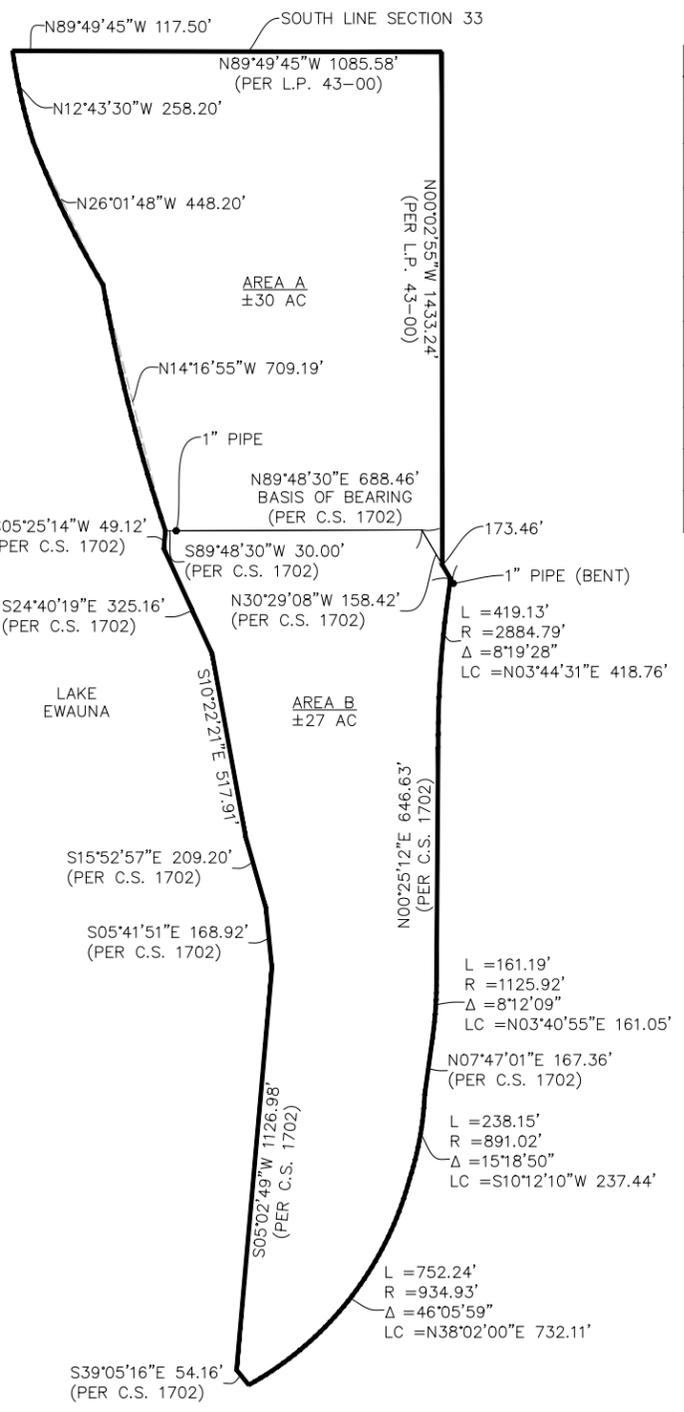
DESCRIPTION	DATE
EXHIBIT 'A' Property Map Update	APR 2021
EXHIBIT 'A' Property Map Update	APR 2021

M&H NO.: 1115200-170983.01
 DATE: FEBRUARY 2021
 DESIGNED BY: JS
 DRAWN BY: AP
 CHECKED BY: MH
 DO NOT SCALE DRAWINGS

SHEET CONTENTS
**EXHIBIT 'A'
PROPERTY MAP -
SOUTH**
 SHEET NO.
3 of 10
 NOT FOR CONSTRUCTION



VICINITY MAP

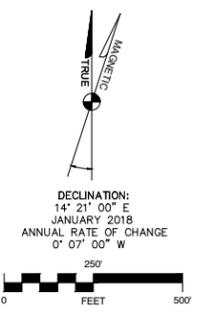


OFFSITE WETLAND MITIGATION AREA DETAIL
RETRACTED PER C.S. 1702
AND LP 43-00

LEGEND	
AIRPORT PROPERTY BOUNDARY	—
PARCEL BOUNDARY	- - - - -
SECTION & 1/4 SECTION LINES	- - - - -
FEE SIMPLE	(123)
EASEMENT	▨
USA (United States of America) - IN FEE	■
FUTURE AIRPORT PROPERTY	■
RUNWAY PROTECTION ZONE	- - - - -
RUNWAY SAFETY AREAS	- - - - -
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 - BASE MAP SOURCE U.S.G.S 7.5' TOPO QUAD.



Mead & Hunt
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Suite 100
Portland, OR 97220
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meadhunt.com

ADKINS
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KLAMATH FALLS, OR 97601
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W / AdkinsEngineering.com
ENGINEERING-PLANNING-SURVEYING

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CRATER LAKE KLAMATH REGIONAL AIRPORT

CRATER LAKE - KLAMATH REGIONAL AIRPORT EXHIBIT 'A' PROPERTY MAP
KLAMATH FALLS, OREGON

DATE	BY	REVISIONS
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April 2018	Mead & Hunt/Adkins	Exhibit 'A' Property Map Update

M&H NO.: 1115200-170983.01
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CHECKED BY: MH
DO NOT SCALE DRAWINGS

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SHEET NO.

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EXHIBIT 'A' PROPERTY MAP PROPERTY INVENTORY TABLE													
Recording Date	2019 Property Map Parcel #	Grantor	Grantee	Property Interest (Fee or Easement)	Parcel Acreage	Parcel Fee	Parcel Easement	Recorded Liber (Book/Page)	Instrument of Title	Purpose	Federal Acquired	Transferred or Released	Surplus
1/6/2006	E-8 (11)	City of Klamath Falls	City of Klamath Falls	Easement	--	--	0.42	Land Partition 56-07	Land Partition	Waterline Easement	--	--	NA
1/6/2006	E-7 (11)	City of Klamath Falls	City of Klamath Falls	Easement	--	--	0.42	Land Partition 56-07	Land Partition	Waterline Easement	--	--	NA
03/26/2002	E-6	United States of America (USA)	City of Klamath Falls	Easement	--	--	--	M02, pg 17561	Quitclaim Deed	Land Conveyance & Road Easement	--	--	Yes
03/26/2002	408	United States of America (USA)	City of Klamath Falls	Fee	23.64	23.64	--	M02, pg 17561	Quitclaim Deed	Deeded Former Base to City with Avigation Easement	--	--	Yes
02/1/2002	435	Ross T. Fleming	City of Klamath Falls	Fee	8.08	8.08	--	M02, pg 6284	Warranty Deed	Rwy 14-32 Safety Area	AIP 3-41-0030-13	--	No
02/1/2002	436	Ross T. Fleming	City of Klamath Falls	Fee	22.94	22.94	--	M02, pg 6284	Warranty Deed	Rwy 14-32 Safety Area	AIP 3-41-0030-13	--	No
12/5/2001	437	Joseph J. Bair & Mary Ellen Bair	City of Klamath Falls	Fee	12.14	12.14	--	M01, pg 62212	Warranty Deed	Rwy 14-32 Safety Area	AIP 3-41-0030-13	--	No
08/2/2001	438 (11)	Born Properties (An Assumed Business Name)	City of Klamath Falls	Fee	14.79	14.79	--	M01, pg 38783	Warranty Deed	Rwy 14-32 Safety Area	AIP 3-41-0030-13	--	No
12/14/1998	E-3	General Services Admin (GSA)	City of Klamath Falls	Easement	--	--	--	Land Partition 27-98	Land Partition	Sewer Easement	--	--	NA
12/14/1998	E-4	General Services Admin (GSA)	United States of America (USA)	Easement	--	--	--	Land Partition 27-98	Land Partition	Guard Access Road	--	--	NA
06/29/1998	E-5	United States of America (USA)	City of Klamath Falls	Easement	0.25	--	0.25	M98, pg 22834	Easement	Airport Entrance Access/Utility Road	--	--	Yes
06/13/1997	A100E1	United States of America (USA)	City of Klamath Falls	Fee	37.54	37.54	--	M97, pg 18201	Quitclaim Deed	--	--	--	Yes
03/27/1997	439	City of Klamath Falls	United States of America (USA)	Fee	30.94	30.94	--	M97, pg 8953	Quitclaim Deed	Returned land described in m87, pg 3983 back to the United States	--	--	No
03/27/1997	443 (5)	City of Klamath Falls	United States of America (USA)	Easement	--	--	--	M80, pg 12752	Quitclaim Deed	Avigation & Hazard Easement	--	--	No
04/9/1996	404	Art Davina	City of Klamath Falls	Fee	8.6	8.6	--	M96, pg 9941	Warranty Deed	Development	AIP 3-41-0030-08	--	No
06/22/1992	403 (11)	Raymond K. Ingold, Trustee of the Ingold Family Trust dated 6-19-86, Oregon Tech Foundation, et al	City of Klamath Falls	Fee	7.04	7.04	--	M92, pg 13610	Statutory Warranty Deed	Land Conveyance	--	--	No
12/28/1987	A146E	United States of America (USA)	Antonio Mazzier, Amelia A. Massier	Fee	0.08	0.08	0.08	M87 22996	Quitclaim Deed	USA Surplus land	--	--	Yes
06/19/1987	440	United States of America (USA)	City of Klamath Falls	Fee	1.58	1.58	--	M87, pg 10611	Quitclaim Deed	USA Surplus land	--	--	Yes
07/10/1980	E-1 (11)	Gerald S. Whitlatch	City of Klamath Falls	Easement	--	--	27.3	M80, pg 12752	Deed	Avigation & Hazard Easement - Rwy 25	--	--	No
11/28/1978	E-2 (11)	Wayne N. Horton, Shirley Y. Horton & James H. Patton	Peter Janelli, Jr. & Eva Janelli	Easement	--	--	16.36	M78, pg 26690	Easement	Avigation & Hazard Easement - Rwy 7	--	--	No
08/2/1967	A143	Guy A. Galletti	United States of America (USA)	Fee	29.38	29.38	--	M-67 5942	Sale - Warranty Deed	Warranty Deed (Sale to USA)	--	--	No
2/15/1966	505E	Martin John Greene, Thomas Francis Greene, Dorothy Cecelia Greene	United States of America (USA)	Easement	2.11	--	2.11	M-66 1275	Warranty Easement	Warranty Clearance Easement	--	--	NA
2/15/1966	506E	Martin John Greene, Thomas Francis Greene, Dorothy Cecelia Greene	United States of America (USA)	Easement	32.14	--	32.14	M-66 1275	Warranty Easement	Warranty Clearance Easement	--	--	NA
12/15/1965	B210E	Great Northern Railway	United States of America (USA)	Easement	28.5	--	28.5	M-65 4689	Warranty Easement	Warranty Clearance Easement	--	--	NA
12/15/1965	B258-1	Great Northern Railway	United States of America (USA)	Fee	0.04	0.04	--	M-65 4684	Sale	Warranty Easement	--	--	No
12/15/1965	B258-2	Great Northern Railway	United States of America (USA)	Fee	0.04	0.04	--	M-65 4684	Sale	Warranty Easement	--	--	No
12/15/1965	B258E1	Great Northern Railway	United States of America (USA)	Easement	0.3	--	0.3	M-65 4686	Warranty Easement	Warranty Clearance Easement	--	--	NA
12/15/1965	B258E2	Great Northern Railway	United States of America (USA)	Easement	0.26	--	0.26	M-65 4686	Warranty Easement	Warranty Clearance Easement	--	--	NA
12/15/1965	B258E3	Great Northern Railway	United States of America (USA)	Easement	0.33	--	0.33	M-65 4686	Warranty Easement	Warranty Clearance Easement	--	--	NA
11/23/1965	519L	Southern Pacific Company	United States of America (USA)	Easement	9.36	--	9.36	Vol 912, pg 331	N/A	Avigation Easement	--	--	No
9/29/1965	C328E	George A. McDonald & Alice G. McDonald; R.H. Ellis & Blanche Day Ellis; Klamath Irrigation District	United States of America (USA)	Easement	2.19	--	N/A	Civil No. 65-494	Declaration of Taking	Avigation Easement - Rwy 14 Approach	--	--	NA
9/29/1965	502E-1	Dale A. Fleming & Janice M. Fleming; Federal Land Bank of Spokane; Peter R. Garske; Klamath Irrigation District	United States of America (USA)	Easement	30.48	--	N/A	Civil No. 65-494	Declaration of Taking	Avigation Easement - Rwy 32 ALS	--	--	NA
9/29/1965	502E-1A	Dale A. Fleming & Janice M. Fleming; Federal Land Bank of Spokane; Peter R. Garske; Klamath Irrigation District	United States of America (USA)	Easement	20.2	--	N/A	Civil No. 65-494	Declaration of Taking	Avigation Easement - Rwy 32 RPZ/ALS	--	--	NA
9/29/1965	511E	William D. Dangler & Patricia Dangler; Edith Smith, Stanley C. Smith & Mildred P. Smith; Edith Hale & E.W. Hale; Sabina Smith; Dewitt C. Smith & Esther Armstrong Smith; Klamath Irrigation District	United States of America (USA)	Easement	17.45	--	N/A	Civil No. 65-494	Declaration of Taking	Avigation Easement - Rwy 32 ALS	--	--	NA
9/20/1965	B247E	James T. Weldon & Margaret E. Weldon	United States of America (USA)	Easement	0.64	--	0.64	M65-1779	Easement	Avigation Easement	--	--	No
8/20/1965	A142E	Tony Mazzier & Amelia Mazzier	United States of America (USA)	Easement	0.22	--	0.22	M-65 1076	Easement	Rwy 32 Line-of-Sight Easement - Navaid	--	--	No
8/18/1965	C-335E	Bert Larka, Astrid J. Larka	United States of America (USA)	Easement	0.27	--	0.27	M-65 1031	Warranty Easement	Warranty Clearance Easement	--	--	NA
6/30/1965	B248E	Mona J. Hadley / Robert A. Stewart/Robert O. Stewart & Marilyn J. Stewart	United States of America (USA)	Easement	0.54	--	0.54	Vol 362, pg 536	Warranty Easement	Warranty Clearance Easement	--	--	NA
6/30/1965	508E	Burford E. Boyd, Margaret A. Boyd	United States of America (USA)	Easement	26.14	--	26.14	Vol 362, pg 533	Warranty Easement	Warranty Clearance Easement	--	--	NA
3/26/1965	B237E	Russell J. Walsh & Edith Walsh	United States of America (USA)	Easement	4.47	--	4.47	Vol 360, pg 335	Warranty Easement	Warranty Clearance Easement	--	--	NA
3/26/1965	B238E	Russell J. Walsh & Edith Walsh	United States of America (USA)	Easement	4.2	--	4.2	Vol 360, pg 335	Warranty Easement	Warranty Clearance Easement	--	--	NA
3/26/1965	C320E	Hubert W. Bratton, Bertra M. Bratton	United States of America (USA)	Easement	0.44	--	0.44	Vol 360, pg 332	Warranty Easement	Warranty Clearance Easement	--	--	NA
3/12/1965	503E-1	Edmund G. Born, Dorothy R. Born, Joseph J Bair, Mary Ellen Bair	United States of America (USA)	Easement	10.72	--	10.72	Vol 360-pg 120	Warranty Easement	Warranty Clearance Easement	--	--	NA
3/12/1965	503E-2	E.G Born, Dorothy R. Born, Joseph J Bair, Mary Ellen Bair	United States of America (USA)	Easement	0.38	--	0.38	Vol 360, pg 120	Warranty Easement	Warranty Clearance Easement	--	--	NA
3/12/1965	503E-3	E.G Born, Dorothy R. Born, Joseph J Bair, Mary Ellen Bair	United States of America (USA)	Easement	0.5	--	0.5	Vol 360, pg 120	Warranty Easement	Warranty Clearance Easement	--	--	NA
3/12/1965	509E-1	Joseph J Bair, Mary Ellen Bair	United States of America (USA)	Easement	1.74	--	1.74	Vol 360, pg 117	Warranty Easement	Warranty Clearance Easement	--	--	NA
3/12/1965	509E-2	Joseph J Bair, Mary Ellen Bair	United States of America (USA)	Easement	0.07	--	0.07	Vol 360, pg 117	Warranty Easement	Warranty Clearance Easement	--	--	NA
11/16/1964	B259E	Klamath County, Oregon	United States of America (USA)	Easement	1.55	--	1.55	Vol 355, pg 523	Easement	Utility Cable Line Easement - RR	--	--	Unknown



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CRATER LAKE
KLAMATH
REGIONAL AIRPORT

CRATER LAKE - KLAMATH
REGIONAL AIRPORT
EXHIBIT 'A' PROPERTY MAP
KLAMATH FALLS, OREGON

DATE	BY	DESCRIPTION
May 2009	Mead & Hunt	EXHIBIT 'A' Property Map Update
April 2012	Mead & Hunt	EXHIBIT 'A' Property Map Update

MSH NO.: 1115200-170983.01
DATE: FEBRUARY 2021
DESIGNED BY: JS
DRAWN BY: AP
CHECKED BY: MH
DO NOT SCALE DRAWINGS

SHEET CONTENTS
EXHIBIT 'A'
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DATA TABLE

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I:\CORP\MEADHUNT\COM\SHAREDFOLDERS\ENR\111520\170983.01\TECH\DRAWINGS\ALP 2020\EXHIBIT 'A'DWG\MLT - 2009 EXHIBIT 'A' UPDATED 2021.DWG
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Recording Date	2019 Property Map Parcel #	Grantor	Grantee	Property Interest (Fee or Easement)	Parcel Acreage	Parcel Fee	Parcel Easement	Recorded Liber (Book/Page)	Instrument of Title	Purpose	Federal Acquired	Transferred or Released	Surplus
11/10/1964	C326E	Arthur L. Gabrielson, Ruby J. Gabrielson	United States of America (USA)	Easement	6.79	--	6.79	Vol 357, pg 394	Warranty Easement	Warranty Clearance Easement	--	--	NA
11/4/1964	A110E	E.G Born, Dorothy R. Born	United States of America (USA)	Easement	10.45	--	10.45	Vol 357, pg 332	Warranty Easement	Warranty Clearance Easement - BRL	--	--	NA
10/12/1964	B256E	Christian Litzenberger & Thelma Litzenberger	United States of America (USA)	Easement	3.42	--	3.42	Vol 356, pg 613	Warranty Easement	Warranty Clearance Easement	--	--	NA
10/6/1964	A109E	C.E. Atwater, Emma Atwater, White Bros. Construction Co. Inc	United States of America (USA)	Easement	15.39	--	15.39	Vol 356, pg 519	Warranty Easement	Warranty Clearance Easement	--	--	NA
10/2/1964	C327E	C. C. Bowles/ C. C. Bowles & Nadine Bowles/Bawles/ E. C. Ravert	United States of America (USA)	Easement	1.28	--	1.28	Vol 356, pg 467	Warranty Easement	Warranty Clearance Easement	--	--	NA
9/22/1964	B230E	Quentin Trump	United States of America (USA)	Easement	0.27	--	0.27	Vol 356, pg 302	Warranty Easement	Warranty Clearance Easement	--	--	NA
9/16/1964	C330E	Albert J. Jeschke, Grace A. Jeschke	United States of America (USA)	Easement	0.54	--	0.54	Vol 356, pg 209	Warranty Easement	Warranty Clearance Easement	--	--	NA
9/1/1964	C337E	G. H. Stiles	United States of America (USA)	Easement	2.43	--	2.43	Vol 355, pg 634	Warranty Easement	Warranty Clearance Easement	--	--	NA
8/25/1964	B201E	Carl R. Jacobson & Grace LaVern Jacobson	United States of America (USA)	Easement	1.94	--	1.94	Vol 355, pg 515	Warranty Easement	Warranty Clearance Easement	--	--	NA
8/25/1964	B203E	Everett Dennis & Frances Dennis	United States of America (USA)	Easement	0.27	--	0.27	Vol 355, pg 521	Warranty Easement	Warranty Easement (Covers Portion)	--	--	NA
8/25/1964	B261E	Everett Dennis & Frances Dennis	United States of America (USA)	Easement	0.27	--	0.27	Vol 355, pg 521	Warranty Easement	Warranty Easement	--	--	NA
8/25/1964	C325E	Walter W. French & Laura French	United States of America (USA)	Easement	1.19	--	1.19	Vol 355, pg 518	Warranty Easement	Warranty Clearance Easement	--	--	NA
8/20/1964	B207E	Klamath County School District	United States of America (USA)	Easement	2.42	--	2.42	Vol 356, pg 305	Warranty Easement	Warranty Clearance Easement	--	--	NA
8/13/1964	B257E	Lloyd E. McFarland & Emma R. McFarland; Abner H. Gilchrist & Edna Gilchrist	United States of America (USA)	Easement	0.1	--	0.1	Vol 355, pg 320	Warranty Easement	Warranty Clearance Easement	--	--	NA
8/3/1964	C334E	Harry J. Waggoner, Norma C. Waggoner	United States of America (USA)	Easement	8.34	--	8.34	Vol 355, pg 317	Warranty Easement	Warranty Clearance Easement	--	--	NA
7/27/1964	A107E	Guy A. Galletti	United States of America (USA)	Easement	7.44	--	7.44	Vol 355, pg 18	Warranty Easement	Warranty Clearance Easement	--	--	NA
7/27/1964	B252E	L.C. Wishard & Ruth W. Wishard	United States of America (USA)	Easement	2.56	--	2.56	Vol 355, pg 24	Warranty Easement	Warranty Clearance Easement	--	--	NA
7/21/1964	C321E	Roland D. Bechtold, Ruth Ann Bechtold, Minne E. Grizzle	United States of America (USA)	Easement	2.57	--	2.57	Vol 355, pg 21	Warranty Easement	Warranty Clearance Easement	--	--	NA
7/16/1964	C318E	Ronald E Phair, Lorraine Phair	United States of America (USA)	Easement	0.11	--	0.11	Vol 354, pg 499	Warranty Easement	Warranty Clearance Easement	--	--	NA
7/11/1964	A104E	R.J. Sumner A& Pauline H. Sumner; Michael R. Quade & Fonda L. Quade,	United States of America (USA)	Easement	4.6	--	4.6	Vol 356, pg 131	Warranty Easement	Warranty Clearance Easement	--	--	NA
7/10/1964	C333E	Cecil F. Bell	United States of America (USA)	Easement	2.71	--	2.71	Vol 354, pg 406	Warranty Easement	Warranty Clearance Easement	--	--	NA
6/30/1964	B200E	Jack Mulkey & Leota Mulkey	United States of America (USA)	Easement	7.53±	--	7.53±	Vol 354, pg 196	Warranty Easement	Warranty Clearance Easement	--	--	NA
6/24/1964	C331E	Phil D. Schroeder, Gertrude M. Schroeder, Ronald A. Croxford, Alice F. Croxford	United States of America (USA)	Easement	0.54	--	0.54	Vol 354, pg 105	Warranty Easement	Warranty Clearance Easement	--	--	NA
6/19/1964	A108E	L.C. Wicks, Ruby Lee Wicks	United States of America (USA)	Easement	12.91	--	12.91	Vol 354, pg 30	Warranty Easement	Warranty Clearance Easement	--	--	NA
6/19/1964	B206E	Effie D. Hodges	United States of America (USA)	Easement	0.97	--	0.97	Vol 354, pg 12	Warranty Easement	Warranty Clearance Easement	--	--	NA
6/19/1964	B241E	Arlie E. Ayers & Mary I. Ayers	United States of America (USA)	Easement	0.39	--	0.39	Vol 354, pg 21	Warranty Easement	Warranty Clearance Easement	--	--	NA
6/19/1964	B245E	Leroy Mills/Roy Mills & Vera L. Mills	United States of America (USA)	Easement	0.55	--	0.55	Vol 354, pg 24	Warranty Easement	Warranty Clearance Easement	--	--	NA
6/19/1964	B250E	Edgar H. Lawrence, Alice V. Lawrence	United States of America (USA)	Easement	0.54	--	0.54	Vol 354, pg 15	Warranty Easement	Warranty Clearance Easement	--	--	NA
6/19/1964	C322E	Drenna A Raulston	United States of America (USA)	Easement	2.2	--	2.2	Vol 354, pg 18	Warranty Easement	Warranty Clearance Easement	--	--	NA
6/19/1964	C332E	Elmer Gober, Louise Gober	United States of America (USA)	Easement	1.61	--	1.61	Vol 354, pg 27	Warranty Easement	Warranty Clearance Easement	--	--	NA
6/18/1964	507E	Eli South & Jessie Marie South; Percy L. Baird & Ramona J. Baird	United States of America (USA)	Easement	2.2	--	2.2	Vol 353, pg 605	Warranty Easement	Warranty Clearance Easement	--	--	NA
6/12/1964	B251E	Roy Lewis & Rachel Lewis	United States of America (USA)	Easement	0.54	--	0.54	Vol 353, pg 446	Warranty Easement	Warranty Clearance Easement	--	--	NA
6/12/1964	C314E	Harry F. Sweeney, Mildred B. Sweeney	United States of America (USA)	Easement	1.34	--	1.34	Vol 353, pg 449	Warranty Easement	Warranty Clearance Easement	--	--	NA
6/12/1964	C315E	Richard J. Sumner & Pauline Sumner	United States of America (USA)	Easement	1.48	--	1.48	Vol 353, pg 452	Warranty Easement	Warranty Clearance Easement	--	--	NA
6/12/1964	C316E	Jack Reed	United States of America (USA)	Easement	2.02	--	2.02	Vol 353, pg 443	Warranty Easement	Warranty Clearance Easement	--	--	NA
6/12/1964	C324E	Walter L. Galloway ; Jennie H. Galloway	United States of America (USA)	Easement	2.68	--	2.68	Vol 353, pg 455	Warranty Easement	Warranty Clearance Easement	--	--	NA
6/12/1964	512E	William F Wong, Esther M Wong	United States of America (USA)	Easement	18.58	--	18.58	Vol 353, pg 458	Warranty Easement	Warranty Clearance Easement	--	--	NA
5/26/1964	C317E	Calvin C. Crumrine & Irma Crumrine	United States of America (USA)	Easement	1.11	--	1.11	Vol 353, pg 224	Warranty Easement	Warranty Clearance Easement	--	--	NA
5/26/1964	510E	Walter L. Bliss, Della C. Bliss	United States of America (USA)	Easement	6.66	--	6.66	Vol 353, pg 218	Warranty Easement	Warranty Clearance Easement	--	--	NA
5/21/1964	B202E	Joe Davis & Cora Davis	United States of America (USA)	Easement	0.38	--	0.38	Vol 353, pg 157	Warranty Easement	Warranty Clearance Easement	--	--	NA
5/21/1964	B205E	Klamath County, OR	United States of America (USA)	Easement	64.69	--	64.69	Vol 353, pg 154	Easement	Clearance Easement - Rwy 14 End	--	--	NA
5/21/1964	B249E	Ralph W. Baker & Mary Alma Banker	United States of America (USA)	Easement	0.54	--	0.54	Vol 353, pg 221	Warranty Easement	Warranty Clearance Easement	--	--	NA
5/21/1964	515E	Eudora Morris, Dan M. McAulliffe, Shirley C. McAulliffe	United States of America (USA)	Easement	18.55	--	18.55	Vol 353, pg 160	Warranty Easement	Warranty Clearance Easement	--	--	NA
5/21/1964	517E	Edgar D. Hoffman, Sarrah E. Hoffman	United States of America (USA)	Easement	10	--	10	Vol 353, pg 163	Warranty Easement	Warranty Clearance Easement	--	--	NA
4/27/1964	C-303E	Wilfred E. Ralston & Jennie L. Ralston; Harold L. Hollis & Elizabeth L. Hollis	United States of America (USA)	Easement	0.57	--	0.57	Vol 351, pg 475	Warranty Easement	Warranty Clearance Easement	--	--	NA
4/27/1964	C336E	Delbert R. Broyles, Mildred Y. Broyles, D.W. Starkey, Olive V. Starkey	United States of America (USA)	Easement	5.23	--	5.23	Vol 354, pg 473	Warranty Easement	Warranty Clearance Easement	--	--	NA
4/20/1964	C313E	Kenneth Eugene Baker & Margaret Ann Baker	United States of America (USA)	Easement	2.2	--	2.2	Vol 352, pg 387	Warranty Easement	Warranty Clearance Easement	--	--	NA
4/20/1964	C329E	Edgar H. Lawrence & Alice V. Lawrence	United States of America (USA)	Easement	1.52	--	1.52	Vol 352, pg 376	Warranty Easement	Warranty Clearance Easement	--	--	NA
4/20/1964	516E	Margaret R. Prime, Jon D. Prime (John)	United States of America (USA)	Easement	6.79	--	6.79	Vol 352, pg 390	Warranty Easement	Warranty Clearance Easement	--	--	NA
4/20/1964	518E	Melecio Rodriguez, Epifania O. Rodriguez	United States of America (USA)	Easement	8.46	--	8.46	Vol 352, pg 396	Warranty Easement	Warranty Clearance Easement	--	--	NA
4/17/1964	513E	Tony Mazzier, Amelia Mazzier	United States of America (USA)	Easement	25.09	--	25.09	Vol 352, pg 393	Warranty Easement	Warranty Clearance Easement	--	--	NA
4/10/1964	A105E	R.J. Sumner, Pauline M. Sumner	United States of America (USA)	Easement	18.04	--	18.04	Vol 352, pg 277	Warranty Easement	Warranty Clearance Easement	--	--	NA
4/8/1964	A106E	Marion Reginato, Leslie Reginato	United States of America (USA)	Easement	10.48	--	10.48	Vol 352, pg 217	Warranty Easement	Warranty Clearance Easement	--	--	NA
4/8/1964	C305E	Wesley Harsey, Pearle Harsey	United States of America (USA)	Easement	0.76	--	0.76	Vol 352, pg 214	Warranty Easement	Warranty Clearance Easement	--	--	NA
4/8/1964	C309E	Lydia J. Knotts or Lydia Knotts	United States of America (USA)	Easement	1.24	--	1.24	Vol 352, pg 220	Warranty Easement	Warranty Clearance Easement	--	--	NA
4/7/1964	C304E	Jasper G. Moore, Helen C. Moore, Miles E. Cain	United States of America (USA)	Easement	2	--	2	Vol 352, pg 478	Warranty Easement	Warranty Clearance Easement	--	--	NA
4/2/1964	C306E	Steve Wilson & Mary F. Wilson	United States of America (USA)	Easement	2.52	--	2.52	Vol 352, pg 131	Warranty Easement	Warranty Clearance Easement	--	--	NA
4/2/1964	C311E	Ray G. Oren, Ray G. Oren, Jr. Mildred I. Oren	United States of America (USA)	Easement	1.06	--	1.06	Vol 352, pg 134	Warranty Easement	Warranty Clearance Easement	--	--	NA
3/30/1964	C301E	Mathew Del Fatti & Julia Mae Del Fatti	United States of America (USA)	Easement	1.01	--	1.01	Vol 351, pg 56	Warranty Easement	Warranty Clearance Easement	--	--	NA
3/30/1964	C310E	Dorothy Thomas / Dorothy Bennett/Dorothy Bennett Thomas & Clifford A. Thomas	United States of America (USA)	Easement	2.57	--	2.57	Vol 352, pg 53	Warranty Easement	Warranty Clearance Easement	--	--	NA



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DATE	BY	REVISIONS
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April 2011	Mead & Hunt	Update

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Recording Date	2019 Property Map Parcel #	Grantor	Grantee	Property Interest (Fee or Easement)	Parcel Acreage	Parcel Fee	Parcel Easement	Recorded Liber (Book/Page)	Instrument of Title	Purpose	Federal Acquired	Transferred or Released	Surplus
3/30/1964	C312E	Ray Thomas Dorrell & Verdie Adeline Dorrell	United States of America (USA)	Easement	0.65	--	0.65	Vol 352, pg 59	Warranty Easement	Warranty Clearance Easement	--	--	NA
2/20/1963	A137E	Green, et al	United States of America (USA)	Fee	5.87	5.87	--	Vol 343, pg 279	Judgement/Condemnation (Civil No. 60-372)	Approach Light System - Rwy 14	--	--	Unknown
5/14/1962	500E	Martin Greene & Anita M. Green, Klamath County and Klamath Irrigation District	United States of America (USA)	Easement	0.3	--	0.3	Vol 337, pg 372	Judgement/Condemnation (Civil No. 60-163)	Easement Cable Line - Rwy 32 ALS	--	--	No
12/20/1960	A-135E1	Leo A. Garske & Sophie A. Garske	United States of America (USA)	Fee	2.16	2.16	--	Vol 326, pg 239	Warranty Deed	Land Conveyance - Rwy 32 ALS	--	--	No
12/20/1960	A-135E2	Leo A. Garske & Sophie A. Garske	United States of America (USA)	Fee	2.68	2.68	--	Vol 326, pg 239	Warranty Deed	Land Conveyance - Rwy 32 ALS	--	--	No
12/20/1960	A135E3	Leo A. Garske & Sophie A. Garske	United States of America (USA)	Fee	1.12	1.12	--	Vol 326, pg 239	Warranty Deed	Land Conveyance - Rwy 32 ALS	--	--	No
8/26/1960	A136E	Buford E. Boyd & Margaret A. Boyd	United States of America (USA)	Easement	2.31	--	2.31	Vol 323, pg 583	Warranty Easement	Warranty Clearance Easement	--	--	NA
8/16/1960	A-138	Tony Mazzier & Amelia Mazzier	United States of America (USA)	Fee	0.08	0.08	--	Vol 323, pg 382	Warranty Deed	Land Conveyance - Rwy 32 ALS	--	--	No
8/31/1959	A131	State of Oregon, ONG	United States of America (USA)	Fee	2.61	2.61	--	Vol 315, pg 346	Quitclaim Deed	Conveyance - Business Park Area	--	--	No
3/19/1959	A129E	Great Northern Railway Co.	United States of America (USA)	Easement	5.68	--	5.68	Vol 310, pg 631	Restrictive Easement Deed	Easement	--	--	NA
10/18/1957	B209E	Lawrence C. Bullard, Dorothy Helen Bullard & Klamath County	United States of America (USA)	Easement	18.66	--	18.66	Civil No. 9408	Judgement on the Declaration of Taking & Order of Possession	Avigation Easement - Rwy 14 Approach	--	--	NA
9/11/1957	B225E	Ira M. Foster & Minnie B. Foster/Minnie Bell Foster	United States of America (USA)	Easement	2.63	--	2.63	Vol 294, pg 283	Warranty Easement	Warranty Clearance Easement	--	--	NA
8/23/1957	B208E	Charles H. Young & June L. Young	United States of America (USA)	Easement	1.9	--	1.9	Vol 294, pg 71	Warranty Easement	Warranty Clearance Easement	--	--	NA
7/26/1957	B214E	H.S. Vaden & Lydia Vaden	United States of America (USA)	Easement	1.31	--	1.31	Vol 293, pg 366	Warranty Easement	Warranty Clearance Easement	--	--	NA
7/15/1957	B244E	James R. Orr & Thelma B. Orr	United States of America (USA)	Easement	1.01	--	1.01	Vol 293, pg 95	Warranty Easement	Warranty Clearance Easement	--	--	NA
7/12/1957	B234E	H. A. Nitschelm & Melvne D. Nitschelm	United States of America (USA)	Easement	5.45	--	5.45	Vol 293, pg 91	Warranty Easement	Warranty Clearance Easement	--	--	NA
7/11/1957	B224E	Donald D. Phelps & Viola Phelps	United States of America (USA)	Easement	0.42	--	0.42	Vol 293, pg 60	Warranty Easement	Warranty Clearance Easement	--	--	NA
6/13/1957	B211E	Iona James, Victor Bednar, Claudia Kay Bednar	United States of America (USA)	Easement	2.6	--	2.6	Vol 292, pg 316	Warranty Easement	Warranty Clearance Easement	--	--	NA
6/13/1957	B227E	Lizzie P. Lord; Thomas A. Wasson Ramona A. Wasson	United States of America (USA)	Easement	5.27	--	5.27	Vol 293, pg 56	Warranty Easement	Warranty Clearance Easement	--	--	NA
6/12/1957	B232E	Willard L. Polson & M. Eunice Polson	United States of America (USA)	Easement	0.51	--	0.51	Vol 292, pg 320	Warranty Easement	Warranty Clearance Easement	--	--	NA
6/11/1957	B220E	Carl E. Peterson & Ruby June Peterson; Dallas William Fanning & Vera Mae Fanning	United States of America (USA)	Easement	0.89	--	0.89	Vol 292, pg 278	Warranty Easement	Warranty Clearance Easement	--	--	NA
6/11/1957	B253E	Elven McNabb & Marjorie McNabb	United States of America (USA)	Easement	2.55	--	2.55	Vol 292, pg 273	Warranty Easement	Warranty Clearance Easement	--	--	NA
4/15/1957	B246E	H. F. Jarrard & Lona Jarrard	United States of America (USA)	Easement	2.65	--	2.65	Vol 291, pg 191	Warranty Easement	Warranty Clearance Easement	--	--	NA
4/12/1957	B243E	William M. Jameson	United States of America (USA)	Easement	0.21	--	0.21	Vol 291, pg 186	Warranty Easement	Warranty Clearance Easement	--	--	NA
4/11/1957	B242E	Murrell L. Wise	United States of America (USA)	Easement	0.23	--	0.23	Vol 291, pg 160	Warranty Easement	Warranty Clearance Easement	--	--	NA
4/9/1957	B222E	Marie Hanel; Elroy E. Krueger & Elizabeth Krueger	United States of America (USA)	Easement	1.1	--	1.1	Vol 291, pg 121	Warranty Easement	Warranty Clearance Easement	--	--	NA
4/9/1957	B229E	Donald D. Phelps & Viola Phelps	United States of America (USA)	Easement	0.01	--	0.01	Vol 291, pg 95	Warranty Easement	Warranty Clearance Easement	--	--	NA
4/9/1957	B231E	Dean Sheldon & Geraldine May Sheldon	United States of America (USA)	Easement	0.16	--	0.16	Vol 291, pg 116	Warranty Easement	Warranty Clearance Easement	--	--	NA
4/9/1957	B240E	Charles F. Mitchell & Naomi G. Mitchell	United States of America (USA)	Easement	4.47	--	4.47	Vol 291, pg 111	Warranty Easement	Warranty Clearance Easement	--	--	NA
4/8/1957	B212E	Crescencio Herrera & Thodora Herrera; Donald Kucera & Nancy I Kucera; Larry A. Kinney	United States of America (USA)	Easement	2.61	--	2.61	Vol 291, pg 64	Warranty Easement	Warranty Clearance Easement	--	--	NA
4/8/1957	B213E	Edward J. Charas & Irene T. Charas; Donald Kucera/Donald E. Kucera	United States of America (USA)	Easement	1.31	--	1.31	Vol 291, pg 44	Warranty Easement	Warranty Clearance Easement	--	--	NA
4/8/1957	B215E	Floyd Case & Dorothy Case	United States of America (USA)	Easement	1.31	--	1.31	Vol 291, pg 54	Warranty Easement	Warranty Clearance Easement	--	--	NA
4/8/1957	B218E	W. R. Oldham & Mary Oldham	United States of America (USA)	Easement	1.32	--	1.32	Vol 291, pg 21	Warranty Easement	Warranty Clearance Easement	--	--	NA
4/8/1957	B219E	Floyd G. Young & Mildred F. Young	United States of America (USA)	Easement	3.16	--	3.16	Vol 291, pg 34	Warranty Easement	Warranty Clearance Easement	--	--	NA
4/8/1957	B221E	Elizabeth M. Sheehy/Elizabeth M. Kellison & Thomas Sheehy	United States of America (USA)	Easement	0.32	--	0.32	Vol 291, pg 59	Warranty Easement	Warranty Clearance Easement	--	--	NA
4/8/1957	B223E	Donald E. Gourley & Leda R. Gourley	United States of America (USA)	Easement	1.09	--	1.09	Vol 292, pg 289	Warranty Easement	Warranty Clearance Easement	--	--	NA
4/8/1957	B226E	John D. Burg & Vivian Burg	United States of America (USA)	Easement	1.95	--	1.95	Vol 291, pg 16	Warranty Easement	Warranty Clearance Easement	--	--	NA
4/8/1957	B235E	Elmer Leroy Bleak & Ethel Bleak	United States of America (USA)	Easement	5.3	--	5.3	Vol 291, pg 6	Warranty Easement	Warranty Clearance Easement	--	--	NA
4/8/1957	B236E	Howard J. Smith & Bertha F. Smith	United States of America (USA)	Easement	2.65	--	2.65	Vol 291, pg 49	Warranty Easement	Warranty Clearance Easement	--	--	NA
4/8/1957	B239E	Ed S. Hawkins & Minnie W. Hawkins	United States of America (USA)	Easement	0.22	--	0.22	Vol 291, pg 39	Warranty Easement	Warranty Clearance Easement	--	--	NA
4/4/1957	B216E	Henry E. Miksch & Rose D. Miksch; Vernon H. Gauthier & Josephine Gauthier	United States of America (USA)	Easement	1.32	--	1.32	Vol 292, pg 256	Warranty Easement	Warranty Clearance Easement	--	--	NA
3/28/1957	B217E	James A. Durand & Josephine Durand	United States of America (USA)	Easement	1.32	--	1.32	Vol 290, pg 507	Warranty Easement	Warranty Clearance Easement	--	--	NA
3/28/1957	B228E	George W. Tedrick & Maida N. Tedrick	United States of America (USA)	Easement	5.3	--	5.3	Vol 290, pg 512	Warranty Easement	Warranty Clearance Easement	--	--	NA
7/26/1956	A100E1	City of Klamath Falls	United States of America (USA)	Easement	37.54	--	37.54	Vol 285, pg 253	Restrictive Easement	Assignment of Restrictive Easements	--	--	NA
7/26/1956	A100E2	City of Klamath Falls	United States of America (USA)	Easement	49.85	--	49.85	Vol 285, pg 253	Restrictive Easement	Assignment of Restrictive Easements	--	--	NA
9/21/1955	434	Jack C. Hayes & Leona C. Hayes	City of Klamath Falls	Fee	32.28	32.28	--	Vol 277, pg 468	Warranty Deed	Rwy 14 End	--	--	No
8/24/1955	A131	United States of America (USA)	State of Oregon	Fee	2.61	2.61	--	Vol 277, pg 1	Quitclaim Deed	Conveyance - Business Park Area	--	--	No
2/17/1955	401	W. M. Raymond & Ruth Raymond	City of Klamath Falls	Fee	45.38	45.38	--	Vol 272, pg 338	Warranty Deed	Aeronautical Development Area	--	--	No
2/16/1955	433	Jack C. Hayes & Leona C. Hayes/Leona A. Hayes	City of Klamath Falls	Fee	4.3	4.3	--	Vol 272, pg 328	Warranty Deed	Rwy 25 End	--	--	No
2/15/1955	429	Melvin C. Keener & Maude Maurine Keener	City of Klamath Falls	Fee	8.72	8.72	--	Vol 272, pg 310	Warranty Deed	Rwy East Side	--	--	No
2/14/1955	426	John Reginato & Ida Reginato	City of Klamath Falls	Fee	3.7	3.7	--	Vol 272, pg 291	Warranty Deed	Rwy 25 / Taxiway System	--	--	No
2/14/1955	431	E. G. Born & Dorothy Born	City of Klamath Falls	Fee	20.02	20.02	--	Vol 272, pg 297	Warranty Deed	Rwy 25 / Taxiway System	--	--	No
2/14/1955	432	A. M. Ager & Clarice W. Ager	City of Klamath Falls	Fee	0.79	0.79	--	Vol 272, pg 293	Warranty Deed	Rwy 25 / Taxiway System	--	--	No
1/14/1955	430	Dean Hall & Oralee Hall	City of Klamath Falls	Fee	29.26	29.26	--	Vol 272, pg 295	Warranty Deed	Rwy 25 End	--	--	No
9/15/1953	442 (4)	United States of America (USA)	City of Klamath Falls	Fee / Easement	8.3	8.3	--	Vol 263, pg 88	Deed and Easement	Drainage Canal Conveyance - Midfield	--	--	No
6/4/1953	410	United States of America (USA)	City of Klamath Falls	Fee	38.59	38.59	--	Vol 261, pg 226	Patent	Guard Base Area	--	--	No
1/14/1948	441/409/407 (3) (11)	United States of America (USA)	City of Klamath Falls	Fee	44.5	44.5	--	Vol 221, pg 282	Correction Deed	Landside Area (441/409 - Guard) 407 (Civilian Apron)	--	--	Yes
2/19/1945	428	E. G. Born & Dorothy	City of Klamath Falls	Fee	40	40	--	Vol 173, pg 373	Warranty Deed	Rwy 25 / Taxiway System	--	--	No
2/16/1945	427	John Reginato & Ida Reginato	City of Klamath Falls	Fee	10	10	--	Vol 173, pg 315	Warranty Deed	Taxiway System	--	--	No
4/3/1942	416	N. B. Huffman and Emma Ellen Huffman	City of Klamath Falls	Fee	5	5	--	Vol 146, pg 367	Warranty Deed	Rwy 25 End	--	--	No



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The preparation of this document may have been supported, in part, through the Airport Improvement Program financial assistance from the Federal Aviation Administration as provided under Title 49 U.S.C., Section 47104. The contents do not in any way constitute a commitment on the part of the United States to participate in any development depicted therein nor does it indicate that the proposed development is environmentally acceptable or would have justification in accordance with appropriate public laws.



CRATER LAKE - KLAMATH REGIONAL AIRPORT EXHIBIT 'A' PROPERTY MAP KLAMATH FALLS, OREGON

DATE	BY	REVISIONS
May 2009	Mead & Hunt	Initial
April 2012	Mead & Hunt	Update

DESCRIPTION: EXHIBIT 'A' PROPERTY MAP UPDATE
M&H NO.: 115200-170983.01
DATE: FEBRUARY 2021
DESIGNED BY: JS
DRAWN BY: AP
CHECKED BY: MH
DO NOT SCALE DRAWINGS

SHEET CONTENTS
EXHIBIT 'A' PROPERTY MAP - DATA TABLE (CONTINUED)
SHEET NO.

I:\CORP\MEADHUNT\COM\SHARED\FOLDERS\REV\11152001\170983.01\TECH\CAD\DRAWINGS\ALP_2020\EXHIBIT_A\DWG\LMT_2009_EXHIBIT_A_UPDATED_2021.DWG 8/2/2021 1:36 PM

Recording Date	2019 Property Map Parcel #	Grantor	Grantee	Property Interest (Fee or Easement)	Parcel Acreage	Parcel Fee	Parcel Easement	Recorded Liber (Book/Page)	Instrument of Title	Purpose	Federal Acquired	Transferred or Released	Surplus
2/27/1942	418 (11)	Mona Irene Horn, G. W. Horn/G.W. Horn/Geo W. Born	City of Klamath Falls	Fee	9.52	9.52	--	Vol 145, pg 356	Warranty Deed	Rwy 25 End	--	--	No
1/21/1942	417	Howard C. Walker & Ruth M. Walker	City of Klamath Falls	Fee	5.5	5.5	--	Vol 144, pg 317	Warranty Deed	Rwy 25 End	--	--	No
1/12/1942	412	C. H. Kelly & Carolyn Kelly, J. F. Kelly	City of Klamath Falls	Fee	36.94	36.94	--	Vol 144, pg 89	Quitclaim Deed	Guard Munition Storage Area	--	--	No
1/6/1942	419	James A. Rowley & Alma I. Rowley	City of Klamath Falls	Fee	5	5	--	Vol 143, pg 617	Warranty Deed	Aeronautical Development Area	--	--	No
12/30/1941	415	N. J. Rowley	City of Klamath Falls	Fee	16.58	16.58	--	Vol 143, pg 520	Warranty Deed	Rwy 25 End	--	--	No
12/30/1941	420	N. J. Rowley	City of Klamath Falls	Fee	16.58	16.58	--	Vol 143, pg 520	Warranty Deed	Rwy 25 End	--	--	No
11/17/1941	425	H. W. Waits & Ada F. Waits	City of Klamath Falls	Fee	2	2	--	Vol 142, pg 493	Warranty Deed	Rwy 7 South Side	--	--	No
6/25/1941	421	N. J. Rowley	City of Klamath Falls	Fee	5	5	--	Vol 139, pg 79	Warranty Deed	Rwy 25 End	--	--	No
6/8/1941	424	J. F. Maguire	City of Klamath Falls	Fee	26	26	--	Vol 138, pg 393	Warranty Deed	Guard Base Area	--	--	No
6/7/1941	409	W. Claude Adams and Kyra L. Adams	City of Klamath Falls	Fee	2	2	--	Vol 138, pg 401	Warranty Deed	Guard Base Area	--	--	No
5/21/1941	413 (11)	R. H. Kelly/ Rolland H. Kelly & Viola B. Kelly	City of Klamath Falls	Fee	21.68	21.68	--	Vol 138, pg 150	Warranty Deed	Guard Ammunition Storage	--	--	No
5/13/1941	407	Mike Zupan and Anna Zupan	City of Klamath Falls	Fee	38	38	--	Vol 137, pg 589	Warranty Deed	General Aviation Ramp Area	--	--	No
5/12/1941	423	E. G. Born & Dorothy Born	City of Klamath Falls	Fee	89.9	89.9	--	Vol 137, pg 561	Warranty Deed	Engine Testing	--	--	No
5/8/1941	405	George W. McAnulty and Emma May McAnulty	City of Klamath Falls	Fee	20	20	--	Vol 137, pg 403	Warranty Deed	Aeronautical Development Area	--	--	No
5/8/1941	414 (11)	Otis O. Smith	City of Klamath Falls	Fee	41.09	41.09	--	Vol 137, pg 515	Warranty Deed	Rwy 25 End	--	--	No
5/6/1941	422	Nelson J. Rowley/N.J. Rowley	City of Klamath Falls	Fee	35	35	--	Vol 137, pg 427	Warranty Deed	Rwy 25	--	--	No
4/11/1941	402	Balsiger Motor Company	City of Klamath Falls	Fee	54	54	--	Vol 139, pg 342	Warranty Deed	Rwy 25	--	--	No
2/21/1935	411 (11)	R. H. Kelly, C.H. Kelly & J.F. Kelly	City of Klamath Falls	Fee	22.57	22.57	--	Vol 104, pg 392	Deed	Guard Munition Storage Area	--	--	No
4/12/1930	406 (11)	R.S. Moore & Clara A. Moore	City of Klamath Falls	Fee	287.52	287.52	--	Vol 90, pg 177	Deed	Northeast General Aviation Area	--	--	No
N/A	444 (6)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Rwy 25 End - South Side	N/A	N/A	N/A
N/A	445 (7)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Rwy 25 End - North Side	N/A	N/A	N/A
10/19/1999	446 (8)	Secretary of the Air Force	State of Oregon	N/A	21.1	N/A	N/A	N/A	N/A	Training and Support of Oregon Air National Guard	N/A	N/A	N/A
N/A	447 (9)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	North of Guard Munitions Storage Area	N/A	N/A	N/A
6/11/2007	Area A (13)	Oregon Department of State Lands	City of Klamath Falls	Fee	30.2	30.2	--	N/A	Memorandum of Understanding	Wetland Mitigation Site (Ore.Cir.Ct. Judgement in Condemnation, 2010)	3-41-0030-23/24	--	No
6/11/2007	Area B (13)	Oregon Department of State Lands	City of Klamath Falls	Fee	29.8	29.8	--	N/A	Memorandum of Understanding	Wetland Mitigation Site (Ore.Cir.Ct. Judgement in Condemnation, 2010)	3-41-0030-23/24	--	No
NEW PARCELS SINCE 2009 EXHIBIT A PROPERTY MAP													
3/2/2009	102	City of Klamath Falls	State of Oregon	Fee	2.69	2.69	--	DN 2009-003096	Bargain and Sale Deed	Airport Business Park Area	N/A	N/A	No
3/2/2009	104 (1) (2)	City of Klamath Falls	State of Oregon	Fee	7.89	7.89	7.89	DN 2009-003095	Bargain and Sale Deed	Airport Business Park Area	N/A	N/A	No
6/16/1994	901 (1) (11)	Klamath County	City of Klamath Falls	Fee	--	0.48	--	M94, pg 19011	Quitclaim Deed	Tract crossing BNSF RR	N/A	N/A	No
TOTAL (13)					2019.46	1310.74	670.25						
PARCEL CONVEYANCES IDENTIFIED SINCE 2009 EXHIBIT A PROPERTY MAP (PER 2018 TITLE SEARCH DATA)													
6/2/2008	443 (5) (10)	United States of America (USA)	City of Klamath Falls	Fee	--	0.66	--	DN 2008-007979	Quitclaim Deed	Airport Business Park Area	--	--	Yes
4/30/2008	Parcel 2 (10) LP 27-98	Calvary Chapel of Klamath Falls	City of Klamath Falls	Fee	--	2.69	--	DN 2008-006266	Warranty Deed	No purpose listed.	--	--	NA
9/28/1995	-- (10)	United States Air Force	City of Klamath Falls	Easement	--	--	0.14	M95, pg 27034	Easement	City Utility Line - Guard Leased Area	--	--	NA
9/1/1994	N/A (10)	City of Klamath Falls	Pacific Gas Transmission Company	Easement	--	--	2.33	M94, pg 29744 rerecorded M94, pg 39209	Right-of-Way Agreement	Gas Pipeline - North Rwy 14 End	--	--	NA
8/26/1994	404 (10)	Art Davina	Pacific Gas Transmission Company	Easement	--	--	0.15	M94, pg 26701	Right-of-Way Agreement	Gas Pipeline - Near USFS	--	--	NA
3/12/1987	408 / A131 (10)	United States of America (USA)	City of Klamath Falls	Fee	--	30.94	--	M87, pg 3983	Quitclaim Deed	Airport Business Park Area	--	M87, pg 8953 back to United States	Yes
1/21/1980	E-700 (10)	City of Klamath Falls	Gerald S. Whitlatch	Fee & Easement	24.53	24.53	24.53	M80, pg 3464	Deed	Easement East Rwy 25 End	--	--	No
12/20/1960	A135E1 (10)	Leo A. Garske & Sophie A. Garske	United States of America (USA)	Easement	--	--	2.91	Vol 326, pg 342	Warranty Easement	Rwy 32 ALS	--	--	NA
12/20/1960	A135E2 (10)	Leo A. Garske & Sophie A. Garske	United States of America (USA)	Easement	--	--	2.56	Vol 326, pg 342	Warranty Easement	Rwy 32 ALS	--	--	NA
8/26/1960	A136 (10)	Buford E. Boyd & Margaret A. Boyd	United States of America (USA)	Fee	0.54	0.54	--	Vol 323, pg 581	Warranty Deed	Rwy 14 ALS	--	--	No
2/15/1955	A100E1 (10)	W. M. Raymond & Ruth Raymond	City of Klamath Falls	Easement	--	--	37.54	Vol 272, pg 340	Restrictive Easement	Land West of Altamont Drive and North of Brett Way	--	--	NA

LEGEND	
Data Gap	Parcel Data Missing from the 2009 LMT Exhibit "A" Property Map.
Data Update	Parcel Data Updated or Revised from the 2009 LMT Exhibit "A" Property Map
New Data	Parcel Data Added from the 2009 LMT Exhibit "A" Property Map
Stricken	Parcel Data Removed from the 2009 LMT Exhibit "A" Property Map
N/A	Parcel Data Not Available
--	Parcel Data Not Applicable
<i>Italics Acreage</i>	Parcel Size Determined from Drawing Boundary

TABLE NOTES

- (1) PARCELS 104 & 901 WERE DISCOVERED DURING REVIEW OF TITLE RECORD OBTAINED FROM AMERITITLE DATED NOVEMBER 7, 2018.
- (2) PARCELS 408 & 104: A PORTION OF PARCEL 408 WAS TRANSFERRED TO THE STATE OF OREGON. REFER TO PARCEL 104 & 102.
- (3) PARCELS 441, 408 & 407 WERE RECONVEYED IN JANUARY 14, 1948 TO CORRECT A LEGAL DESCRIPTION IN BOOK 215, PAGE 459.
- (4) PARCEL 442 INCLUDES CONVEYANCE OF THE A-3-N LATERAL AND 1-E DRAIN WITH A FEE INTEREST AS WELL AS AN 8.3 ACRE EASEMENT FOR HIGHWAY PURPOSES IN THE SAME DOCUMENT.
- (5) PARCEL 443 AS SHOWN ON THE ORIGINAL 2009 TABLE INCLUDED REFERENCE TO A NONEXISTENT DEED RECORD. THE PARCEL WAS DEEDED TO THE CITY OF KLAMATH FALLS AS SHOWN IN ADDITIONAL CONVEYANCES.
- (6) PARCEL 444: TITLE SEARCH AND COUNTY COURTHOUSE RECORD VISIT ON 03-21-2019 DID NOT REVEAL PARCEL DEED RECORD.
- (7) PARCEL 445: TITLE SEARCH AND COUNTY COURTHOUSE RECORD VISIT ON 03-21-2019 DID NOT REVEAL PARCEL DEED RECORD.
- (8) PARCEL 446: TITLE SEARCH AND COUNTY COURTHOUSE RECORD VISIT ON 03-21-2019 DID NOT REVEAL PARCEL DEED RECORD.
- (9) PARCEL 447: TITLE SEARCH AND COUNTY COURTHOUSE RECORD VISIT ON 03-21-2019 DID NOT REVEAL PARCEL DEED RECORD.
- (10) ADDITIONAL CONVEYANCES INCLUDE FEE INTEREST CHAIN OF TITLE ITEMS AND EASEMENTS ENCUMBERING AIRPORT LANDS PER TITLE RECORD OBTAINED FROM AMERITITLE DATED NOVEMBER 7, 2018.
- (11) PARCEL OR EASEMENT ACREAGE TOTALS CALCULATED BY RETRACING DEED OR SURVEY RECORDS IS DENOTED WITH ITALICS.
- (12) THE ABSENCE OF PARCEL ACREAGE TOTAL NOT SHOWN FOR EASEMENTS INDICATES EASEMENT IS CONTAINED WITHIN A PORTION OF A FEE SIMPLE PARCEL.
- (13) FEE SIMPLE TOTAL OF 1,310.74 ACRES INCLUDES 1,250.74 ACRES OF CONTIGUOUS LMT PROPERTY PLUS AN ADDITIONAL 60 ACRES OF OFFSITE WETLAND MITIGATION AREA.



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CRATER LAKE - KLAMATH REGIONAL AIRPORT EXHIBIT 'A' PROPERTY MAP
KLAMATH FALLS, OREGON

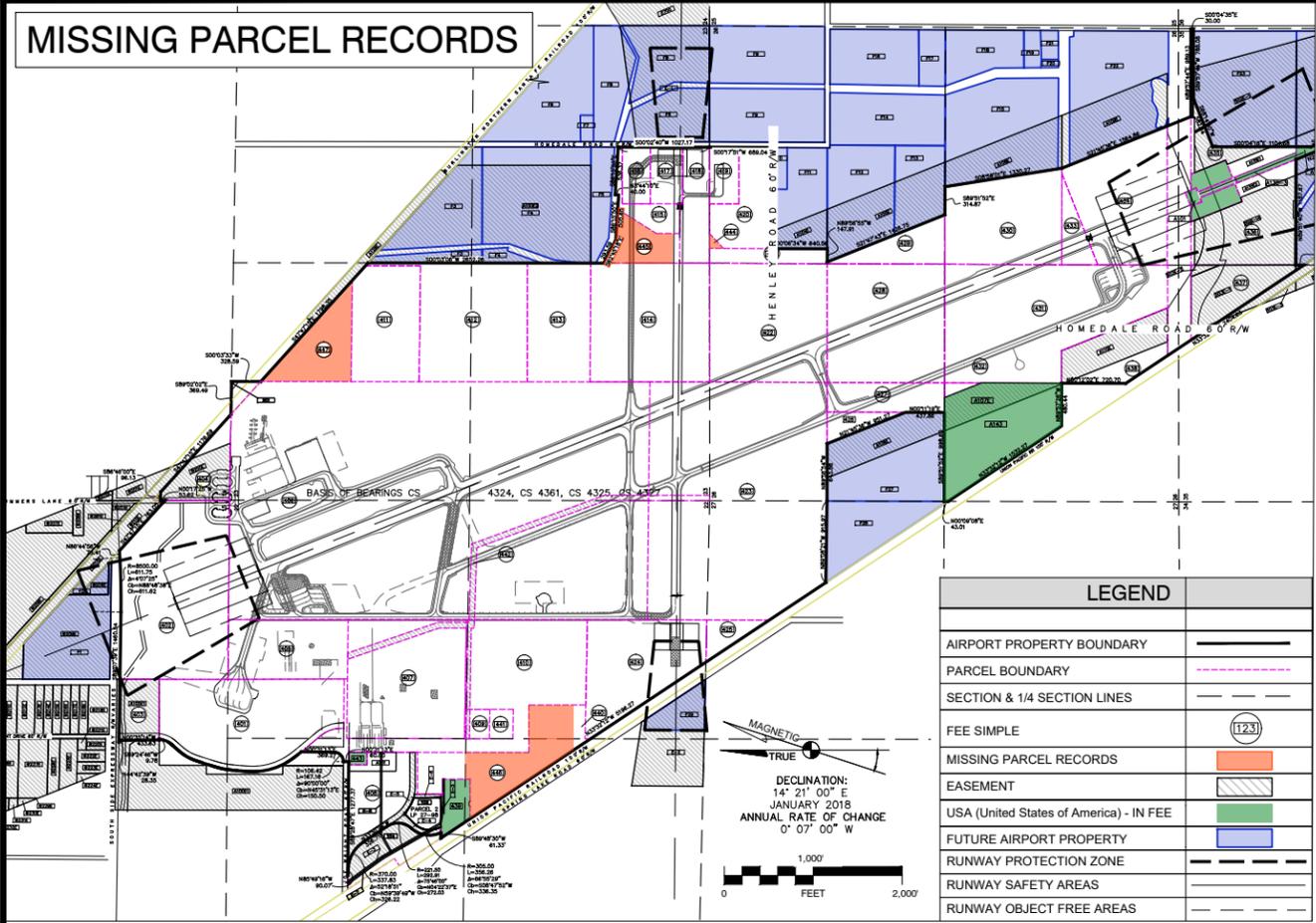
DATE	BY	REVISIONS
May 2009	Mead & Hunt	Initial
April 2012	Mead & Hunt	Revised

MSH NO.: 1115200-170983.01
DATE: FEBRUARY 2021
DESIGNED BY: JS
DRAWN BY: AP
CHECKED BY: MH
DO NOT SCALE DRAWINGS

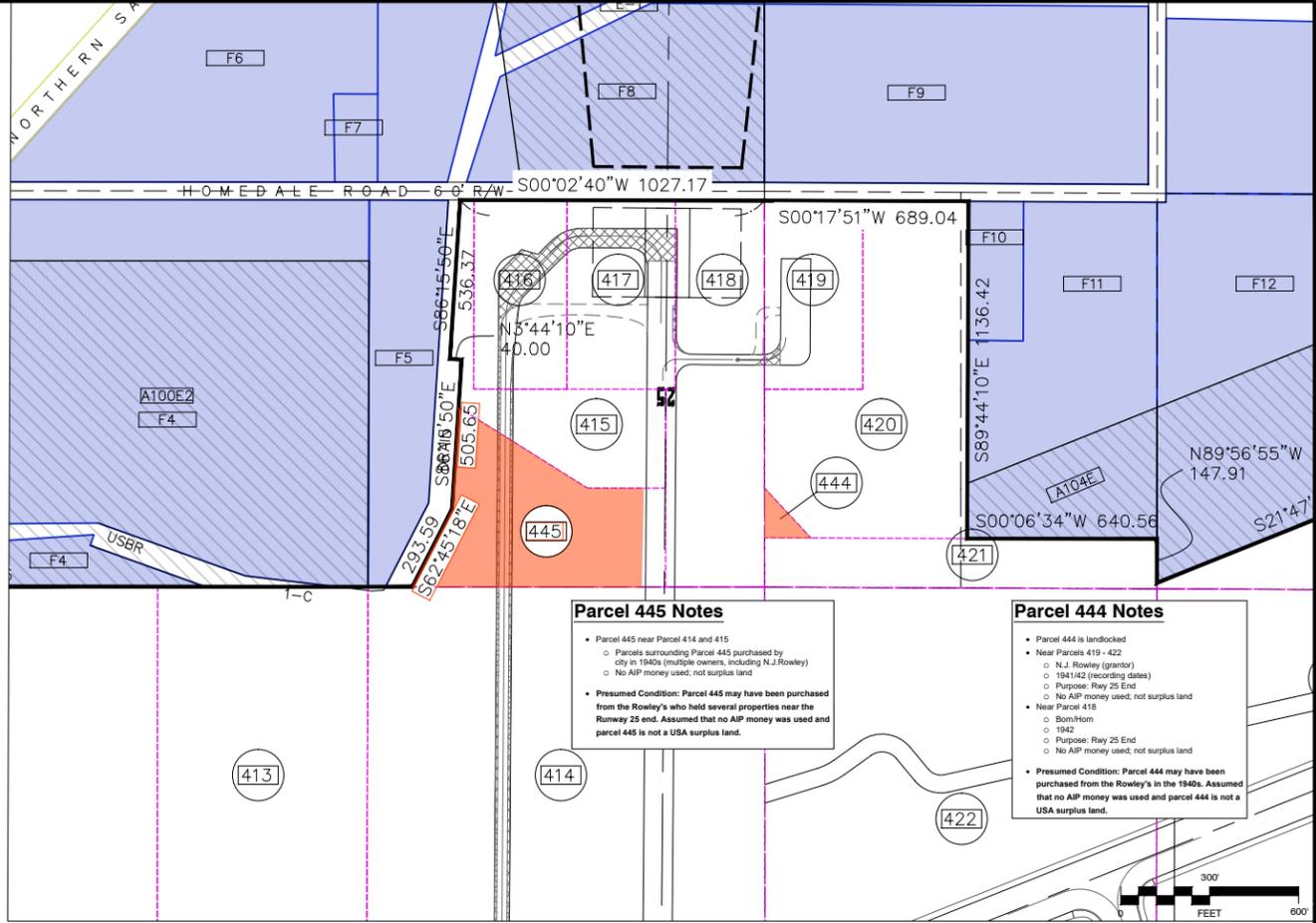
EXHIBIT 'A' PROPERTY MAP - DATA TABLE (CONTINUED)

SHEET NO.

MISSING PARCEL RECORDS



LEGEND	
AIRPORT PROPERTY BOUNDARY	—
PARCEL BOUNDARY	- - - - -
SECTION & 1/4 SECTION LINES	—
FEE SIMPLE	(123)
MISSING PARCEL RECORDS	■
EASEMENT	▨
USA (United States of America) - IN FEE	■
FUTURE AIRPORT PROPERTY	■
RUNWAY PROTECTION ZONE	▨
RUNWAY SAFETY AREAS	▨
RUNWAY OBJECT FREE AREAS	▨

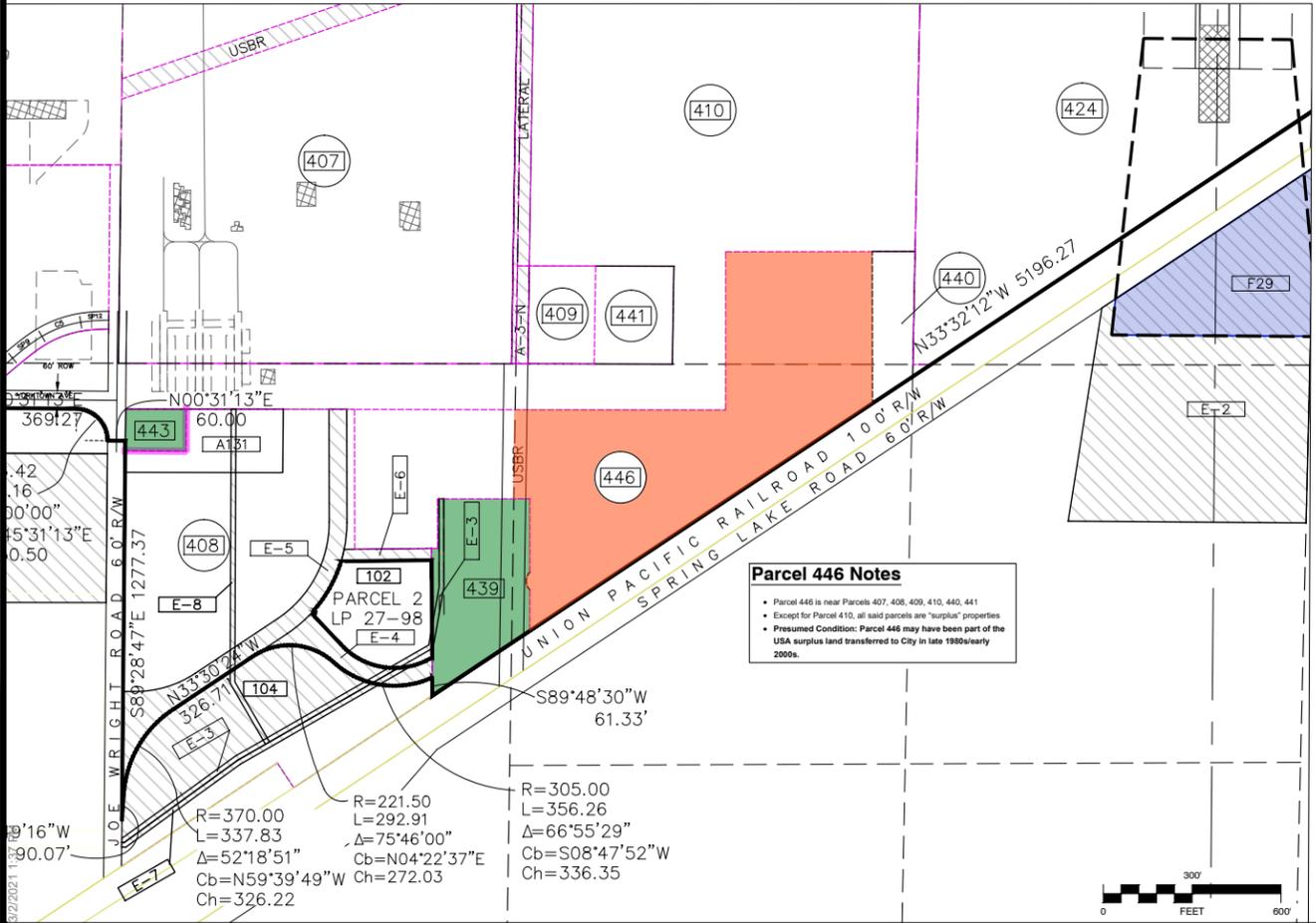


Parcel 445 Notes

- Parcel 445 near Parcel 414 and 415
- Parcels surrounding Parcel 445 purchased by city in 1940s (multiple owners, including N.J. Rowley)
- No AIP money used; not surplus land
- Presumed Condition: Parcel 445 may have been purchased from the Rowley's who held several properties near the Runway 25 end. Assumed that no AIP money was used and parcel 445 is not a USA surplus land.

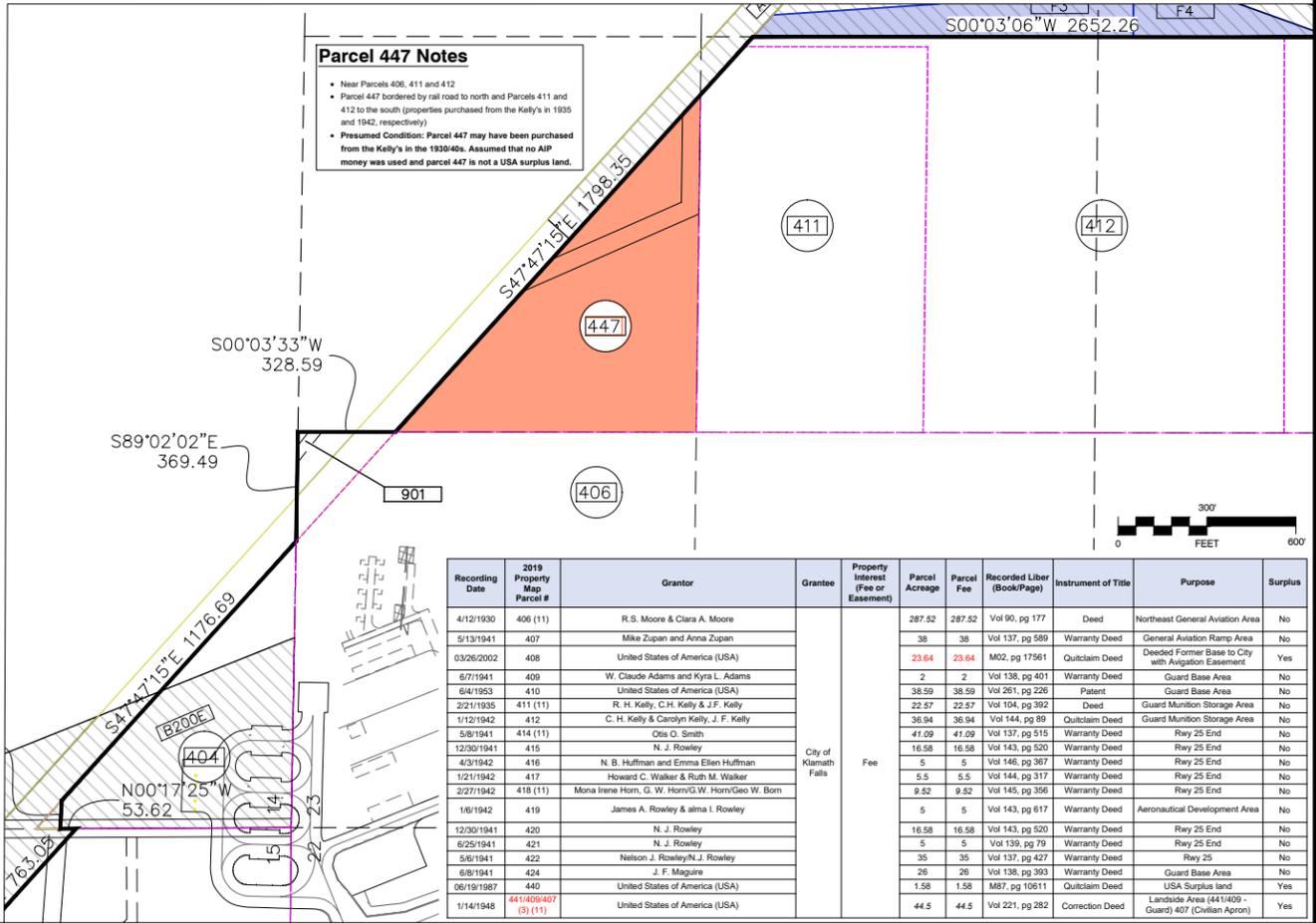
Parcel 444 Notes

- Parcel 444 is landlocked
- Near Parcels 419 - 422
- N.J. Rowley (grantor)
- 1941/42 (recording dates)
- Purpose: Run 25 End
- No AIP money used; not surplus land
- Near Parcel 418
- Born/From
- 1942
- Purpose: Run 25 End
- No AIP money used; not surplus land
- Presumed Condition: Parcel 444 may have been purchased from the Rowley's in the 1940s. Assumed that no AIP money was used and parcel 444 is not a USA surplus land.



Parcel 446 Notes

- Parcel 446 is near Parcels 407, 408, 409, 410, 440, 441
- Except for Parcel 410, all said parcels are "surplus" properties
- Presumed Condition: Parcel 446 may have been part of the USA surplus land transferred to City in late 1980s/early 2000s.



Parcel 447 Notes

- Near Parcels 406, 411 and 412
- Parcel 447 bordered by rail road to north and Parcels 411 and 412 to the south (properties purchased from the Kelly's in 1935 and 1942, respectively)
- Presumed Condition: Parcel 447 may have been purchased from the Kelly's in the 1930s/40s. Assumed that no AIP money was used and parcel 447 is not a USA surplus land.

Recording Date	2019 Property Map Parcel #	Grantor	Grantee	Property Interest (Fee or Easement)	Parcel Acreage	Parcel Fee	Recorded Liber (Book/Page)	Instrument of Title	Purpose	Surplus	
4/12/1930	406 (1)	R.S. Moore & Clara A. Moore	City of Klamath Falls	Fee	287.52	287.52	Vol 90, pg 177	Deed	Northeast General Aviation Area	No	
5/13/1941	407	Mike Zupan and Anna Zupan			38	38	Vol 137, pg 589	Warranty Deed	General Aviation Ramp Area	General Aviation Ramp Area	No
03/26/2002	408	United States of America (USA)			23.64	23.64	M02, pg 17561	Quitclaim Deed	Deeded Former Base to City with Avigation Easement	Deeded Former Base to City with Avigation Easement	Yes
6/7/1941	409	W. Claude Adams and Kyra L. Adams			2	2	Vol 138, pg 401	Warranty Deed	Guard Base Area	Guard Base Area	No
6/4/1953	410	United States of America (USA)			38.59	38.59	Vol 261, pg 226	Patent	Guard Base Area	Guard Base Area	No
2/21/1935	411 (1)	R. H. Kelly, C.H. Kelly & J.F. Kelly			22.57	22.57	Vol 104, pg 392	Deed	Guard Munition Storage Area	Guard Munition Storage Area	No
1/12/1942	412	C. H. Kelly & Carolyn Kelly, J. F. Kelly			36.94	36.94	Vol 144, pg 89	Quitclaim Deed	Guard Munition Storage Area	Guard Munition Storage Area	No
5/8/1941	414 (1)	Otis O. Smith			41.09	41.09	Vol 137, pg 515	Warranty Deed	Run 25 End	Run 25 End	No
12/30/1941	415	N. J. Rowley			16.58	16.58	Vol 143, pg 520	Warranty Deed	Run 25 End	Run 25 End	No
4/3/1942	416	N. B. Huffman and Emma Ellen Huffman			5	5	Vol 146, pg 367	Warranty Deed	Run 25 End	Run 25 End	No
1/21/1942	417	Howard C. Walker & Ruth M. Walker			5.5	5.5	Vol 144, pg 317	Warranty Deed	Run 25 End	Run 25 End	No
2/27/1942	418 (1)	Mona Irene Horn, G. W. Horn/G.W. Horn/Geo W. Horn			9.52	9.52	Vol 145, pg 356	Warranty Deed	Run 25 End	Run 25 End	No
1/8/1942	419	James A. Rowley & Alma I. Rowley			5	5	Vol 143, pg 617	Warranty Deed	Aeronautical Development Area	Aeronautical Development Area	No
12/30/1941	420	N. J. Rowley			16.58	16.58	Vol 143, pg 520	Warranty Deed	Run 25 End	Run 25 End	No
6/25/1941	421	N. J. Rowley			5	5	Vol 139, pg 79	Warranty Deed	Run 25 End	Run 25 End	No
5/8/1941	422	Nelson J. Rowley/N.J. Rowley	35	35	Vol 137, pg 427	Warranty Deed	Run 25	Run 25	No		
6/8/1941	424	J. F. Maguire	26	26	Vol 138, pg 393	Warranty Deed	Guard Base Area	Guard Base Area	No		
06/19/1987	440	United States of America (USA)	1.58	1.58	M87, pg 10611	Quitclaim Deed	USA Surplus land	USA Surplus land	Yes		
1/14/1948	441(20407) (3) (1)	United States of America (USA)	44.5	44.5	Vol 221, pg 282	Correction Deed	Land Area 6414609 - Guard) 407 (Civilian Apron)	Land Area 6414609 - Guard) 407 (Civilian Apron)	Yes		

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The preparation of this document may have been supported, in part, through the Airport Improvement Program financial assistance from the Federal Aviation Administration as provided under Title 49 U.S.C., Section 47104. The contents do not in any way constitute a commitment on the part of the United States to participate in any development depicted therein nor does it indicate that the proposed development is environmentally acceptable or would have justification in accordance with appropriate public laws.



CRATER LAKE - KLAMATH REGIONAL AIRPORT EXHIBIT 'A' PROPERTY MAP KLAMATH FALLS, OREGON

DATE	BY	DESCRIPTION
May 2009	Mead & Hunt	Property Map Update
April 2012	Mead & Hunt	Property Map Update

M&H NO.: 1115200-170983.01
 DATE: FEBRUARY 2021
 DESIGNED BY: JS
 DRAWN BY: AP
 CHECKED BY: MH
 DO NOT SCALE DRAWINGS

EXHIBIT 'A' PROPERTY MAP - MISSING PARCEL RECORDS

I:\CORP\MEADHUNT\COM\SHAREDFOLDERS\DRAWINGS\PLP 2020\EXHIBIT ADKINGLMT 2009 EXHIBIT A UPDATED 2021.DWG
 02/20/21 10:10 AM

APPENDIX A. ALP REVIEW CHECKLIST

The following checklist shall be used in lieu of FAA AC 150/5070-6B, Appendix F, Airport Layout Plan Drawing set. This checklist is intended for use when submitting a new or updated ALP to the FAA for review and approval. Consultants and/or sponsors should indicate “Yes,” “No” or “N/A” (not applicable) for every item on the checklist. The same checklist shall be provided to FAA for review and verification. For all reviewers: It is important that each item listed be shown on the respective plan.

Airport Identification (to be completed by Sponsor or Consultant)			
Airport	Crater Lake – Klamath Regional Airport		
City and State	Klamath Falls, OR	Location Identifier	LMT
Airport Owner	City of Klamath Falls, OR		

ALP Submission Information (to be completed by Sponsor or Consultant)			
ALP Prepared by	Mead & Hunt		
	Name of Consulting Firm		
	Daniel Lumetta		October 9, 2020
	Name of Individual		
	909-467-8533		Date
	Telephone		
	daniel.lumetta@meadhunt.com		
	Email address		
Consulting QA/QC Review	Kelly Maddoux		October 9, 2020
	Name and Title of Individual		
			Date
Sponsor Review	John Barsalou		October 8, 2020
	Airport Director		
	Name and Title of Individual		
			Date

FAA Review (to be completed by FAA)			
	Name and Title of Individual		
			Date

Critical Design Aircraft or Family of Aircraft:

	Make	Model	Annual Itinerant Operations
Existing	Civilian and Military Fleet	AAC D	17,538
		ADG III	500
Future	Boeing (McDonnell Douglas)	DC-10-30	184

Forecasted Year: 2038

Existing D-III

Future D-IV

Airport Reference Code (ARC): _____

Runway Design Code (RDC) & Runway Reference (RRC):

Runway	RDC	RRC
Runway 14/32	D-IV-2400	D/IV/2400
Runway 7/25	B-II-VIS	B/II/VIS

Approach Minimums:

Rwy End	Minimum	Rwy End	Minimum
Runway 14	3/4-Mile	Runway 32	1/2-Mile
Runway 7	Visual	Runway 25	Visual
Click here to enter text.			
Click here to enter text.			

Runways (Existing and Future):

Runway	Existing		Future		Departure Surface (Y or N/A)
	Length (ft)	Width (ft)	Length (ft)	Width (ft)	
Runway 14/32	10,302	150	10,302	150	Y
Runway 7/25	5,258	100	5,000	75	Y
Click here to enter text.					
Click here to enter text.					

Runway	Existing		Future		Departure Surface (Y or N/A)
	Length (ft)	Width (ft)	Length (ft)	Width (ft)	
Click here to enter text.					

For the balance of the checklist, enter a mark ( or X) to confirm inclusion.

Narrative Report					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
B. Basic aeronautical forecasts (0-5, 6-10, 11-20 years): Basic aeronautical forecasts (0-5, 6-10, 11-20 years):	Forecasts of future levels of aviation activity as approved by the FAA. These projections are used to determine the need for new or expanded facilities. See AC 150/5070-6, Chapter 7.			X	
1. Total annual operations	Total local and itinerant aircraft operations at the airport.			X	
2. Annual itinerant operations by all aircraft	Itinerant operations by aircraft that leaves the local airspace, generally 25 miles or more from the airport. See AC 150/5070-6, Chapter 7, Section 702.a. and Figure 7-2.			X	
3. Annual itinerant operations by current critical aircraft				X	
4. Annual itinerant operations by future critical aircraft				X	
5. Number of based aircraft	Aircraft that use the subject airport as a home base, i.e., have hangar or tie-down space agreements. See AC 150/5070-6, Chapter 7, Section 702.a. and Figure 7-2.			X	
6. Annual instrument approaches	Number of instrument approaches expected to be executed during a 12-month period. See AC 150/5070-6, Chapter 7, Section 702.a. and Figure 7-2.			X	
7. Number of enplanements	See AC 150/5070-6, Chapter 7, Section 702.a. and Figure 7-2.			X	

Narrative Report					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
8. Critical Aircraft (also referred as “design aircraft” or “critical design aircraft)	<p>The critical aircraft is the most demanding aircraft identified in the forecast that will use the airport. Federally funded projects require that the critical aircraft will make substantial use of the airport in the planning period. Substantial use means either 500 or more annual itinerant operations or scheduled service. The critical aircraft may be a single aircraft or a composite of the most demanding characteristics of several aircraft. Provide the aircraft, AAC, and ADG. (e.g. Boeing 737-400, C-III) See AC 150/5300-13A, Paragraph 105(b) and FAA Order 5090.3C, 3-4.</p>			x	
9. Runway Design Code (RDC)	<p>Describe the RDC for each runway. For the purpose of airport geometric design, each runway will contain a RDC which signifies the design standards to which the runway is to be built. The RDC consists of three parameters: Aircraft Approach Category (AAC), Airplane Design Group (ADG) and the approach visibility minimums. These parameters represent the aircraft that are intended to be accommodated by the airport, regardless of substantial use. See AC 150/5300-13A, Paragraph 105(c).</p>			x	
10. Runway Reference Code (RRC)	<p>Describe the RRC for each runway. The RRC describes the current operational capabilities of a runway where no special operating procedures are necessary. The RRC consists of the same three components as the RDC, but is based on planned development and has no operational application. See AC 150/5300-13A, Paragraph 318.</p>			x	
C. Alternatives/Proposed Development				x	

Narrative Report					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
11. Explanation of proposed development items	Specific projects can be described as project listings on a master table, on individual project data sheets, or in projects booklets.			X	
12. Discuss near-term and future Approach Procedure Requirements or effects (e.g., LPV, Circling, etc.)	Based on existing or forecast usage. See FAA Order 7400.2, Figures 6-6-3 and 6-3-9.			X	
13. Navigational Aids or Other Equipment Needs (e.g., Approach Lights, Wind Cones, AWOS, etc.)	The need for new or additional navigational aids is a function of the fleet mix, the percentage of time that poor weather conditions are present, and the cost to the users of not being able to use the airport while it is not accessible.			X	
14. Wind coverage. Is it adequate for existing and future runway layouts? Has wind data been updated?	This analysis determines if additional runways are needed to provide the necessary wind coverage. Reference AC 150/5300-13A, Appendix 2 for guidance on wind coverage analysis techniques.			X	
D. Modification to Standards.	Any approved nonconformance to FAA standards, other than dimensional standards for RSAs and OFZs, require FAA approval. A description of all approved modification to standards shall be provided. See AC 150/5300-13A, Paragraph 106(b) and FAA Order 5300.1.			X	
E. Obstruction Surfaces (14 CFR Part 77 and Threshold Siting Surface)	Reference 14 CFR Part 77 and AC 150/5300-13A, Paragraph 303.			X	
F. Runway Protection Zone	A description of any incompatible land uses inside the RPZ shall be provided. Prior to including new or modified land use in the RPZ, the Regional and ADO staff must consult with the National Airport Planning and Environmental Division, APP-400. This policy is exempt from existing land uses in the RPZ. See AC 150/5300-13A, Paragraph 310 and FAA memorandum dated September 27, 2012.			X	

Narrative Report					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
G. Development summary (including sketches, schedules, and cost estimates) for stages of construction for: Development summary (including sketches, schedules, and cost estimates) for stages of construction for:	Documentation provided should include any electronic spreadsheets and files to facilitate in modifying the financial plan on an as-needed basis.			X	
15. Development Projects Completed Since Last ALP				X	
16. 0-5 years				X	
17. 6-10 years				X	
18. 11-20 years				X	
H. Shadow or line-of-sight study for towered airports (negative or positive statements are required).	Reference FAA Order 6480.4. This can be from the Airway Facilities Tower Integration Laboratory (AFTIL) or simpler GIS-generated studies.			X	
I. Letters of coordination with all levels of government, as needed.	Affected private and/or governmental groups, agencies, commissions, etc., that may have input on the plans. See AC 150/5070-6, Chapter 3.			X	
J. Wildlife Hazard Management Issues Review (in narrative).	Reference AC 150/5200-33.			X	
K. Preliminary Identification of Environmental Features	Potential or known features only. Further environmental analysis will be necessary. Reference FAA Order 5050.4B. Begin framework for NEPA analysis.			X	
19. Major airport drainage ditches				X	
20. Wetlands				X	
21. Flood Zones				X	
22. Historic or Cultural features				X	
23. Section 4(f) features				X	
24. Flora/Fauna				X	

Narrative Report					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
25. Natural Resources				X	
26. Etc. (other features identified in Order 5050.4B)				X	
L. Note Action Items from Runway Safety Program Office	List and note status of items from Runway Safety Program Office or Runway Safety Action Plan.			X	
M. Declared Distance (DD)	The narrative on declared distances is used to aid in understanding the maximum distances available and suitable for meeting takeoff, rejected takeoff, and landing distances performance requirements for turbine powered aircraft. The narrative shall also provide clarification on why declared distances have been implemented. Declared distances data must be listed for all runway ends. The TORA, TODA, ASDA, and LDA will be equal to the runway length in cases where a runway does not have displaced thresholds, stopways, or clearway, and have standard RSAs, ROFAs, RPZs, and TSS. Reference AC 150/5300-13A, Paragraph 323.			X	
Remarks	See Master Plan Update				

A.2. Title Sheet

- The scale of the Title Sheet should be developed to include the items listed below.
- The minimum size for the final drawing set is 22” X 34” (ANSI D) and 24” X 36” (ARCH D). Coordinate use of 34” x 44” (ANSI E) and 26” X 48” (ARCH E) with FAA. Color drawings may be acceptable if they are still usable if reproduced in grey scale.

Title Sheet					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
A. Title and revision blocks	Each drawing in the Airport Layout Plan drawing set shall have a Title and Revision Block. For drawings that have been updated, e.g., as-builts, the revision block should show the current revision number and date of revision.	X			
B. Airport sponsor approval block	Provide an approval block for the sponsoring authority's representative to sign. Include space for name, title, and date.	X			
C. Date of ALP (date the airport sponsor signs the ALP)	The month and year of signature prominently shown near the title.	X			
D. Index of sheets (including revision date column)	Airport Layout Drawing, Airport Airspace Drawing, Inner Portion of the Approach Surface Drawing, Terminal Area Drawing, Land Use Drawing, Airport Property Map, Airport Departure Surface, etc.	X			
E. State Aeronautics Agency Approval Block (as needed)	Provide an approval block for the sponsoring authority's representative to sign. Include space for name, title, and date.			X	
F. State outline with county boundaries. County in which airport is located should be highlighted.	Provide as needed.	X			
G. Location map (general area)		X			
H. Vicinity map (specific airport area)		X			
Remarks					

A.3. Airport Data Sheet

- For smaller airports, some of the ALP sheets may be combined if practical and approved FAA.

Airport Data Sheet					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
A. Title and Revision Blocks	Each drawing in the Airport Layout Plan drawing set shall have a Title and Revision Block. For drawings that have been updated, e.g., as-builts, the revision block should show the current revision number and date of revision.	X			
B. Wind Rose (all weather and IFR) with appropriate airport reference code and runway orientation depicted, crosswind coverage, and combined coverage, source of wind information and time period covered (for IFR runways applicable minimums should be included):	Assembly and analysis of wind data to determine ultimate runway orientation and also provides the operational impact of winds on existing runways. If instrument procedures are present or will be requested then both all-weather and instrument meteorological condition wind roses are required. See AC 150/5300-13A, Appendix 2.	X			
1. 10.5, 13, 16, 20 knots wind rose (based on appropriate airport reference code)	When a runway orientation provides less than 95 percent wind coverage for any aircraft forecasted to use the airport on a regular basis, a crosswind runway is recommended. The 95 percent wind coverage is computed on the basis of the crosswind not exceeding 10.5 knots for Airport Reference Codes A-I and B-I, 13 knots for Airport Reference Codes A-II and B-II, 16 knots for Airport Reference Codes A-III, B-III, and C-I through D-III, and 20 knots for Airport Reference Codes A-IV through D-VI. See also AC 150/5300-13A, Paragraph 302(c)(3) and AC 150/5300-13A, Appendix 2.	X			
2. Percentage of wind coverage/crosswind	When a runway orientation provides less than 95 percent wind coverage for any aircraft forecasted to use the airport on a regular basis, a crosswind runway is recommended. The 95 percent wind coverage is computed on the basis of the crosswind not exceeding 10.5 knots for Airport Reference Codes A-I and B-I, 13 knots for Airport Reference Codes A-II and B-II, 16 knots for Airport Reference Codes A-III, B-III, and C-I through D-III, and 20 knots for Airport Reference Codes A-IV through D-VI. See also AC 150/5300-13A, Paragraph 302(c)(3) and AC 150/5300-13A, Appendix 2.	X			
3. Source of data	Wind data may be obtained from NOAA at http://www.ncdc.noaa.gov/ Reference AC 150/5300-13A, Appendix 2, Paragraph A2-5 and A2-6.	X			

Airport Data Sheet					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
4. Age of data (last 10 consecutive years of data with most current data no older than 10 years)	Data must be from the latest 10-year period from the reporting station closest to the airport. Reference AC 150/5300-13A, Appendix 2, Paragraph A2-5.	X			
C. Airport Data Table		X			
1. ARC for Airport	List the Airport Reference Code (ARC) for airport. 5300-13AARC is an airport designation that signifies the airport's highest Runway Design Code (RDC), minus the third (visibility) component of the RDC. Reference AC 150/5300-13A.	X			
2. Mean maximum temperature of hottest month	List the mean maximum temperature and the hottest month for the airport location as listed in "Monthly Station Normals of Temperature, Precipitation, and Heating and Cooling Degree-Days" (Climatology of the United States No. 81). See AC 150/5325-4, 506.b.	X			
3. Airport elevation (highest point of the landing areas, nearest 0.1 foot) – using North American Vertical Datum of 1988 (NAVD88)	List the Airport Elevation, the highest point on an airport's usable runway expressed in feet above mean sea level (MSL). Use NAVD88. Reference AC 150/5300-13A, Paragraph 102(g) All elevations shall be in NAVD88. A note shall be put on the Airport Layout Drawing that denotes that the NAVD88 vertical control datum was used.	X			
4. Airport Navigational Aids, including ownership (NDB, TVOR, ASR, Beacon, etc.)	List the electronic aids available at the airport.	X			

Airport Data Sheet					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
5. Airport reference point coordinates, nearest second (existing, future if appropriate, and ultimate) - NAD83	<p>List the Airport Reference Point, the latitude and longitude of the approximate center of the airport. Use the North American Datum of 1983 (NAD83) coordinate system. See AC 150/5300-13A, Paragraph 207.</p> <p>All latitude/longitude coordinates shall be in NAD83. A note shall be put on the Airport Layout Drawing that denotes that the NAD83 coordinate system was used.</p>	X			
6. Miscellaneous facilities (taxiway lighting, lighted wind cone(s), AWOS, etc.) [Including type/model and any facility critical areas]	List any other facilities available at the airport.		X		
7. Airport Reference Code and Critical Aircraft (existing & future)	List the existing and ultimate Airport Reference Code and Critical Aircraft, the most demanding aircraft identified in the forecast that will use the airport. Federally funded projects require that critical design airplanes have at least 500 or more annual itinerant operations at the airport (landings and takeoffs are considered as separate operations) for an individual airplane or a family grouping of airplanes. See AC 150/5325-4, 102.a.(8) and AC 150/5070-6, 702.a. Indicated dimensions for wingspan and undercarriage, along with approach speed.		X		
8. Airport magnetic variation, date and source	Magnetic declination may be calculated at http://www.ngdc.noaa.gov/geomag-web/#declination . This model is using the latest World Magnetic Model which has an Epoch Year of 2010. See FAA Order 8260.19, "Flight Procedures and Airspace." Chapter 2, Section 5, for further information.		X		
9. NPIAS service level (GA, RL, P, CS, etc.)	See FAA Order 5090.3C.		X		

Airport Data Sheet					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
10. State equivalent service role	As applicable pursuant to State Aviation Department System Plan.	X			
D. Runway Data Table	The Runway Data Table should show information for both existing and ultimate runways.	X			
1. Runway identification (Include identifying runways that are "utility")	A column for each runway end should be present. List the runway end number and if pavement strength is less than 12,500 pounds (single-wheel), then note as utility.	X			
2. Runway Design Code (RDC)	5300-13A The first component, depicted by a letter, is the AAC and relates to aircraft approach speed (operational characteristics). The second component, depicted by a Roman numeral, is the ADG and relates to either the aircraft wingspan or tail height (physical characteristics); whichever is more restrictive. The third component relates to the visibility minimums expressed by RVR values in feet of 1200, 1600, 2400, and 4000. List the RDC for each runway. See AC 150/5300-13A, Paragraph 105(c).	X			
3. Runway Reference Code (RRC)	The RRC describes the current operational capabilities of a runway where no special operating procedures are necessary. Like the RDC, it is composed of three components: AAC, ADG, and visibility minimums. List the RRC for each Runway. See AC 150/5300-13A, Paragraph 318.	X			
4. Pavement Strength & Material Type	Indicate the runway surface material type, e.g., turf, asphalt, concrete, water, etc.	X			
a. Strength by wheel loading	List the existing and ultimate design strength of the landing surface. See AC 150/5320-6, Chapter 3.	X			
b. Strength by PCN	See AC 150/5335-5.	X			

Airport Data Sheet					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
c. Surface treatment	Note any surface treatment: grooved, PFC, etc.	X			
5. Effective Runway Gradient (%) Author to note maximum grade within runway length. Note to included statement that the runway meets line of sight requirements	List the maximum longitudinal grade of each runway centerline. See AC 150/5300-13A, Paragraph 313.	X			
6. Percent (%) Wind Coverage (each runway)	List the percent wind coverage for each runway for each Aircraft Approach Category. See AC 150/5300-13A, Appendix 2.	X			
7. Runway dimensions (length and width)	Dimensions determined for the Critical Design Aircraft by using graphical information in AC 150/5325-4.	X			
8. Displaced Threshold	Provide the pavement elevation of the runway pavement at any displaced threshold. See AC 150/5300-13A, Paragraph 303(2).	X			
9. Runway safety area dimensions (actual existing and design standard)	List the existing and ultimate dimensions of the Runway Safety Area (RSA). See AC 150/5300-13A, Paragraph 307.	X			
10. Runway end coordinates (NAD83) (include displaced threshold coordinates, if applicable) to the nearest 0.01 second and 0.1 foot of elevation.	Show the latitude and longitude of the threshold center and end of pavement (if different) to the nearest .01 of a second and 0.1 foot of elevation.	X			
11. Runway lighting type (LIRL, MIRL, HIRL)	List the existing and ultimate type of runway lighting system for each runway, e.g., Reflectors, Low Intensity Runway Lighting (LIRL), Medium Intensity Runway Lighting (MIRL), or High Intensity Runway Lighting (HIRL). LIRLs will typically not be shown for new systems. See AC 150/5340-30, Ch. 2.	X			

Airport Data Sheet					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
12. Runway Protection Zone (RPZ) Dimensions	List the existing and ultimate Runway Protection Zone (RPZ) dimensions. See AC 150/5300-13A, Paragraph 310. Prior to including new or modified land use in the RPZ, the Regional and ADO staff must consult with the National Airport Planning and Environmental Division, APP-400. This policy is exempt from existing land uses in the RPZ. See AC 150/5300-13A, Paragraph 310 and FAA memorandum dated September 27, 2012.	X			
13. Runway marking type (visual or basic, non-precision, precision)	Indicate the existing and ultimate pavement markings for each runway. See AC 150/5340-1, Section 2.	X			
14. 14 CFR Part 77 approach category (50:1; 34:1; 20:1) Existing and Future	List the existing and ultimate approach surface slope. See FAA Order 7400.2, Figures 6-6-3 and 6-3-9.	X			
15. Approach Type (precision, non-precision, visual)	List the existing and ultimate Part 77 Approach Use Types. See FAA Order 7400.2, Figures 6-6-3 and 6-3-9.	X			
16. Visibility minimums (existing and future)	List the existing and ultimate visibility minimums for each runway. See AC 150/5300-13A, Table 1-3.	X			
17. Type of Aeronautical Survey Required for Approach (Vertically Guided, not Vert. Guided)	List the type of aeronautical survey required for the visibility minimums given. See AC 150/5300-18, Section 2.7 and AC 150/5300-13A, Table 3-4 and Table 3-5.	X			
18. Runway Departure Surface (Yes or N/A)"	Determine applicability of 40:1 Departure Obstacle Clearance Surface (OCS) as defined in Paragraph 303(c) of AC 150/5300-13A.	X			

Airport Data Sheet					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
19. Runway Object Free Area	List the existing and ultimate dimensions of the Runway Object Free Area (OFA). See AC 150/5300-13A, Paragraph 309. Objects non-essential for air navigation or aircraft ground maneuvering purposes must not be placed in the ROFA, unless a modification to standard has been approved.	X			
20. Obstacle Free Zone	The OFZ clearing standard precludes aircraft and other object penetrations, except for frangible NAVAIDs that need to be located in the OFZ because of their function. Modification to standards does not apply to the OFZ. List the Runway OFZ, Inner-approach OFZ, Inner-transitional OFZ, and Precision OFZ if applicable.	X			
21. Threshold siting surface (TSS)	List the existing and ultimate threshold siting surface (i.e. approach and departure surfaces). Identify any objects penetrating the surface. If none, state "No TSS Penetrations". Reference AC 150/5300-13A, Paragraph 303.	X			
22. Visual and instrument NAVAIDs (Localizer, GS, PAPI, etc.)	List the existing and ultimate visual navigational aids serving each runway.	X			
23. Touchdown Zone Elevation	List the highest runway centerline elevation in the existing and ultimate first 3000 feet from landing threshold. See FAA Order 8260.3, Appendix 1.	X			
23. Taxiway and Taxilane width	List the existing and ultimate width of the taxiways and taxilane. Reference AC 150/5300-13A, Paragraph 403 and Table 4-2.	X			
24. Taxiway and Taxilane Safety Area dimensions	List the existing and ultimate taxiway and taxilane safety area dimensions. Reference AC 150/5300-13A, Paragraph 404(c) and Table 4-1.	X			

Airport Data Sheet					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
25. Taxiway and Taxilane Object Free Area	List the existing and ultimate taxiway and taxilane object free area dimensions. Reference AC 150/5300-13A, Paragraph 404(b) and Table 4-1.	X			
26. Taxiway and Taxilane Separation	List any objects located inside the Taxiway/Taxilane Safety Area and Taxiway/Taxilane Object Free Area. Also provide the distance from the taxiway/taxilane centerline to the fixed or movable object. Reference Paragraph 404(a) and Table 4-1.	X			
27. Taxiway/Taxilane lighting	List the existing and ultimate type of taxiway lighting system, e.g., Reflectors, Low Intensity Taxiway Lighting (LITL), Medium Intensity Taxiway Lighting (MITL), or High Intensity Taxiway Lighting (HITL). LITLs will typically not be shown for new systems. See AC 150/5340-30, Chapter 4.	X			
28. Identify the vertical and horizontal datum	All latitude/longitude coordinates shall be in North American Datum of 1983 (NAD 83). A note shall be put on the Airport Layout Drawing that denotes that the NAD 83 coordinate system was used. All elevations shall be NAVD88. A note shall be put on the Airport Layout Drawing that denotes that the NAVD88 vertical control datum was used.	X			
E. Modification to Standards Approval Table (if applicable, a separate written request, including justification, should accompany the modification to standards). Show: Approval Date/ Airspace Case No. / Standard to be Modified / Description	Provide a table to list all FAA approved Modifications to Standards. See AC 150/5300-13A, Paragraph 106(b), and FAA Order 5300.1. List "None Required" on the table if no Modifications have yet been proposed or approved.			X	

Airport Data Sheet					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
F. Declared Distances Table	Required even if Declared Distances are not in effect. Declared distances are only to be used for runways with turbine-powered aircraft. The TORA, TODA, ASDA, and LDA will be equal to the runway length in cases where a runway does not have displaced thresholds, stopways, or clearways, and have standard RSAs, ROFAs, RPZs, and TSS. Reference AC 150/5300-13A, Paragraph 323.	X			
1. Take Off Run Available (TORA)	List the runway length declared available and suitable for the ground run of an airplane taking off, i.e., Take Off Run Available (TORA). The TORA may be reduced such that it ends prior to the runway to resolve incompatible land uses in the departure RPZ, and/or to mitigate environmental effects. Reference AC 150/5300-13A, Paragraph 323(d)(1).	X			
2. Take Off Distance Available (TODA)	List the length of remaining runway or clearway (CWY) beyond the far end of the TORA ADDED TO the TORA. The resulting sum is the Take Off Distance Available (TODA) for the runway. The TODA may be reduced to mitigate penetrations to the 40:1 instrument departure surface, if applicable. The TODA may also extend beyond the runway end through the use of a clearway Reference AC 150/5300-13A, Paragraph 323(d)(2).	X			
3. Accelerate Stop Distance Available (ASDA)	5300-13A List the length the length of runway plus stopway (if any) declared available and suitable for satisfying accelerate-stop distance requirements for a rejected takeoff. Additional RSA and ROFA can be obtained by reducing the ASDA. Reference AC 150/5300-13A, Paragraph 323(d)(3).	X			

Airport Data Sheet					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
4. Landing Distance Available (LDA)	5300-13A List the length of runway declared available and suitable for satisfying landing distance requirements. The LDA may be reduced to satisfy the approach RPZ, RSA, and ROFA requirements. Reference AC 150/5300-13A, Paragraph 323(e).	X			
G. Legend	Provide a Legend that identifies all symbols and line types used on the drawing. Lines must be clear and readable with sufficient scale and quality to discern details.		X		
Remarks					
B.4. Wind data used latest 10-year data available when originally analyzed for the Master Plan Update (i.e., 2007-2016).					
D.23-27. All taxiway data contained in the Taxiway Data Block.					
E. No Modification to Standards required; a Non-Standard Conditions Table is included.					
G. Legends provided on each individual sheet.					

A.4. Airport Layout Plan Drawing

- For smaller airports, some of the ALP sheets may be combined if practical and approved by FAA.
- Two, or more, sheets may be necessary for clarity, existing and proposed. The reviewer should be able to differentiate between existing, future, and ultimate development. If clarity is an issue, some features of this drawing may be placed in tabular format. North should be pointed towards the top of the page or to the left. (scale 1”=200’ to 1”=600’)

Airport Layout Plan Drawing					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
A. Title and Revision Blocks	Each drawing in the Airport Layout Plan drawing set shall have a Title and Revision Block. For drawings that have been updated, e.g., as-builts, the revision block should show the current revision number and date of revision.	X			
B. Space for the FAA approval stamp	Leave a blank four-inch by four-inch area for the FAA approval stamp.	X			
C. Layout of existing and proposed facilities and features:	To assure full consideration of future airport development in 14 CFR Part 77 studies, airport owners must have their plans on file with the FAA. The necessary plan data includes, as a minimum, planned runway end coordinates, elevation, and type of approach for any new runway or runway extension. See AC 150/5300-13A, Paragraph 106.	X			
1. True and magnetic North arrow with year of magnetic declination	Magnetic declination may be calculated at http://www.ngdc.noaa.gov/geomag-web/#declination . This model is using the latest World Magnetic Model which has an Epoch Year of 2010. See FAA Order 8260.19, "Flight Procedures and Airspace." Chapter 2, Section 5, for further information.	X			
2. Airport reference point – locate by symbol a Lat./Long. To nearest second (existing, future, and ultimate) NAD 83	List the Airport Reference Point, the latitude and longitude of the approximate center of the airport. Use the NAD 83 coordinate system. See AC 150/5300-13A, Paragraph 207.	X			
3. Wind cones, segmented circle, beacon, AWOS, etc.	Show as applicable pursuant to AC 150/5300-13A, Chapter 6.	X			

Airport Layout Plan Drawing					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
4. Contours (showing only significant terrain differences)	Topography, budget, and future uses of the base mapping, will dictate what intervals of topographical contours to use on the maps. Topographic issues may be important in the alternatives analysis, which may require that reduced contour intervals be used. See AC 150/5070-6, 1005.	X			
5. Elevations: All NAVD88	All latitude/longitude coordinates shall be in NAD83/NAVD88.	X			
a. Runway – existing, future, and ultimate ends (nearest 0.1 ft.)	Show the latitude and longitude of the threshold center and end of pavement.	X			
b. Touchdown Zone Elevation (highest point in first 3,000 ft. of runway)	List the highest runway centerline elevation in the existing and ultimate first 3000 feet from landing threshold. See FAA Order 8260.3, Appendix 1.	X			
c. Runway high/low points (existing and future)	For all runways identify high and low points (centerline) and provide elevation information.	X			
d. Label runway/runway intersection elevations	Label the pavement elevation of runway intersections where the centerlines cross.	X			
e. Displaced Thresholds (if any)	Label the pavement elevation and coordinates of the runway pavement at any displaced threshold. See AC 150/5300-13A, Paragraph 303(a)(2).	X			
f. Roadways & Railroads (where they intersect Approach surfaces, the extended runway centerline, and at the most critical points)	Provide elevation information for the traverse ways' centerline elevation where they intersect the Part 77 Approach surfaces (existing and ultimate). Note whether this elevation is the actual elevation or the traverseway elevation plus the traverseway adjustment (23' for railways, 17' for interstate highways, 15' for other public roads, or 10' for private roads). See also 14 CFR Part 77.	X			

Airport Layout Plan Drawing					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
g. Structures, Buildings, and Facilities	All buildings on the Airport Layout Drawing should be identified by an alphanumeric character. List these identifiers in a table and give a description of the building. If no Terminal Area drawing is done, also include the top of structure elevation in MSL. If any of the structures violate any airport or approach surfaces give an ultimate disposition to remedy the violation. Don't forget navigation aid shelters, AWOS/ASOS, RVRs, PAPIs, Fueling systems, REILs, etc. Also identify the structure use (hangar, FBO, crew quarters, etc.), as needed. Some lesser objects may be identified by symbols in the legend.	X			
h. Define features to include: trees streams, water bodies, etc.	Provide information and delineate trees, streams, water bodies, etc., on or near airport property and approach surfaces.	X			
6. Runway Details					
a. Runway Design – runway length, runway width, shoulder width, blast pad width, blast pad length, and cross wind component. (existing, future, and ultimate)	AC 150/5325-4 describes procedures for establishing the appropriate runway length. AC 150/5300-13A, Table 3-4 and Table 3-5 provides the minimum runway length. AC 150/5300-13A, Table 3-8 provides the standard dimensions of the runway width, shoulder width, blast pad width, blast pad length, and crosswind component based on RDC. Clearly denote the runway numbers at the thresholds. Show location of existing and future threshold lights.		X		
b. Orientation – true bearing to nearest 0.01 second (and runway numbers)	Show the true bearing to the nearest .01 of a degree of the runway centerline.		X		

Airport Layout Plan Drawing					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
c.	End Coordinates – existing, future, and ultimate degrees, minutes, seconds (to the nearest 0.01 second)	Show the latitude and longitude of the threshold center and end of pavement (if different) to the nearest .01 of a second.			
		x			
d.	Runway Safety Areas (RSA) – actual, existing, future, and ultimate (including dimensions)	Show the extents of the existing and ultimate RSA 5300-13A. Reference AC 150/5300-13A, Paragraph 307.			
		x			
e.	Runway Object Free Areas (ROFA)	Show the extents of the existing and ultimate ROFA. Reference AC 150/5300-13A, Paragraph 309.			
		x			
f.	Precision Obstacle Free Zone (POFZ)	Show the extents of the existing and ultimate POFZ. Reference AC 150/5300-13A, Paragraph 308(d).			
		x			
g.	Obstacle Free Zone (OFZ)	Show the extents of the existing and ultimate OFZ. Reference AC 150/5300-13A, Paragraph 308.			
		x			
h.	Clearways and Stopways	Show any/all clearways and stopways/overruns and the markings used to denote these areas. See AC 150/5300-13A, Paragraph 311 and 312; and AC 150/5340-1, Section 2, Paragraph 14.			
				x	
i.	Runway Protection Zone (RPZ) - Dimensions (existing, future, and ultimate)	Show existing and ultimate RPZ. See AC 150/5300-13A, Paragraph 310. Show the existing and ultimate protective area/zone type of ownership. Identify any incompatible objects and activities inside the RPZ. Prior to including new or modified land use in the RPZ, the Regional and ADO staff must consult with the National Airport Planning and Environmental Division, APP-400. This policy is exempt from existing land uses in the RPZ. See AC 150/5300-13A, Paragraph 310 and FAA memorandum dated September 27, 2012.			
		x			

Airport Layout Plan Drawing					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
j.	14 CFR Part 77 Approach Surfaces	Show the portion of the existing and ultimate approach surfaces that are over airport and adjacent property and identify the approach surface dimensions and slope. See FAA Order 7400.2, Figure 6-3-9.	X		
k.	Threshold Siting Criteria: Approach/Departure Surface (existing, future, and ultimate) 5300-13A	Determine and identify pursuant to AC 150/5300-13A, Paragraph 303(b) and 303(c).	X		
l.	Terminal Instrument Procedures (TERPS)surface and TERPS GQS, if applicable.	Determine and identify pursuant to AC 150/5300-13A, Paragraph 303(a)(4)(a), Table 3-4, and Table 3-5. Reference FAA Order 8260.3.	X		
m.	Navigation Aids (NAVAIDS) – PAPI, ILS, GS, LOC, ALS, MALSR, REIL, etc., (plus facility critical area's)	Show all NAVAIDS and provide clearance distances from runways, taxiways, etc. Reference AC 150/5300-13A, Chapter 6.	X		
n.	Marking – thresholds, hold lines, etc.	Show on the runway the type and location of markings, existing and ultimate. See AC 150/5340-1, Section 2.	X		
o.	Displaced threshold coordinates and elevation	Show the latitude, longitude, and the pavement elevation of the runway pavement at any displaced threshold. See AC 150/5300-13A, Paragraph 303(a)(2).5300-13A.	X		
p.	Runway centerline separation distances	Show the runway centerline separation distances to parallel runway centerline, holding position, parallel taxiway/taxilane centerline, aircraft parking area, and helicopter touchdown pad, if applicable. Reference AC 150/5300-13A, Paragraph 321 and Table 3-8.	X		
7.	Taxiway Details	Show the taxiway centerline separation distances to parallel taxiway/taxilane centerlines, fixed or movable objects.	X		

Airport Layout Plan Drawing					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
a. Dimensions – width (existing & ultimate)	Taxiway width based on Taxiway Design Group (TDG). See AC 150/5300-13A, Table 4-2.	X			
b. Taxiway Edge Safety Margin (TESM)	TESM dimension based on TDG. See AC 150/5300-13A, Table 4-2.		X		
c. Taxiway Shoulder Width	Taxiway shoulder width based on TDG. See AC 150/5300-13A, Table 4-2.		X		
b. Taxiway/Taxilane Object Free Area (TOFA)	TOFA width based on Taxiway Design Group (TDG). TOFA extend the entire length of taxiway. See AC 150/5300-13A, Table 4-1.	X			
c. Taxiway/Taxilane Safety Area (TSA)	TSA width based on TDG. TSA extend the entire length of taxiway. See AC 150/5300-13A, Table 4-1.	X			
d. Taxiway/Taxilane Centerline Separation from:		X			
i. Runway centerline	Show the distance from centerline of runway to centerline of taxiway. See AC 150/5300-13A, Table 4-1.	X			
ii. Parallel taxiway	Show the distance from centerline of taxiway to centerline of parallel taxiway. See AC 150/5300-13A, Table 4-1.	X			
iii. Aircraft parking	Show the distance from centerline of taxiway to marked aircraft parking/tie downs. See AC 150/5300-13A, Table 4-1.	X			
iv. Fixed or Movable Objects	Show the distance from centerline of taxiway to airport objects such as buildings, facilities, poles, etc. See AC 150/5300-13A, Table 4-1.	X			
8. Fences (identify height)	Show the location of existing and ultimate fences and identify height.	X			

Airport Layout Plan Drawing					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
9. Aprons					
a. Dimensions (square footage, dimension, or length and width)	Include dimensions of apron and distance from runway and taxiway centerlines. Apron should be sized using activity forecast and the apron design spreadsheet. See AC 150/5300-13A, Chapter 5 and FAA Engineering Brief No. 75.	X			
b. Identify aircraft tie-down layout	Show proposed tie-down layout on the apron area. See AC 150/5300-13A, Figure A5-1, AC 20-35, and AC 150/5340-1.	X			
c. Identify Special Use Areas (e.g., deicing or aerial application areas on or near apron)	Show as applicable and pursuant to representative ACs.	X			
10. Roads	Label all roads.	X			
11. Legend	Provide a Legend that identifies all symbols and line types used on the drawing. Lines must be clear and readable with sufficient scale and quality to discern details.	X			
12. Items to be identified with distinct line types	Use distinct line types to identify different items and differentiate between existing and ultimate.				
a. NAVAID Critical Areas (Glide Slope, Localizer, AWOS, ASOS, VOR, RVR, etc.)	Show the critical area outline for all Instrument Landing System and other electronic Navigational Aids located on the airport. See AC 150/5300-13A, Chapter 6 for general guidance and FAA Order 5750.16 for critical area dimensions.	X			
b. Building Restriction Lines 5300-13A(BRL)	The BRL is the line indicating where airport buildings must not be located, limiting building proximity to aircraft movement areas. See AC 150/5300-13A, Paragraph 213(a).	X			
c. Runway Visibility Zone (RVZ)	Show the RVZ for the existing and ultimate airport configurations. See AC 150/5300-13A, 305(c).	X			

Airport Layout Plan Drawing					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
d. Airport Property Lines and Easements (existing, future, and ultimate)	Show the airport property boundaries, including easements, for the existing and ultimate airport configurations.	x			
13. Survey Documentation		x			
a. Survey Monuments (PACS/SACS, see AC 150/5300-16)	Show the location of all established survey monuments located on or near the airport property. Identify Primary and Secondary Airport Control Stations (PACS/SACS) if they exist. See AC 150/5300-16.	x			
	Show the location of all section corners on or near the airport property.				
b. Offsets, stations, etc.	Show as applicable.			x	
14. Any Air Traffic Control Tower (ATCT) line of sight/shadow study areas (use separate sheet if necessary)	Reference FAA Order 6480.4.	x			
15. General Aviation development area (e.g., fuel facilities, FBO, hangars, etc.) – greater detail can be shown on the terminal area drawing	Show as applicable.	x			
16. Facilities and movement areas that are to be phased out, if any, are described	Show as applicable.	x			
Remarks					
6.a. Runway Shoulder Width listed in Runway Data Table on Data Sheet					
6.k. Departure Surfaces provided in the Departure Surface Drawing.					
6.l. GQS shown on Inner Portion of the Approach Surface Drawings where applicable.					
7.b., c. Taxiway details listed in Taxiway Data Table on Data Sheet but not shown on ALP for drawing clarity.					
7.d.iii., iv Taxiway details illustrated on Building Area Plans.					
9.a., b. Apron square footages provided in Existing Facilities Table and details illustrated on Building Area Plans.					

A.5. Airport Airspace Drawing

- A required drawing.
- Scale 1” = 2000’ plan view, 1” = 1000’ approach profiles, 1”=100’ (vertical) for approach profiles.
- 14 CFR Part 77, Objects Affecting Navigable Airspace, defines this as a drawing depicting obstacle identification surfaces for the full extent of all airport development. It should also depict airspace obstructions for the portions of the surfaces excluded from the Inner Portion of the Approach Surface Drawing.

Airport Airspace Drawing					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
A. Title and Revision Block	Each drawing in the Airport Layout Plan drawing set shall have a Title and Revision Block. For drawings that have been updated, e.g., as-builts, the revision block should show the current revision number and date of revision.	X			
B. Plan view (based on ultimate runway lengths) Include location of water or sewage facilities if inside horizontal surface.					
1. U.S. Geological Survey (USGS) Quad Sheet for base map	Use the most current USGS Quadrangle(s) as a base map for the airspace drawing.	X			
2. Runway end numbers	Show the ultimate runways and runway numbers. Contact the FAA before renumbering existing runways.	X			
3. Part 77 Surfaces (Horizontal, Conical, Transition, based on ultimate). Including elevations at the point where surfaces change.	Show the extents of the Part 77 imaginary surfaces. For airports that have precision approach runways show balance of the 40,000’ approach on a second sheet, if necessary. See 14 CFR Part 77.19.	X			
4. 50’ elevation contours on sloping surfaces (NAVD88)	Show contour lines on all sloping Part 77 imaginary surfaces. See 14 CFR Part 77.19.	X			
5. Top elevations of penetrating objects for the inner portion of the approach surface drawing	Identify by unique alphanumeric symbol all objects beyond the Runway Protection Zones that penetrate any of the Part 77 surfaces. See 14 CFR Part 77.	X			
6. Note specifying height restriction (ordinances/statutes)	List any local zoning restrictions that are in place to protect the airport and surrounding airspace. See AC 150/5190-4.	X			

Airport Airspace Drawing					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
7. North Arrow with magnetic declination and year	Magnetic declination may be calculated at http://www.ngdc.noaa.gov/geomag-web/#declination . This model is using the latest World Magnetic Model which has an Epoch Year of 2010. See FAA Order 8260.19, "Flight Procedures and Airspace." Chapter 2, Section 5, for further information.	X			
C. Profile view					
1. Airport Elevation	List the Airport Elevation, the highest point on an airport's usable runway expressed in feet above mean sea level (MSL). Use NAVD88 datum. See AC 150/5300-13A, Chapter 1, Paragraph 102(g).	X			
2. Composite Ground Profile along extended Runway Centerline (Representing the composite profile, based on the highest terrain across the width and along the length of the approach surface)	Depict the ground profile along the extended runway centerline representing the composite profile, based on the highest terrain across the width and along the length of the approach surface.		X		
3. Significant objects (bluffs, rivers, roads, schools, towers, etc.) and elevations	Identify all significant objects (roads, rivers, railroads, towers, poles, etc.) within the approach surfaces, regardless of whether or not they are obstructions. Use the objects' same alphanumeric identifier that was used on the plan view.	X			
	Identify the top elevations of all significant objects (roads, rivers, railroads, towers, poles, etc.) within the approach surfaces, regardless of whether or not they are obstructions.				
4. Existing, future, and ultimate runway ends and approach slopes	Show existing and ultimate runway ends and FAR Part 77 approach surface slopes. See 14 CFR Part 77.19.	X			

Airport Airspace Drawing					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
D. Obstruction Data Tables (identify obstacles not depicted on the Inner Portion of the Approach Surface Drawing)					
1. Object identification number	Identify all significant objects (roads, rivers, railroads, towers, poles, etc.) within the approach surfaces, regardless of whether or not they are obstructions. Use the objects alphanumeric identifier that was used on the plan view.	x			
2. Description	Identify the top elevations of all significant objects (roads, rivers, railroads, towers, poles, etc.) within the approach surfaces, regardless of whether or not they are obstructions. Provide a brief description of the object, e.g., Power Pole, Cell Tower, Natural Gas Flare, etc.		x		
3. Date of Obstruction Survey	Provide the date of latest obstruction survey.		x		
4. Ground Surface Elevation	Provide the ground surface elevation (MSL) at the base of each object.		x		
5. Object Elevation	List the above ground level (AGL) height and the top of object elevation (above mean sea level / AMSL / MSL) for each object.		x		
6. Amount of surface penetration	List the surface that is penetrated and the amount the object protrudes above the surface. See 14 CFR Part 77.		x		
7. Proposed or existing disposition of the obstruction	Provide a proposed or existing disposition of the object to remedy the penetration. See AC 70/7460-1.				
a. Proposed Disposition (existing)			x		
b. Proposed Disposition (future)			x		
Remarks					

A.6. Inner Portion of the Approach Surface Drawing

- A required drawing.
- Scale 1”=200’ Horizontal, 1”=20’ Vertical, two sheets may be necessary for clarity. Typically, the plan view is on the top half of the drawing and the profile view is on the bottom half. Views should be drawn from the runway threshold to a point on the approach slope 100 feet above the runway threshold elevation, at a minimum, or the limits of the RPZ, whichever is further.
- Drawings containing the plan and profile view of the inner portion of the approach surface to the runway and a tabular listing of all surface penetrations. The drawing will depict the obstacle identification approach surfaces contained in 14 CFR Part 77, Objects Affecting Navigable Airspace. The drawing may also depict other surfaces, including the threshold-siting surface, Glideslope Qualification Surface (GQS), those surfaces associated with United States Standards for Instrument Procedures (TERPS), or those required by the local FAA office or state agency. The extent of the approach surface and the number of airspace obstructions shown may restrict each sheet to only one runway end or approach.

Inner Portion of the Approach Surface Drawing					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
A. Title and Revision Block	Each drawing in the Airport Layout Plan drawing set shall have a Title and Revision Block. For drawings that have been updated, e.g., as-builts, the revision block should show the current revision number and date of revision.	X			
B. Plan View (existing, future, and ultimate)					
1. Inner portion of approach surface	Show the area from the runway threshold out to where the ultimate approach surface slope is 100 feet above the threshold elevation.	X			
2. Aerial photo for base map	Use an aerial photograph for the base map.	X			
3. Objects (identified by numbers)	Identify all significant objects (roads, rivers, railroads, towers, poles, etc.) within the approach surfaces, regardless of whether or not they are obstructions using an alphanumeric character.	X			
4. Property line within approaches	Show the property lines that are within the area/portion of airport shown.	X			

Inner Portion of the Approach Surface Drawing					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
5. Road & railroad elevations, plus movable object heights	Provide elevation information for the traverse ways' centerline elevation where they intersect the Part 77 Approach surfaces (existing and ultimate). Note whether this elevation is the actual elevation or the traverse way elevation plus the traverse way adjustment (23' for railways, 17' for interstate highways, 15' for other public roads, or 10' for private roads). See also 14 CFR Part 77.	X			
6. Part 77 Approach Surface clearance over Roads and Railroads at the most critical points, the Centerline and Edge of the surface.	Provide elevation information for the traverse ways where they intersect the edges and centerline of the Part 77 Approach surfaces (existing and ultimate). Note whether this elevation is the actual elevation or the traverseway elevation plus the traverseway adjustment (23' for railways, 17' for interstate highways, 15' for other public roads, or 10' for private roads). See also 14 CFR Part 77.	X			
7. Physical end of runway, end number, elevation (NAVD88) Nearest 0.1 foot	Show the existing and ultimate runway end, runway number, and the elevation of the threshold center.	X			
8. Airport Design Surfaces					
a. Runway Safety Area	Show the extents of the existing and ultimate Runway Safety Area (RSA). See AC 150/5300-13A, Paragraph 307 and Table 3-8.	X			
b. Runway Object Free Area	Show the extents of the existing and ultimate Object Free Area (OFA). See AC 150/5300-13A, Paragraph 309 and Table 3-8.	X			
c. Runway Obstacle Free Zone (OFZ)	Show the extents of the existing and ultimate OFZ which includes the inner-approach OFZ, inner-transitional OFZ, and the Precision OFZ (POFZ), if applicable. See AC 150/5300-13A, Paragraph 308.	X			

Inner Portion of the Approach Surface Drawing					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
d. Runway Protection Zone (RPZ)	Show the extents of the existing and ultimate RPZ. Prior to including new or modified land use in the RPZ, the Regional and ADO staff must consult with the National Airport Planning and Environmental Division, APP-400. This policy is exempt from existing land uses in the RPZ. See AC 150/5300-13A, Paragraph 310, Table 3-5 and FAA memorandum dated September 27, 2012.	X			
e. NAVAID critical area	Show the critical area outline for all Instrument Landing System and other electronic Navigational Aids located on the airport. See AC 150/5300-13A, Chapter 6 for general guidance and FAA Order 5750.16 for critical area dimensions.	X			
9. Ground contours	Show ground contour lines in 2', 5', or 10' intervals. Topographic issues may be important in the alternatives analysis, which may require that reduced contour intervals be used. See AC 150/5070-6, Paragraph 1005.	X			
10. North arrow with magnetic declination and year	Magnetic declination may be calculated at http://www.ngdc.noaa.gov/geomag-web/#declination . This model is using the latest World Magnetic Model which has an Epoch Year of 2010. See FAA Order 8260.19, Chapter 2, Section 5, for further information.	X			
C. Profile view					
1. Existing and proposed runway centerline ground profile (list elevations at runway ends & at all points of grade changes) (representing the composite profile based on the highest terrain across the width and along the length of the approach surface)	Depict the ground profile along the extended runway centerline representing the composite profile, based on the highest terrain across the width and along the length of the approach surface to where the ultimate approach surface slope is 100 feet above the threshold elevation. A more effective presentation may be a rendering of a composite critical profile.	X			

Inner Portion of the Approach Surface Drawing					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
2. Future development from plan view	Identify future development using same alphanumeric identifier that was used on the plan view.	X			
3. Part 77 Approach/transition surface; existing and future VASI/PAPI siting surface	Show the boundaries of the existing and ultimate Part 77 Approach Surface. See FAA Order 7400.2, Figure 6-3-9, See also 14 CFR Part 77.	X			
4. Threshold Siting Surface	Depict any applicable siting requirements pursuant to Table 3-2 of FAA AC 150/5300-13A.	X			
5. Terrain in approach area (fences, streams, etc.)	Show all significant terrain(fences, streams, mountains, etc.) within the approach surfaces, regardless of whether or not they are obstructions	X			
6. Objects – identify the controlling object (same numbers as plan view)	Show all significant objects (roads, rivers, railroads, towers, sign and power poles, etc.) within the approach surfaces, regardless of whether or not they are obstructions.	X			
	Identify the objects using same alphanumeric identifier that was used on the plan view.				
7. Cross section of road & railroad	Show the cross-section of any roads and/or railroads that cross the area shown. Indicate cross section elevations of roads and railroads at edges and extended centerlines that cross the area shown.	X			
8. Existing and proposed property and easement lines	Show the airport property boundaries, including easements, for the existing and ultimate airport configurations. AC 5300-13A Note easements for pipelines and residential through the fence gateways.	X			
D. Obstruction tables for each approach surface (surface should be identified)	A separate table for each runway end must be used to enhance information clarity.				
1. Object identification number	List each object by the same alphanumeric symbol used in the plan view.	X			

Inner Portion of the Approach Surface Drawing					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
2. Description	Provide a brief description of the object, e.g., Power Pole, Cell Tower, Natural Gas Flare, etc.	X			
3. Date of Obstruction Survey and Survey Accuracy	Provide the date of latest obstruction survey.	X			
4. Surface Penetrations	5300-13A For any object that penetrates the Part 77 surface, the approach surface, or the obstacle free zone, describe the vertical length the object protrudes.	X			
5. Proposed disposition of surface penetrations	Provide a proposed disposition of the object to remedy the penetration as described in item 4 above. See AC 70/7460-1 for Part 77 violations. "Removal" and/or "Lower" should be listed for any Airports safety area/zone violations. See AC 150/5300-13A, Paragraph 303 and 308.	X			
6. Object elevation	List the Above Ground Level (AGL) height and the top of object elevation in MSL for each object.	X			
7. Triggering Event (e.g., a runway extension) – Timeframe/expected date for removal	List the surface that is penetrated and the amount the object protrudes above the surface. See 14 CFR Part 77 and AC 150/5300-13A, Paragraphs 303 and 308.	X			
8. Allowable approach surface elevation (if applicable)		X			
9. Amount of approach surface penetration (if applicable)		X			
10. Proposed disposition of approach surface obstruction (if applicable)	Provide a proposed disposition of the object to remedy the penetration. See AC 70/7460-1 for Part 77 violations. "Removal" and/or "Lower" should be listed for any Airports safety area/zone violations. See AC 150/5300-13A, Paragraph 303.	X			

Inner Portion of the Approach Surface Drawing					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
11. Obstacle Free Zone (OFZ)	Determine and depict the applicable OFZ surfaces, see AC 150/5300-13A, Paragraph 308. Provide a proposed disposition of the object to remedy the penetration. Note: Modification to the OFZ standard is not permitted.	X			
E. Runway Centerline Profile	This may be shown on the Inner Portion of the Approach Surface drawing if there is space to show the runway and Runway Safety Area in sufficient detail otherwise a separate sheet may be necessary. At a minimum this drawing is to show the full length of the runway and Runway Safety Area including: runway elevations, runway and Runway Safety Area gradients, all vertical curves, and a line representing the 5' line-of-sight. See AC 150/5300-13A, Paragraph 305.	X			
1. Scale	The vertical scale of this drawing must be able to show the separation of the runway surface and the 5' Line-of-Sight line. See AC 150/5300-13A, Paragraph 305.	X			
2. Elevation	Show runway elevations, runway and Runway Safety Area gradients, and all vertical curve data. See AC 150/5300-13A, Paragraph 318.	X			
3. Line of Sight	The vertical scale of this drawing must be able to show the separation of the runway surface and the 5' Line-of-Sight line. See AC 150/5300-13A, Section 305.	X			
Remarks					
E. Runway centerline profiles illustrated on Runway Centerline Profiles drawing.					

A.7. Runway Departure Surface Drawing

- Required where applicable. For each runway that is designated for instrument departures.
- This drawing depicts the applicable departure surfaces as defined in Paragraph 303 of FAA AC 150/5300-13A. The surfaces are shown for runway end(s) designated for instrument departures.
- 40:1 for Instrument Procedure Runways (Scale, 1” = 1000’ Horizontal, 1” = 100’ Vertical, Out to 10,200’ beyond Runway threshold) 62.5:1 for Commercial Service Runways (Scale, 1” = 2000’ Horizontal, 1” = 100’ Vertical, Out to 50,000’ beyond Runway threshold).
- Contact the FAA if the scale does not allow the entire area to fit on a single sheet. The depiction of the One Engine Inoperative (OEI) surface is optional; it is not currently required.

Runway Departure Surface Drawing					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
A. Title and Revision Blocks	Each drawing in the Airport Layout Plan drawing set shall have a Title and Revision Block. For drawings that have been updated, e.g., as-builts, the revision block should show the current revision number and date of revision.	X			
B. Plan view (existing & future)	See AC 150/5300-13A, Paragraph 303(c).				
1. Aerial Photo for base map	Use an aerial photograph for the base map. A USGS 7.5 minute series map is also acceptable.	X			
2. Runway end numbers and elevations (nearest 1/10 of a foot)	Show the existing and ultimate runway end, runway number, and the elevation of the threshold center. For runways that have a clearway, depict this surface and the relocated departure surface. Reference AC 150/5300-13A, Paragraph 303(c)(1).	X			
3. 50’ elevation contours on sloping surfaces (NAVD88)	Show contour lines on the Part 77 imaginary surfaces. See 14 CFR Part 77.19.	X			
4. Depict property line, including easements	Show the property line(s) that are within the area/portion of airport shown.	X			
5. Identify, by numbers, all traverse ways with elevations and computed vertical clearance in the departure surface	Identify all significant objects (roads, rivers, railroads, towers, poles, etc.) within the departure surfaces, regardless of whether or not they are obstructions using unique alphanumeric characters.	X			

Runway Departure Surface Drawing					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
6. Ground contours	Show ground contour lines in 2', 5', or 10' intervals. Topographic issues may be important in the alternatives analysis, which may require that reduced contour intervals be used.	X			
C. Profile view (existing & future)					
1. Ground profile	Depict the ground profile along the extended runway centerline representing the composite profile, based on the highest terrain across the width and along the length of the departure surface to extents of the surface dimensions.	X			
2. Significant objects (bluffs, rivers, roads, buildings, fences, structures, etc.)	Show all significant objects (roads, rivers, railroads, towers, poles, etc.) within the approach surfaces, regardless of whether or not they are obstructions using an alphanumeric character.	X			
3. Identify obstructions with numbers on the plan view	Identify the objects using same alphanumeric identifier that was used on the plan view.	X			
4. Show roads and railroads with dashed lines at edge of the departure surface	Show the cross-section of any roads and/or railroads that cross the area shown.	X			
D. Obstruction Data Tables					
1. Object identification number	Identify all significant objects (roads, rivers, railroads, towers, poles, etc.) within the departure surfaces, regardless of whether or not they are obstructions using unique alphanumeric characters. List each object by the same alphanumeric symbol used in the plan view.	X			
2. Description	Provide a brief description of the object, e.g., Power Pole, Cell Tower, Tree, Natural Gas Flare, etc.	X			
3. Object Elevation	List the Above Ground Level (AGL) height and the top of object elevation in MSL for each object.	X			

Runway Departure Surface Drawing					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
4. Amount of surface penetration	List the object protrudes above the departure surface. See AC 150/5300-13A, Paragraph 303(c).	X			
5. Proposed or existing disposition of the obstruction	Provide a proposed disposition of the object to remedy the penetration. See AC 150/5300-13A, Paragraph 303(c).	X			
6. Separate table for each departure surface	A separate table for each runway end must be used to enhance information clarity.	X			
Remarks					
B.1 USGS quad sheets used for base map as aerial photographs do not extend to full length of departure surfaces.					

A.8. Terminal Area Drawing

- Scale 1”=50’ or 1”=100’. Plan view of aprons, buildings, hangars, parking lots, roads.
- This plan consists of one or more drawings that present a large-scale depiction of areas with significant terminal facility development. Such a drawing is typically an enlargement of a portion of the ALP. At a commercial service airport, the drawing would include the passenger terminal area, but might also include general aviation facilities and cargo facilities. See AC 150/5300-13A, Appendix 5.
- Use scale that allows the extent of the terminal/FBO apron area to best fit the chosen sheet size, e.g., typical GA airports may be able to use 1”=50’ scale on a 22” X 34” sheet, but a complex hub airport with multiple terminal areas may require a 1”=100’ scale on a 36” X 48” sheet. Contact FAA if an airport layout requires scaling or sheet sizing other than what is listed.
- This drawing is not needed at every airport type and is therefore optional.

Terminal Area Drawing					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
A. Title and Revision Blocks	Each drawing in the Airport Layout Plan drawing set shall have a Title and Revision Block. For drawings that have been updated, e.g., as-builts, the revision block should show the current revision number and date of revision.	X			
B. Building data table	All buildings on the Airport Layout Drawing should be identified by an alphanumeric character. List these identifiers in a table and give a description of the building.				
1. Structure identification number	If no Terminal Area drawing is done, also include the top of structure elevation in MSL.	X			
2. Top elevation of structures (AMSL)	Show the location of existing and ultimate hangars. Include dimensions of apron and distance from runway and taxiway centerlines. See AC 150/5300-13A, Appendix 5. Show the elevation of the highest point of each structure.	X			
3. Obstruction marking/lighting (existing/future)					
C. Buildings to be removed or relocated noted	If any of the structures violate any airport or approach surfaces give an ultimate disposition to remedy the violation.	X			
D. Fueling facilities, existing and future	Show the location of existing and ultimate fueling facilities. Include dimensions of apron and distance from runway and taxiway centerlines.	X			

Terminal Area Drawing					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
E. Air carrier gates positions shown (existing/future)	Show the existing and ultimate air carrier gate positions. See AC 150/5300-13A, Chapter 5.			X	
F. Existing and future security fencing with gates	Show the existing and ultimate security fencing and gates. See AC 150/5300-13A, Paragraph 606.	X			
G. Building restriction line (BRL)	Show the Building Restriction Line (BRL) that is within the area/portion of airport shown. The BRL identifies suitable building area locations on airports. This should be located where the Part 77 surfaces are at 35' above the airport elevation unless a different height is coordinated with the FAA. See AC 150/5300-13A, Paragraph 213(a).	X			
H. Taxiway or Taxilane centerlines designated	Show centerlines of all taxiway and taxilanes within the area/portion of airport shown.	X			
I. Dimensions					
1. Clearance Dimensions between runway, taxiway, and taxilane centerlines and hangars, buildings, aircraft parking, and other objects.	Show the location of existing and ultimate apron. Include dimensions of apron and distance from runway and taxiway centerlines. Apron should be sized using activity forecast and the apron design spreadsheet. See AC 150/5300-13A, Chapter 5 and FAA Engineering Brief No. 75.	X			
2. Dimensions of aprons, taxiways, etc.	Show the dimensions between existing and ultimate runway, taxiway, and taxilane centerlines and existing and ultimate hangars, buildings, aircraft parking, and other fixed or movable objects. See AC 150/5300-13A, Chapter 3 and Chapter 4.		X		
Apron/Hangar areas that do not meet dimensional standards of the critical aircraft should be identified and the wingspan/design group of the aircraft that can use that area depicted.					
Include tie down location with clearances	Show proposed tie-down layout on the apron area as well as taxilane marking plan. See AC 150/5300-13A, Appendix 5, AC 20-35, and AC 150/5340-1.				
J. Property Line	Show the property line(s) that are within the area/portion of airport shown.	X			

Terminal Area Drawing					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
K. Auto parking (existing & ultimate)	Show the existing and ultimate auto parking areas. See AC 150/5300-13A, Appendix 5.	X			
L. Major airport drainage ditches or storm sewers	Show any significant airport drainage ditches or storm sewers within the area/portion of airport shown.	X			
M. Special Use Area (e.g., Agricultural spraying support, Deicing, or Containment)	Show any special use areas within the area/portion of airport shown.	X			
N. North Arrow with magnetic declination and year	Magnetic declination may be calculated at http://www.ngdc.noaa.gov/geomag-web/#declination . This model is using the latest World Magnetic Model which has an Epoch Year of 2010. See FAA Order 8260.19, "Flight Procedures and Airspace." Chapter 2, Section 5, for further information.	X			
O. Fence	Show the existing and ultimate perimeter fencing or general area fencing.	X			
P. Entrance Road	Show the existing and ultimate entrance road. See 5300-13AFAA Order 5100.38, Chapter 6, Section 2.	X			
Remarks					

A.9. Land Use Drawing

- Scale 1”=200’ to 1”=600’.
- A drawing depicting on- and off-airport land uses and zoning in the area around the airport. At a minimum, the drawing must contain land within the 65 DNL noise contour. For medium or high activity commercial service airports, on-airport land use and off-airport land use may be on separate drawings. The Airport Layout Drawing should be used as a base map.
- Drawing optional. Need based on scope of work.

Land Use Drawing					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
A. Title and Revision Blocks	Each drawing in the Airport Layout Plan drawing set shall have a Title and Revision Block. For drawings that have been updated, e.g., as-builts, the revision block should show the current revision number and date of revision.	X			
B. Airport boundaries/property, existing & future (fee and easement)	Show the existing and ultimate property lines. If known, show property lines for parcels surrounding the airport.	X			
C. Plan view of land uses by category (Agricultural, Aeronautical, Commercial, Residential, etc.). Use local land use categories.					
1. On-Airport (existing & future)	Label existing and ultimate on-airport property by usage, e.g., Terminal Area, Air Cargo, Public Ramp, Airfield - Movement, Airfield - Non-movement, etc. Include existing and future airport features (e.g., runways, taxiways, aprons, safety areas/zones, terminal buildings and navigational aids).	X			
2. Off-Airport (existing & future) [to the 65 DNL Contour at a minimum, if contour known]	Label existing and ultimate off-airport property by usage and zoning, e.g., Agricultural, Industrial, Residential, Commercial, etc.	X			
D. Boundaries of local government	List any local zoning restrictions that are in place to protect the airport and surrounding airspace. See AC 150/5190-4.	X			
E. Land use legend	Provide a legend that identifies all symbols and line types used on the drawing. Lines must be clear and readable with sufficient scale and quality to discern details.	X			

Land Use Drawing					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
F.	Public facilities (schools, hospitals, parks, churches etc.)	Identify public facilities, e.g., schools, parks, etc.	X		
G.	Runway visibility zone for intersecting runways	Show the Runway Visibility Zone(s) for the existing and ultimate airport configurations. See AC 150/5300-13A, Section 305.	X		
H.	Show off-airport property out to 65 DNL if available	Label existing and ultimate off-airport property by usage and zoning, e.g., Agricultural, Industrial, Residential, Commercial, etc.	X		
I.	Airport Overlay Zoning or Zoning Restrictions	List any local zoning restrictions that are in place to protect the airport and surrounding airspace. See AC 150/5190-4.	X		
J.	North arrow with magnetic declination and year	Magnetic declination may be calculated at http://www.ngdc.noaa.gov/geomag-web/#declination . This model is using the latest World Magnetic Model which has an Epoch Year of 2010. See FAA Order 8260.19, "Flight Procedures and Airspace." Chapter 2, Section 5, for further information.	X		
K.	Drawing details to include runways, taxiways, aprons, RPZ, terminal buildings and NAVAIDS	Show existing and future airport features (e.g., runways, taxiways, aprons, safety areas/zones, terminal buildings and navigational aids, etc.). See AC 150/5300-13A.	X		
L.	Crop Restrictions	Show the Crop Restriction Line (CRL). See AC 150/5300-13A, Paragraph 322 and AC 150/5200-33.	X		
Remarks					

A.10. Airport Property Map / Exhibit A

- Scale 1”=200’ to 1”=600’.

Airport Property Map / Exhibit A					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
A. Will Property Map serve as Exhibit A? – If YES , follow the directions to the right. – If NO , go to item B below.	If prepared in accordance with AC 150/5100-17, Land Acquisition and Relocation Assistance for Airport Improvement Program Assisted Projects, use ARP SOP no. 3.00 Exhibit A guidance instead of below checklist.	X			
If Property Map will not serve as Exhibit A:					
B. Title and Revision Blocks					
C. Plan view showing parcels of land (existing, future, and ultimate)					
1. Fee land interests (existing and future)					
2. Easement interests (existing and future)					
a. Part 77 protection					
b. Compatible Land Use					
c. RPZ protection					
3. Airport Property Line					
D. Legend – shading/cross hatching, survey monuments, etc.					
E. Data Table					
1. Depiction of various tracts of land acquired to develop airport	If any obligations were incurred as a result of obtaining property, or an interest therein, they should be noted. Obligations that stem from Federal grant or an FAA-administered land transfer program, such as surplus property programs, should also be noted. The drawing should also depict easements beyond the airport boundary.				

Airport Property Map / Exhibit A					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
2. Method of acquisition or property status (fee simple, easement, etc.)					
3. Type of Acquisition Indicated	(e.g., AIP-noise, AIP-entitlement, PFC, surplus property, local purchase, local donation, condemnation, other)				
4. Acreage					
F. Access point(s) for through-the-fence arrangements including residential					
Remarks					

APPENDIX B. EXHIBIT ‘A’ REVIEW CHECKLIST

Checklist Review Item	Sponsor/Consultant			FAA
	Yes	No	N/A	Agree
1. Existing Dedicated Airport Property Boundary Line identified. This can consist of a combination of fee interest, easements and/or leases. It may include lands that are not contiguous with the airport boundary. Identify source of base map data.	X			
Airports Specialist Comments:				
2. All the airport property parcels are shown and have a unique designation. Parcels with designations from previous Exhibit ‘A’s should not be changed. However, a new system of designations may be used for new and future property acquisitions. Parcel designations must be consistent with grant descriptions.	X			
Airports Specialist Comments:				
3. Each segment of a parcel’s boundary is described in some manner. Metes and bounds, township/range/section, lot and block, plat or other appropriate property description (may be an attachment to the Exhibit ‘A’ plan sheet or checklist). Points of reference may also be included to further describe the parcel.	X			
Airports Specialist Comments:				
4. Parcels that were once airport property are shown. The date they were released from federal obligations by the FAA and the date of disposal must be included.			X	
Airports Specialist Comments:				
5. Parcel information includes: (often in table format)				
a. Grantor (selling owner)	X			
b. Type of interest acquired (fee simple, easement, etc.)	X			
c. Acreage	X			
d. Type of conveyance instrument	X			
e. Liber/book and page of recording	X			
Airports Specialist Comments:				
6. Each airport property parcel shows: (often in table format)				
a. FAA grant number, including year if acquired under a grant	X			
b. PFC Project Number if acquired with Passenger Facility Charge funds (recommended)	X			
c. Surplus Property Transfer, Government Land Transfer or other statutory federal agreements/conditions. See FAA Order 5010.4 and form 5010-1 Data Element #25 for additional information.	X			
d. Type of easement (clearing, avigation, utility, right of way, expiration date, easement held by others, subordination agreement, etc.)	X			

Checklist Review Item	Sponsor/Consultant			FAA
	Yes	No	N/A	Agree
e. Date and type of release/land use change approval (aeronautical use, interim use, concurrent use, etc.). This can also include any release from federal obligations such as a release from the National Emergency Use Provision (NEUP), mineral rights, liens, residential through-the-fence access agreements, etc.	X			
f. Date of property disposal	X			
g. Public land references, if applicable (PIN #/Assessors #, date of recording, book and page, etc.)	X			
h. Any known encumbrances on the property	X			
Airports Specialist Comments:				
7. Purpose of acquisition (current/future development, concurrent use, noise, revenue production, etc.), often in table format. Interim use can be identified with an attached reference.	X			
Airports Specialist Comments:				
8. The plan shows the following for both existing and future configurations based upon the approved Airport Layout Plan:				
a. Runway Protection Zones (RPZ)	X			
b. Runways	X			
c. Runway Safety Areas (RSA)	X			
d. Runway Object Free Areas (OFA)	X			
e. Taxiways		X		
f. Other airport design surfaces (as necessary, must maintain a legible map)				
g. Road/railroad right-of-ways	X			
h. Bearing and distance of airport property lines	X			
Airports Specialist Comments:				
9. North arrow, legend and graphic/numerical scale is shown	X			
Airports Specialist Comments:				
10. If the Exhibit 'A' is being submitted as part of a land acquisition project, the parcels being acquired are shown			X	
Airports Specialist Comments:				
11. Title block clearly labeled as Exhibit "A" Airport Property Inventory Maps and dated	X			
Airports Specialist Comments:				
12. Revision block/table, Sponsor approval block, Preparer's block, dated	X			

Checklist	Sponsor/Consultant			FAA
Review Item	Yes	No	N/A	Agree
Airports Specialist Comments:				
13. Understandable and legible legend, including all linetypes and symbols used	X			
Airports Specialist Comments:				
14. Parcel table is legible	X			
Airports Specialist Comments:				
Provide an explanation for any checklist item marked 'No'.				

Accepted By: _____ Date: [Click here to enter a date.](#)

Airports Specialist

Appendix B

Environmental Overview



CRATER LAKE

KLAMATH REGIONAL
AIRPORT

Appendix B: Environmental Overview

This Environmental Overview provides a preliminary review and initial screening of environmental resources located on or near the Crater Lake-Klamath Regional Airport (LMT or the Airport), which is owned and operated by the City of Klamath Falls (the City/Airport). Research for the environmental overview included a review of existing agency information, such as databases, previously developed airport environmental studies, resource management plans, and record documents.

PURPOSE OF THE ENVIRONMENTAL OVERVIEW

The Master Plan identifies the orderly development of airport facilities recommended over the 20-year planning period; excluding the areas leased by the Oregon Air National Guard (Oregon ANG). The recommended Master Plan facilities will be documented in the Capital Improvement Plan (CIP) and depicted on the Airport Layout Plan (ALP) drawings, which will be submitted for Federal Aviation Administration (FAA) review and approval.

The purpose of this Environmental Overview is to identify known resources/environmental issues for Master Plan facility planning and alternatives analysis purposes. This information supports possible measures to avoid or minimize potential environmental effects, including requirements for permitting and subsequent evaluation pursuant to the National Environmental Policy Act (NEPA) of 1969. This Environmental Overview is not intended to fulfil NEPA requirements. The environmental analyses required for NEPA compliance will be undertaken subsequent to Master Plan completion but prior to necessary FAA approvals, funding, or facility construction.

ENVIRONMENTAL RESOURCES CONSIDERED

FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures*, serves as the FAA's policy and procedures for complying with NEPA. FAA guidance for the preparation of NEPA documents identifies sixteen environmental resources/issue areas that should be considered, fourteen of which are discussed in this Environmental Overview:

- 1 Air Quality
- 2 Biological Resources (Threatened and Endangered Species)
- 3 Climate
- 4 Coastal Resources
- 5 U.S. Department of Transportation Act, Section 4(f)
- 6 Farmlands
- 7 Hazardous Materials, Solid Waste, and Pollution Prevention
- 8 Historical, Architectural, Archaeological, and Cultural Resources
- 9 Land Use
- 10 Natural Resources and Energy Supply
- 11 Noise and Noise-Compatible Land Use
- 12 Socioeconomics, Environmental Justice, and Children’s Environmental Health and Safety Risks
- 13 Visual Effects (Light Emissions / Visual Resources)
- 14 Water Resources (Wetlands, Floodplains, Surface Waters, Groundwater, Wild and Scenic Rivers)

Two environmental items, cumulative impacts and the irreversible and irretrievable commitment of resources, are not addressed until specific projects are proposed for NEPA review. Subsequent NEPA analyses will comply with FAA Order 1050.1F and address these issues.

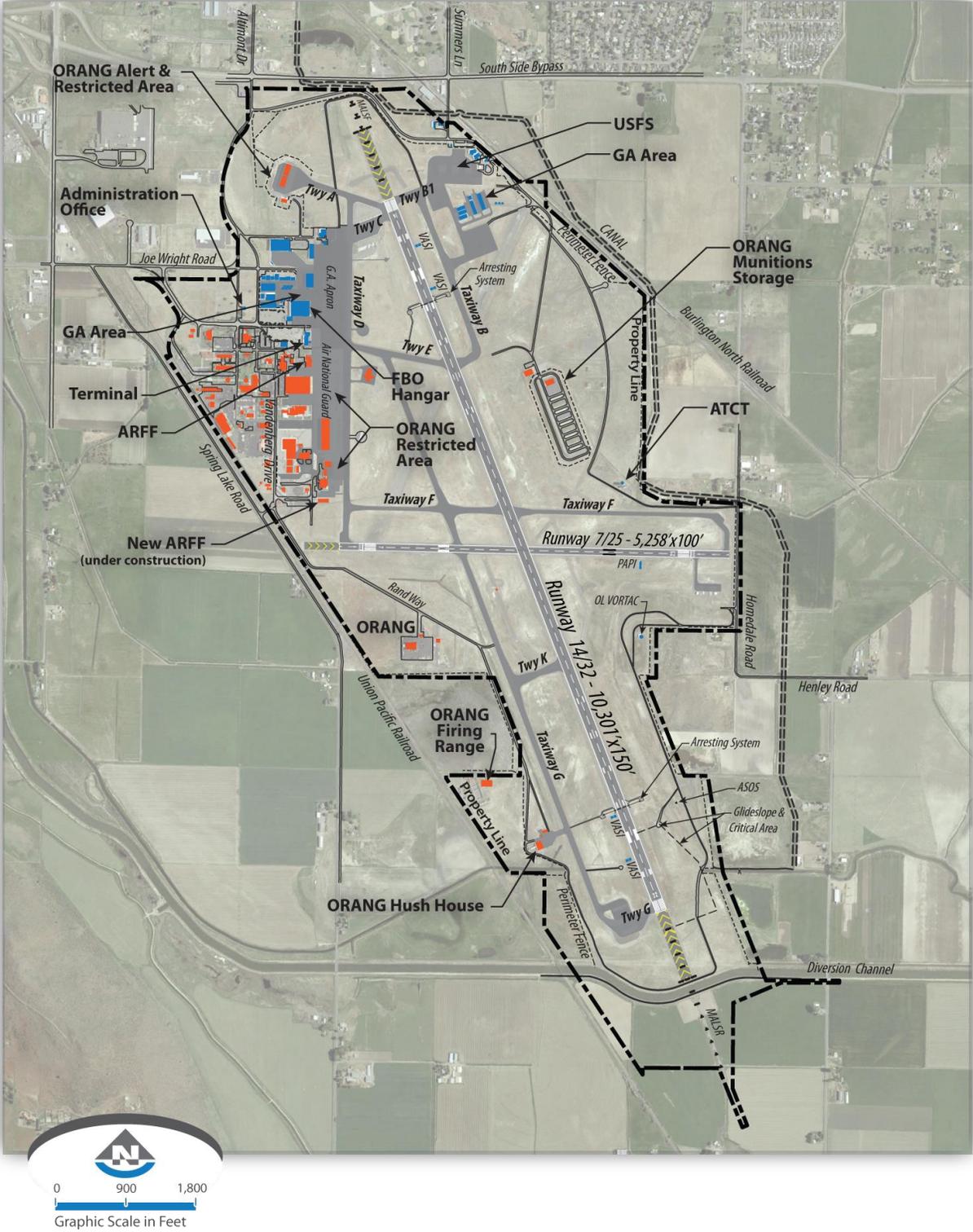
Resource documents were referenced to support preparation of this Environmental Overview. Specific resources are identified numerically throughout this document and summarized in the **Reference Section** located at the end of this Environmental Overview report.

AIRPORT BACKGROUND

LMT is owned by the City of Klamath Falls and is located approximately 4 miles southeast of the downtown center. LMT serves commercial, corporate/business, and recreational aircraft and is the base for the Oregon Air National Guard 173rd Fighter Wing (Oregon ANG) and U.S. Forest Service Klamath Falls Air Tanker Base (KATB).

The Airport contains approximately 1,166 acres and is situated on gently sloping terrain at an elevation of 4,095 feet above mean sea level (MSL). The surrounding land uses adjacent to the Airport are predominantly agricultural and rural residential (**Figure EO-1, Airport Location**).

Figure EO-1 : Airport Location



Source: Mead & Hunt 2020.

1. AIR QUALITY

The United States Environmental Protection Agency (EPA) is charged with implementing the Clean Air Act (CAA). The EPA's Office of Air Quality Planning and Standards established the National Ambient Air Quality Standards (NAAQS) for specific outdoor pollutants known as priority pollutants (ozone, particulate matter, sulfur dioxide, lead, carbon monoxide, and nitrogen dioxide). States develop EPA-approved State Implementation Plans (SIP) to address air quality and identify a plan to bring non-attainment areas (i.e., geographic areas where air pollution levels persistently exceed NAAQS) and maintenance areas into compliance. Compliance with NAAQS means that ambient outdoor levels of defined air pollutants are safe for human health and the environment. An attainment area is one in which air pollution levels do not exceed the established NAAQS. Federal actions within non-attainment and maintenance areas usually require an air quality analysis.

The EPA and State of Oregon Department of Environmental Quality (Oregon DEQ) designate Klamath Falls as a non-attainment area for particulate matter known as PM_{2.5} and as a maintenance area for particulate matter known as PM₁₀. Particulate matter consists of fine metal, smoke, soot, and dust particles that are suspended in the air. PM_{2.5} includes fine particles measuring less than 2.5 microns in diameter; and PM₁₀ includes coarse particles measuring 2.5 to 10 microns in diameter. The EPA designates Klamath Falls as in attainment for all other criteria pollutants under the NAAQS (1).

The LMT annual traffic is approximately 48,000 total aircraft operations, including 30,000 civilian operations. The FAA Terminal Area Forecast (TAF) projects approximately 50,000 total operations by 2040, including 33,400 civilian operations.

CONSIDERATIONS

Project construction and operations have the potential to increase air quality emissions and produce criterial pollutants. FAA Order 1050.1F requires project sponsors to consider the potential air quality effects associated with increases in the number of annual aircraft operations or changes in fleet mix as well as the temporary and permanent air quality effects of project-related construction and operation. The use of alternative power sources, cleaner-burning fuels, and other measures will be considered during the design of proposed projects to avoid or minimize project-related air quality emissions and Best Management Practices (BMPs) are available to avoid or reduce temporary construction-related air quality effects. An air quality analysis will be conducted prior to federal project approvals to achieve NEPA compliance.

2. BIOLOGICAL RESOURCES

Biological resources include federal and state-listed species of plants and animals and their habitats, including wetlands and migratory corridors that contribute to the overall health and productivity of an ecosystem.

2.1 THREATENED AND ENDANGERED SPECIES (FISH, WILDLIFE, AND PLANTS)

Section 7 of the Endangered Species Act (ESA), as amended, requires federal agencies to ensure that a proposed action does not jeopardize the continued existence of any endangered or threatened species or adversely affect its habitat. Project sponsors seeking federal agency approvals or funding must coordinate with the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) concerning the presence of listed or candidate species.

The USFWS maintains a list of threatened and endangered species and critical habitat by state and county. USFWS species lists for the project area were reviewed on August 20, 2018, using the USFWS Information for Planning and Conservation (IPaC) website tool. Seven special status species and one candidate species were identified as potentially occurring within the Airport boundaries (see **Table EO-1, *Special-status Species that May Occur at LMT***). No critical habitat was identified (3).

The City/Airport identified Applegate's milk-vetch (*Astragalus applegatei*), a federal and state-listed endangered plant species, during on-site surveys conducted in 2007. The species was isolated in the northeast portion of the Airport where several hundred plants were observed. The City/Airport conducted surveys of the entire Airport in 2008 and 2013 and found milk-vetch throughout the Airport. The City/Airport conducted another survey in 2018 to determine whether milk-vetch was present near Taxiway G. **Figure EO-2, *Summary of Applegate's Milk-vetch Survey Results at LMT***, presents the areas in which Applegate's milk-vetch was identified during each survey.

The USFWS developed the *Applegate's Milk-Vetch Recovery Plan* in 1998 to increase the stability of the species to the point where it would no longer be in danger of extinction. The 1998 Plan did not identify LMT as a site where milk-vetch was present (4). The USFWS published a five-year review of the recovery plan in 2003 and 2008 to evaluate changes in the species' status following implementation of its 1998 *Recovery Plan*. LMT was identified as a site that included milk-vetch in the 2008 five-year review. The five-year review identified more than 21,000 plants on site and stated that "The Airport, Oregon Department of Agriculture, and the Service are working together to identify measures to minimize and compensate for any future impacts to Applegate's milk-vetch" (5).

The 2013 five-year review concluded that the number of plants present at LMT was sufficient to meet the definition of a self-sustaining population, but USFWS could not down-list the plant's status because LMT was neither secured nor managed specifically to benefit the species, which are requirements for down-listing an endangered species (5). In 2019, another survey was completed which found fewer plant populations.

Table EO-1 : Special-status Species That May Occur at LMT

Common Name	Scientific Name	Federal Status	State Status
<i>Mammal</i>			
Gray wolf	<i>Canis lupus</i>	Endangered	Endangered under the authority of the federal Endangered Species Act in Oregon west of highways 395, 78, and 95.
North American wolverine	<i>Gulo gulo luscus</i>	Proposed Threatened	Threatened
<i>Birds</i>			
Yellow-billed cuckoo	<i>Coccyzus americanus</i>	Threatened	None
<i>Fish</i>			
Lost river sucker	<i>Deltistes luxatus</i>	Endangered	Endangered
Shortnose sucker	<i>Chasmistes brevirostris</i>	Endangered	Endangered
<i>Flowering Plants</i>			
Applegate’s milk-vetch	<i>Astragalus applegatei</i>	Endangered	Endangered
Slender Orcutt grass	<i>Orcuttia tenuis</i>	Threatened	None
Peck’s milkvetch	<i>Astragalus peckii</i>	None	Threatened
Pumice grape-fern	<i>Botrychium pumicola</i>	None	Threatened
Whitebark pine	<i>Pinus albicaulis</i>	Candidate	None
<p>Key:</p> <p>Candidate Species: a plant or animal species for which the U.S. Fish and Wildlife Service (FWS) has sufficient information on its biological status and threats to propose it as endangered or threatened under the Endangered Species Act (ESA), but for which development of a proposed listing regulation is precluded by other higher priority listing activities.</p> <p>Endangered: a plant or animal species that is in danger of extinction throughout all or a significant portion of its range.</p> <p>Threatened: a plant or animal species that is likely to become endangered within the foreseeable future.</p>			

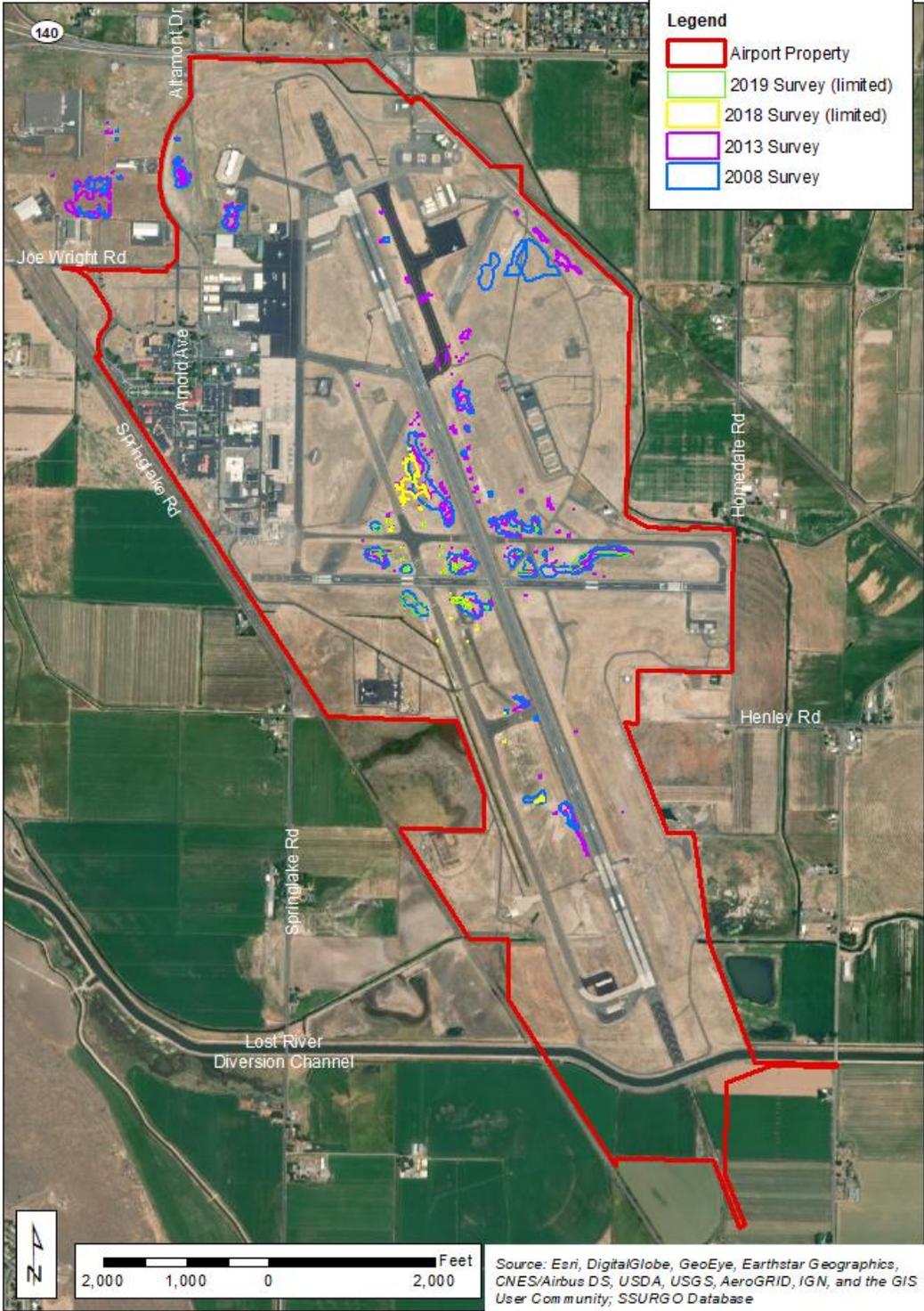
Sources:

USFWS, iPAC database. Accessed August 2018. Available at: <https://ecos.fws.gov/ipac/>.

State of Oregon Department of Fish and Wildlife, 2018

Oregon Department of Agriculture, 2018.

Figure EO-2 : Summary of Applegate’s Milk-vetch Survey Results at LMT



Source: Esri, DigitalGlobe, GeoEye, Earstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community; SSURGO Database

Considerations

Applegate's milk-vetch occurs throughout LMT. Biological surveys will be required to identify the presence and extent of milk-vetch. The survey results will be used to avoid and minimize potential effects to the milk-vetch and serve as the basis of federal agency consultation. Pursuant to NEPA and the Endangered Species Act, the FAA is responsible for determining whether a proposed project could adversely affect a listed species or its critical habitat when it occurs on federally obligated airports, and the FAA is responsible for coordination with the USFWS. Following the completion of the master plan, additional milk-vetch surveys will likely be required, and the FAA will undertake consultation with the USFWS and the Oregon Department of Agriculture to make sure that a proposed project or federal action would not be likely to adversely affect Applegate's milk-vetch or other Federally listed species. The results of the consultation will be considered prior to project approvals or construction.

2.2 WILDLIFE HAZARDS TO AIRCRAFT

LMT is located along the Pacific Flyway, a major seasonal migration route for numerous avian species. The FAA Wildlife Strike Database includes records for 168 wildlife strikes at LMT since January 1, 1990, involving passerines, raptors (owls and hawks), waterfowl, doves, gulls, blackbirds, and other species. Two strikes involving waterfowl have resulted in substantial aircraft damage.

The City/Airport completed its most recent Wildlife Hazard Assessment (WHA) in 2012 and revised its Wildlife Hazard Management Plan (WHMP) in 2014. The WHMP identified specific measures to manage airport property and structures to reduce or discourage the presence of potentially hazardous wildlife, including measures to maintain specific vegetation heights, developing a site-specific plant palette for airport projects, reviewing proposed construction plans for appropriate designs and landscaping, and preventing the accumulation of open water on site.

The WHA identified several off-site ponds that were observed to attract hazardous wildlife, some of which were located within approach and departure airspace. The WHMP recommended property acquisition to facilitate the removal of an off-site pond located immediately north of the airport and within the approach to Runway 14 which was observed to pose risk to aircraft operations (see **Figure EO-3, Pond within Runway 14 Approach**). In addition, multiple detention basins are located adjacent to the airport property near Runway 32, which were also observed to attract hazardous wildlife. The WHMP also recommended the acquisition of this property and pond removal.

Figure EO-3 : Pond within Runway 14 Approach

Source: Mead & Hunt, 2013, Wildlife Hazard Management Plan for LMT

CONSIDERATIONS

The FAA provides guidance for preventing the creation of new wildlife attractants in Advisory Circular 150/5200-33B, “Wildlife Hazard Attractants On and Near Airports” (6). To prevent the creation of potential wildlife attractants, designs for proposed structures, landscaping, and stormwater management facilities will be designed to consider their potential to attract potentially hazardous wildlife and proposed project designs will undergo review by an FAA-qualified Airport Wildlife Hazard Damage Biologist, as necessary, to prevent the development of potential wildlife hazards. Subsequent NEPA analyses conducted following master plan completion, but prior to project approvals, will evaluate whether proposed projects have the potential to attract potentially hazardous wildlife.

3. CLIMATE

The Council on Environmental Quality (CEQ) indicates that global climate change should be considered during a NEPA analysis because increased concentrations of greenhouse gases (GHGs) in the atmosphere can affect global climate change. (GHGs are defined as including carbon [CO₂], methane [CH₄], nitrous oxide [N₂O], hydrofluorocarbons [HFCs], perfluorocarbons [PFCs], and sulfur hexafluoride [SF₆]).

CEQ specifically asks agencies to consider:

- ▶ The potential effects of a proposed action on climate change as indicated by its GHG emissions; and
- ▶ The implications of climate change for the environmental effects of a proposed project.

Considering GHG emissions for an FAA NEPA review should follow the basic procedure of considering the potential incremental change in CO₂ emissions that would result from the proposed action and alternative(s) compared to the no action alternative for the same timeframe, and discussing the context for interpreting and understanding the potential changes.

Considerations

As stated in **Section 1.0, Air Quality**, an air quality analysis will be performed to identify the potential temporary and permanent air quality effects of proposed master plan projects. That data obtained during the air quality analysis will be used to support a separate and distinct discussion of the proposed projects to produce greenhouse gases and their potential effect on the global climate. The evaluation will focus on the potential incremental change in CO₂ emissions that would result from the proposed projects and the implications of climate change. The analysis would also identify the potential effects of the proposed action on climate change as indicated by its GHG emissions and the implications of global climate for the environmental effects of a proposed project.

4. COASTAL RESOURCES

Coastal resources include all-natural resources occurring within coastal waters and their adjacent shorelands. The Coastal Zone Management Act provides for the management of the nation's coastal resources. The Oregon Department of Land Conservation and Development (DLCD) administers the Oregon Coastal Management Program (OCMP). LMT is located outside of Oregon's coastal zone. The proposed master plan will not affect coastal resources (31).

5. U.S. DEPARTMENT OF TRANSPORTATION ACT, SECTION 4(F)

Section 4(f) of the U.S. DOT Act of 1966 (49 U.S.C. § 303) protects significant publicly owned parks, recreational areas, wildlife and waterfowl refuges, and public and private historic sites. Section 4(f) provides that the Secretary of Transportation may approve a transportation program or project requiring the use of a Section 4(f) resource, only if there is no feasible and prudent alternative and the program or project includes all possible planning to minimize harm from the use.

The term use—as it relates to Section 4(f)—denotes an adverse impact to, or occupancy of, a Section 4(f) impact. There are three conditions under which use occurs:

- ▶ Permanent Incorporation, which occurs when a Section 4(f) property is acquired outright for a transportation project;
- ▶ Temporary Occupancy, which occurs when the temporary use of a property is adverse in terms of Section 4(f)'s preservationist purpose; and
- ▶ Constructive Use, which occurs when the proximity of impacts of a transportation project on a Section 4(f) property are so great, even without acquisition of the property, that the activities, features, and attributes of the property are substantially impaired.

CONSIDERATIONS

No Section 4(f) resources are located within LMT boundaries. The nearest park, Klamath Falls Little League Fields, lies northwest of the intersection of State Highway 140 and Summers Lane. The nearest wildlife refuges include the Lower Klamath National Wildlife Refuge, located approximately 7 miles south of LMT. No Section 4(f) resources are known to be present on the airport, and proposed projects would not likely affect or require the use of a Section 4(f) resource.

6. FARMLANDS

The Farmland Protection Policy Act (FPPA) regulates federal actions with the potential to convert important farmland to nonagricultural use. Federal agencies and project sponsors must consider the potential direct and indirect impacts of their proposed projects on farmlands. Direct impacts to farmland typically involve the conversion of farmland to non-agricultural use. Indirect impacts affect farming or livestock operations, such as actions that could limit or prevent access to farmable land, produce noise that is significant and that could potentially affect livestock operations, or create restrictions on the use of adjacent lands. The CEQ urges federal agencies to consider the effects of a proposed Federal action on prime or unique agricultural lands as part of the NEPA review process.

The Natural Resource Conservation Service (NRCS) maintains an inventory of the prime and unique farmland in the United States based on soil type and other factors. Prime farmland is defined as the best combination of physical and chemical characteristics, with minimal pesticides and fertilizer. Unique farmland is typically used for high value food and fiber crops. According to the NRCS Soil Map for Klamath County, Oregon, most of the soil types on the airport property are classified as farmland of statewide importance, while a few areas, mostly along the southeastern and northern ends of the airport, are classified as prime farmland if irrigated (7). **Table EO-2, LMT Soils, Classification, and Farmland Ratings**, identifies the soil types within airport boundaries and their associated farmland ratings. **Figure EO-4, LMT Soils and Farmland Ratings**, identifies the location of each soil type within airport boundaries.

Table EO-2 : LMT Soils, Classification, and Farmland Rating

Soil Classification	Soil Name	Farmland Rating
6A	Calimus fine sandy loam, 0 to 2 percent slopes	Prime farmland if irrigated
9A	Capona loam, 0 to 2 percent slopes	Prime farmland if irrigated
19A	Fordney loamy fine sand, 0 to 2 percent slopes	Prime farmland if irrigated
25	Henley loamy fine sand	Farmland of statewide importance
26	Henley loam	Farmland of statewide importance
27	Henley-Laki complex	Farmland of statewide importance
28	Henley-Laki loams	Farmland of statewide importance
29	Henley variant loam	Farmland of statewide importance
31	Hosley loam	Farmland of statewide importance
38	Laki loam	Farmland of statewide importance
40	Laki-Henley loams	Farmland of statewide importance
53	Malin clay loam	Farmland of statewide importance
58A	Modoc fine sandy loam, 0 to 2 percent slopes	Prime farmland if irrigated
58B	Modoc fine sandy loam, 0 to 2 percent slopes	Prime farmland if irrigated
62	Poe loamy fine sand	Prime farmland if irrigated
63	Poe fine sandy loam	Prime farmland if irrigated
70	Scherrard clay loam	Farmland of statewide importance
90	Zuman loamy fine sand	Farmland of statewide importance

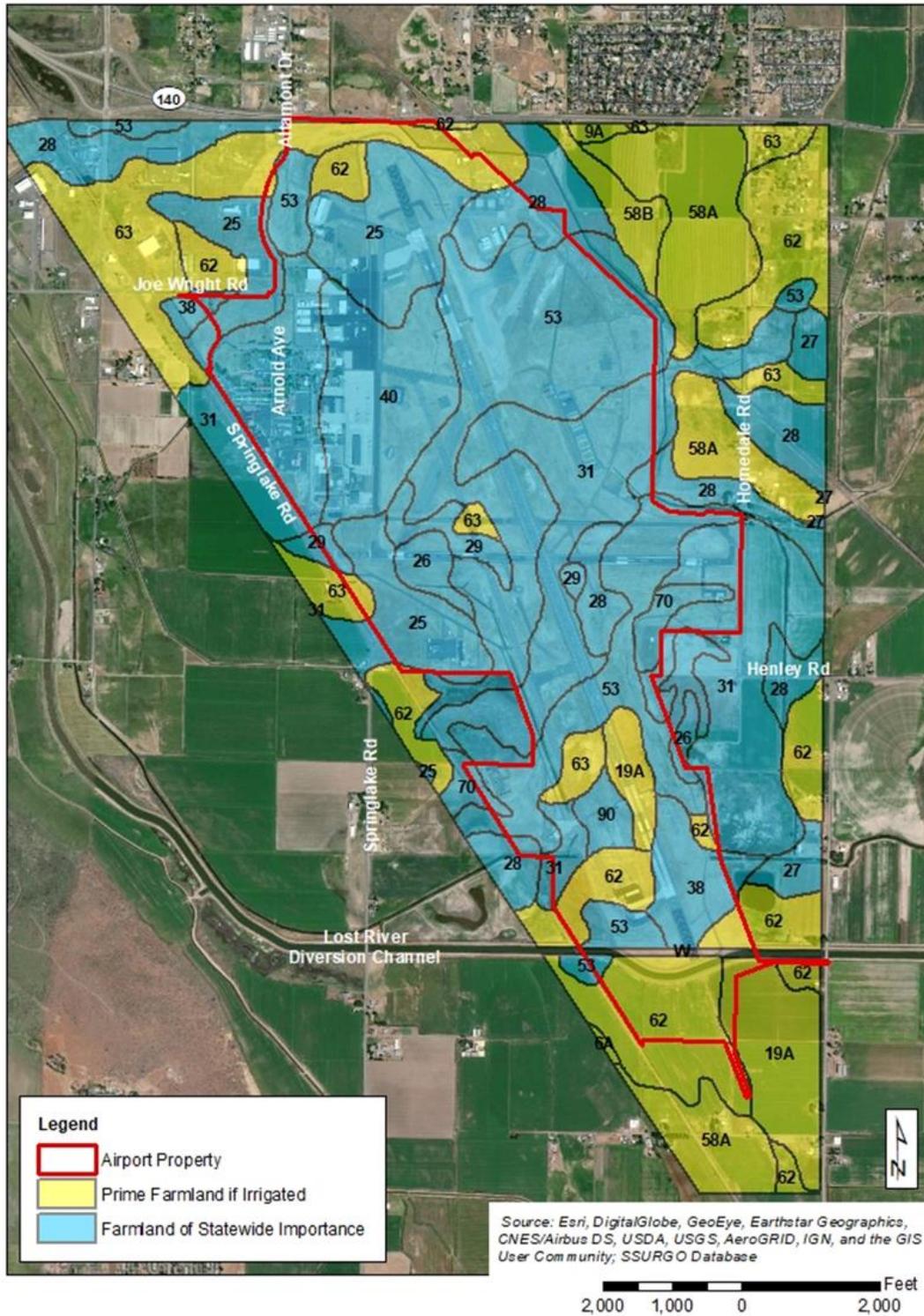
Key:

Farmland of Statewide Importance – In some areas, land that does not meet the criteria for prime or unique farmland is considered to be "farmland of statewide importance" for the production of food, feed, fiber, forage, and oilseed crops. Farmland of statewide importance may include tracts of land that have been designated for agriculture by State law.

Prime Farmland: Land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is also available for these uses.

Source: Published Soil Surveys for Washington, USDA Natural Resources Conservation Service. Available at <https://www.nrcs.usda.gov/wps/portal/nrcs/surveylist/soils/survey/state/?stateId=WA>.

Figure EO-4 : LMT Soils and Farmland Ratings



Source: Esri, DigitalGlobe, GeoEye, Earstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community; SSURGO Database

CONSIDERATIONS

Nearly all airport property is designated as prime farmland or farmland of statewide importance. Since airport property is neither irrigated nor in cultivation, no direct or indirect impact to prime farmland is anticipated. However, the City/Airport holds easements on some adjacent, off-site parcels east and south of the airport that are cultivated. If the acquisition and use of parcels designated as prime and unique farmland or farmland of statewide significance becomes necessary to accommodate a proposed project and results in the conversion of cultivated areas to another use, the impact would require evaluation in accordance with the FPPA. The potential significance of the conversion would be evaluated based on type of soil affected, acreage requiring conversion, and other factors. Coordination with NRCS and other regulatory agencies would be necessary to identify compensatory mitigation and comply with NEPA.

7. HAZARDOUS MATERIALS, SOLID WASTE, AND POLLUTION PREVENTION

According to FAA guidance set forth in Order 1050.1F, an evaluation of hazardous materials, solid waste, and pollution prevention must consider:

- ▶ Existing hazardous waste/contamination at a proposed project site and its immediate vicinity; and
- ▶ The local disposal capacity for solid and hazardous wastes that would be generated from a proposed action.

7.1 HAZARDOUS MATERIALS

The National Priorities List (NPL) is the list of hazardous waste sites in the United States that are eligible for long-term remedial action to be financed under the federal Superfund program. The U.S. Environmental Protection Agency established the NPL in compliance with the requirements of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). The nearest NPL site is North Ridge Estates, a former World War II medical facility located approximately 6 miles north of LMT. Cleanup and restoration are scheduled to be completed by the end of 2018 (8).

The Oregon DEQ maintains the Environmental Cleanup Site Information (ECSI) database to track sites in Oregon with known or potential contamination from hazardous substances and to document whether further action is required. As shown on **Table EO-3, Oregon DEQ Environmental Cleanup Site Information On or Near LMT**, 17 sites containing hazardous substances were identified in the same Public Land Survey System (PLSS) sections as LMT (Township 39S, Range 9E, Sections 14-15, 22-23, 26-27, and 35 [DEQ 2018b]).

Eleven of the 17 sites identified are within Airport boundaries, 10 of which are designated as “No further state action required.” The remaining site (Site No. 2933, Super Spray Service) is now leased and operated by Macy’s Flying Service, and is an active aerial applicator service tenant that uses and stores hazardous materials as part of its operations. The location and use of hazardous materials at Site No. 2033 should be considered during the design and construction of proposed projects to avoid the inadvertent exposure of hazardous materials to construction workers or airport staff during site grading, excavation, or other activities that could cause inadvertent exposure.

Table EO-3 : Oregon DEQ Environmental Cleanup Site Information On and Near LMT

#	Site ID	Site Name	Site Location	Status
1	4537	Kingsley Field - Former Base Landfill - Site #3	Joe Wright Rd.	Record of decision
2	1296	Kingsley Field - Klamath Falls (City of)	Joe Wright Rd.	No further state action required.
3	4549	Kingsley Field - USAF - PLO16	Joe Wright Rd.	No further state action required.
4	4550	Kingsley Field - USAF - Site #1	Joe Wright Rd.	No further state action required
5	4551	Kingsley Field - USAF - Site #11	Joe Wright Rd.	No further state action required
6	4547	Kingsley Field - USAF - Site #5	Joe Wright Rd.	No further state action required
7	4538	Kingsley Field - USAF - Site #6	Joe Wright Rd.	No further state action required
8	4548	Kingsley Field - USAF - Site #9	Joe Wright Rd.	No further state action required
9	4552	Kingsley Field - USAF - TUO15	Joe Wright Rd.	No further state action required
10	4667	Kingsley Field Gas Station (Former)	Joe Wright Rd. / Arnold Ave.	No further state action required
11	816	Kingsley Field Study Area	Joe Wright Rd.	Site investigation required.
12	4399	Wright Road Industrial Park	Joe Wright Rd. / Swan Ct.	No further state action required
13	2933	Super Spray Service	Klamath Falls Airport	Site Screening recommended (EV)
14	2410	Benny Garcia Residence	4804 Bisbee St.	No further state action required
15	2705	Henderson Millwork	3007 Anderson Ave.	Site Screening recommended (EV)
16	3797	Klamath Falls Bus Shop	5338 Summers Ln.	Site Screening recommended (EV)
17	3118	XL Dry Cleaners (Plant)	2995 Anderson Ave.	Site Screening recommended (EV)

Source: United States Environmental Protection Agency.

The Oregon DEQ maintains information about leaking underground storage tanks (LUSTs) (8). **Table EO-4, Leaking Underground Storage Tanks at LMT**, presents the records for seven LUST sites identified within Airport boundaries. Six of the sites are identified as “closed”, indicating that no further action is required, and one site is listed as “unassigned.”

Jet fuel, waste oil, diesel fuel, deicing chemicals, and fertilizers are used or stored at LMT. The City/Airport prepared a Stormwater Pollution and Spill Prevention Plan (SWPSPP) that includes an inventory of hazardous materials used and stored at LMT as well as their locations (10). The data contained in the SWPSPP is used to prevent the release of hazardous materials and their constituents to stormwater.

Table EO-4 : Table EO-4: Leaking Underground Storage Tanks at LMT

#	Site	Facility ID	Site Name	Address	Contaminant	Status
1	18-97-0001	11675	Klamath Falls Airport	6801 Rand Way	Miscellaneous, Gas	Closed
2	18-98-0005	1437	Klamath Aircraft Inc.	6701 Rand Way - Municipal Airport	Diesel	Closed
3	18-92-0062	1437	Klamath Aircraft Inc.	6701 Rand Way - Municipal Airport	Unknown	Unassigned
4	18-89-0010	Unknown	Kingsley Field, Air Nat'l Guard	Kingsley Field IRP Site 14	Miscellaneous, Gas	Closed
5	18-93-6097	Unknown	Oregon Air Guard (Kingsley AFB)	IRP Site 14	Unknown	Closed
6	18-95-0028	4314	Or Air Nat'l Guard - Kingsley Field AFB	IRP Site 10: Former Pol Area	Miscellaneous Gas, Diesel, Other Petro	Closed
7	18-99-0013	4314	Or Air Nat'l Guard - Kingsley Field AFB	IRP Site 10: Former Pol Area	Other Petro	Closed

Source: Oregon Department of Environmental Quality, 2018.

Considerations

Proposed projects have the potential to use, store, or transport hazardous materials, such as fuel, paints, and solvents, during construction and operation. Increased aircraft operations during the planning period may require increased fuel use, transport, and storage. In addition, hazardous materials, such as lead paint and asbestos-containing material, could be encountered during project-related demolition or construction. FAA Order 1050.1F requires project sponsors to conduct a hazardous waste analysis prior to the approval and construction of a proposed project. Further information/clarification regarding site 1437, which Oregon DEQ identified as both closed and unassigned, would be obtained during that analysis. The analysis also will identify and document the types and quantities of any hazardous substances that would be generated during the construction and operation of proposed projects; describe how those materials would be managed, stored, and transported; and necessary measures or precautions. The results of the hazardous waste investigation would also identify and document the presence and extent of hazardous materials that could be encountered during construction or demolition (e.g., lead-based paint, asbestos-containing material) and applicable on-site treatment, engineering, or administrative controls that would be necessary. The Airport would also use the results of the study to amend its SWPSP to include the new facilities.

7.2 SOLID WASTE

The FAA Modernization and Reform Act of 2012 requires the preparation of an Airport Recycling, Reuse, and Waste Reduction Plan as part of an airport master plan, and such a plan will be included as an appendix to the Master Plan. Klamath County Solid Waste operates several disposal facilities including the Klamath Falls Landfill and eight transfer stations. No near-term capacity limitations or unresolved waste disposal issues were identified.

Considerations

The construction of proposed projects could generate construction debris and produce new or increased solid waste streams such as refuse, scrap metal, spent materials, and chemical by-products. As part of the NEPA analysis required prior to FAA project approval, project-related waste streams would be identified.

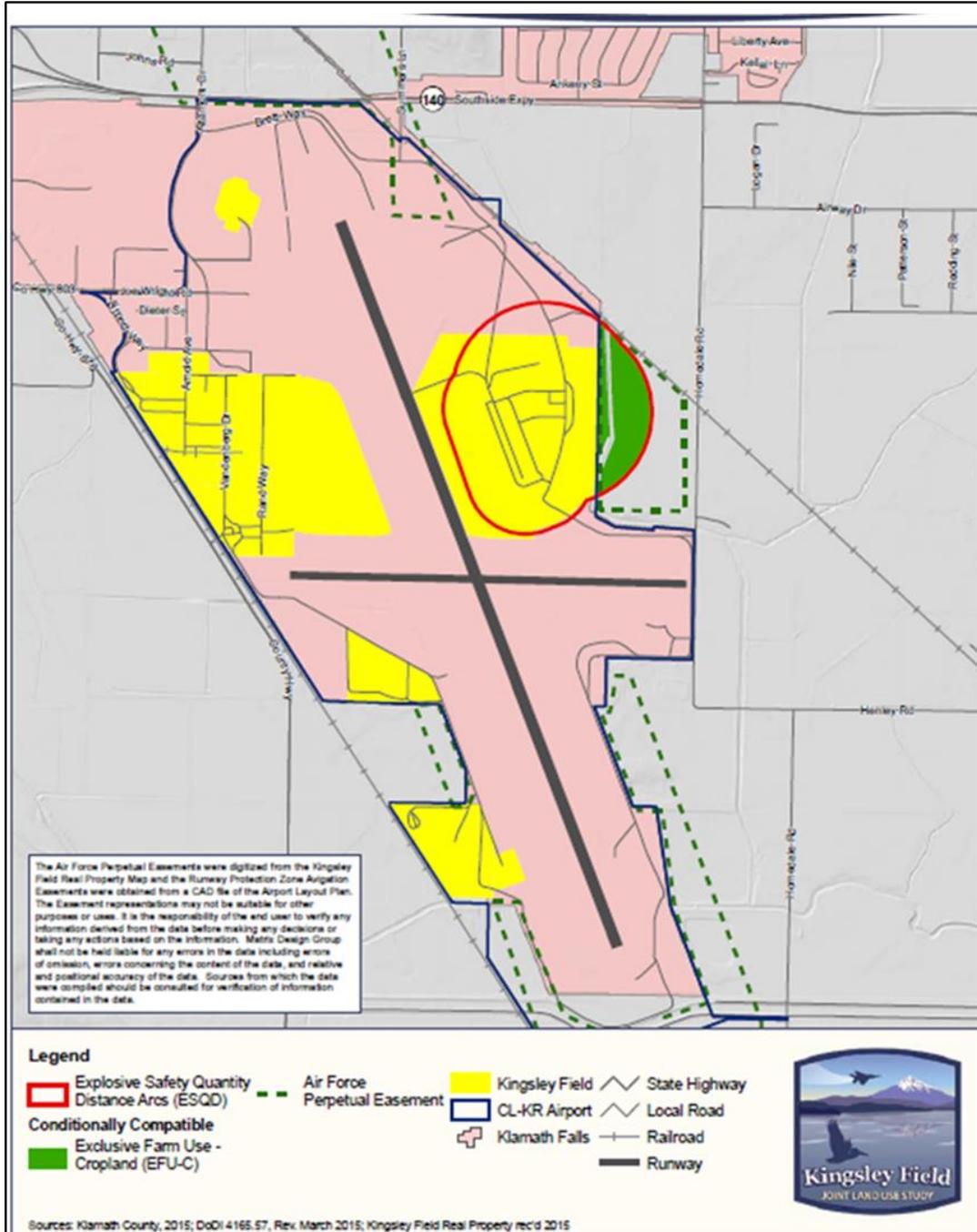
7.3 ORDNANCE AND EXPLOSIVES

A designated military munitions storage area is present near the northeastern airport boundary for the storage of hazardous material including ordnance and explosives. The Oregon ANG has identified an Explosive Safety Quantity Distance (ESQD) Arc to identify the area in which there is a potential safety risk associated with the unlikely explosion of stored munitions. The ESQD Arc extends to an area within a 1,250-foot radius of the munitions storage area and encompasses approximately 27 acres of agricultural area east of the airport boundary and west of the railroad track (see **Figure EO-5, Explosive Safety Quantity Distance Arc**). The airport perimeter road must be closed when munitions are being moved (11). The City/Airport's lease agreement with the Oregon ANG prohibits the civil construction of habitable surface structures by the lessor within specific distances on exclusive use and joint use areas, which applies to airport property within the ESQD Arc. The ESQD Arc and its associated constraints are identified in the Airport Overlay Zone described in **Section 9.1.1**.

Considerations

The location of the ESQD Arc and its buffer area must be considered during the siting, planning, and operation of proposed projects.

Figure EO-5 : Explosive Safety Quantity Distance Arc



Source: City of Klamath Falls, *Joint Land Use Study*.

8. HISTORICAL, ARCHITECTURAL, ARCHAEOLOGICAL, AND CULTURAL RESOURCES

Historical, architectural, archaeological, and cultural resources encompass a range of physical resources associated with important activities in human history and prehistoric times. Federal law requires project sponsors who require federal funds or approvals to consider how their proposed projects would affect historic properties.

Historic properties are defined as architectural history, archaeological resources, or cultural resources that are listed on, or eligible for listing on, the National Register of Historic Places (NRHP). Generally, to qualify for NRHP listing a resource needs to be at least 50 years in age. In accordance with NEPA and Section 106 of the National Historic Preservation Act (NHPA), the FAA is the federal lead agency responsible for consulting with the federally recognized tribes, the State Historic Preservation Office (SHPO), and other agencies, as necessary, and identifying the potential adverse effects of a proposed project on historic properties. Historic properties are generally addressed below in three categories: archaeological (below-ground resources), cultural resources (primarily ethnographic and Native American tribal resources), and architectural history resources (built environment resources).

8.1 ARCHAEOLOGICAL AND CULTURAL RESOURCES

LMT is located within the Klamath Basin of south-central Oregon, an area that includes archaeological and ethnographic records of human use. Within a 1-mile radius of LMT, previous archaeological surveys have identified prehistoric lithic scatters as well as historic refuse scatters. The conclusions of previous archaeological and cultural resource studies for recent airport development indicate that the probability of encountering prehistoric sites within the project area is low (12).

The most recent cultural resources inventory was conducted in 2014 to support Taxiway G Improvements. The study focused on a 96-acre Area of Potential Effect (APE) associated with the taxiway, construction haul road, and staging (see **Figure EO-6, 2014 Cultural Resources Study Area for the Taxiway G Improvement Project**). No historic properties were identified within the APE (13); however, the report included a list of 18 resources studies within 1 mile of the APE and recorded or reported resources within one mile of the APE, some of which were located within the airport but outside the APE for this project (see **Table EO-5, Previously Recorded Cultural Resources Studies within 1 Mile of the Taxiway G**). Previous archaeological and cultural resources studies indicate that airport construction and operation have resulted in significant ground disturbance, resulting in a low potential for the discovery of prehistoric archaeological resources. Isolated historic debris was found during previous surveys listed in **Table EO-6, Previously Recorded or Reported Cultural Resources within 1 Mile of the Taxiway G**, but it was determined to be ineligible for listing on the National Register of Historic Places (13).

Figure EO-6 : 2014 Cultural Resources Study Area for the Taxiway G Improvement Project



Table EO-5 : Previously Recorded Historical, Architectural, Archaeological, and Cultural Resources Studies within 1 Mile of the Taxiway G

SHPO No.	Survey Project Title (Reference)	Distance and Direction from APE	Results
1044	Report of a Cultural Resources Survey of the Pacific Power and Light Company's Proposed Malin to Medford 500KV Powerline Project through the Klamath Basin, Klamath County, Oregon (Cole 1979)	0.3 mile south	Negative, three areas designated as possible archaeological sites not confirmed
14852	Cultural Resource Survey of Selected Reroutes in Klamath County, Oregon, Along Pacific Gas Transmission Company's Medford Extension (Wilt et al. 1995)	0.3 mile north	USBR 1-C Drain; 1-C-7 Drain; Great Northern Railroad HLF-334; Summers Lane HLF-335; historical power transmission line
15549	Archaeological Survey of the South Klamath Falls Highway-Washburn Way, South Klamath Falls Highway (OR 140), Klamath County, Oregon (Tasa 1993)	0.7 mile west-northwest	Negative
16491	Archaeological Survey of the Proposed Klamath Falls Southside Bypass Modification, Klamath Falls-Lakeview Highway (OR 140), Klamath County (ODOT Key #09741) (Connolly 1998)	0.7 mile west-northwest	Negative
19170	A Cultural Resources Inventory of the New Klamath County Roads Department Shop Facility, Klamath County, Oregon (Fleming 2004a)	0.9 mile west	1948 house and outbuildings; 1 pre-contact isolate
19132	Archaeological Survey for New Perimeter Road and East Perimeter Fence at the Klamath Falls Airport, Klamath County, Oregon (Minor 2004)	0.4 mile east	Isolate: 6 obsidian chunks
19634	A Cultural Resources Inventory of the City of Klamath Falls' Proposed "Industry-Ready" "Airport" Parcel, Klamath County, Oregon (Fleming 2004b)	0.3 mile	Negative
19635	A Cultural Resources Inventory of the City of Klamath Falls' Proposed "Industry-Ready" Acquisition of the "WESGO" Parcel, Klamath County, Oregon (Fleming 2004c)	0.8 mile west	Isolates: 4 pre-contact isolates
21221	Cultural Resources Inventory for the Klamath Falls Airport/Kingsley Field, Klamath County, Oregon (Butler et al. 2007)	0.1 mile east	Historical refuse scatter 35KL2909; historical isolate IF-1
22396	Determination of Effect for Proposed Wireless Site KF43, Klamath Falls Airport, Klamath County, Oregon, T. 39S, R. 9E, Sec. 15 (Gray and Tonsfeldt n.d.)	0.8 mile north	Negative
23145	Henley School Waterline Extension Project Cultural Resources Inventory SHPO Case #10-0042 (Smith Gebauer 2010)	0.5 mile east	Negative
23423	Final Report Cultural Resources Evaluation Klamath Falls-Kingsley Field Air National Guard Base, Oregon Air National Guard (Foothills Engineering Consultants 2002)	Adjacent to APE	Buildings and Structures Inventory; historical debris scatter OR-KL-132
24194	Hosanna Christian School Cultural Resources Inventory (Smith Gebauer 2011a)	0.8 mile north	Negative
24536	Kingsley Southgate Cultural Resources Inventory (Smith Gebauer 2011b)	0.6 mile west	Negative
25809	Pacific Connector Gas Pipeline Project Cultural Resources Survey, Coos, Douglas, Jackson, and Klamath Counties, Oregon: 2013 Cultural Resources Addendum (Bowden et al. 2013)	1 mile south	Negative
25962	Cultural Resource Inventory for the Taxiway J Improvements at Kingsley Field, Klamath Falls Airport, Klamath County, Oregon (Shantry and Moret-Ferguson 2013)	0.1 mile east	Negative
26154	Cultural Resources Identification, Evaluation, and Findings Report for Land Disposal of Eight Parcels in Klamath County, Oregon (Nickels 2013)	0.1 mile east	USBR Two barns, the Parker residence, the No. 1 Drain, and Lost River Diversion Channel
26190	Pacific Connector Gas Pipeline Project Cultural Resources Survey, Coos, Douglas, Jackson, and Klamath Counties, Oregon: 2013 Cultural Resources Addendum #2 (Ragsdale et al. 2013)	0.8 mile southwest	Testing and evaluation of sites outside of the APE

Source: SWCA Environmental Consultants (SWCA), Cultural Resource Inventory for Taxiway G Improvements at Kingsley Field, Klamath Falls Airport, Klamath County, Oregon. SWCA Cultural Resources Report No. 14-648. Portland, Oregon.

Table EO-6 : Previously Recorded or Reported Historical, Architectural, Archaeological, and Cultural Resources within 1 Mile of the Taxiway G

Resource No.	Resource Type	Reference	Date/Period of Resource	Distance and Direction from APE
35-KL-2909	Historical debris scatter	De Shazo Khan 2007	1870–1917	0.1 mile northeast
N/A	Old power line	Not recorded, noted in Wilt et al. 1995 survey	1911–1912	0.2 mile northeast
HLF-334	Great Northern Railroad segment	Not recorded, noted in Wilt et al. 1995 survey	1931	0.2 mile east
IF-1	2 historical glass fragments	De Shazo Khan 2007	Pre-WWI	0.3 mile north
HLF-472	USBR 1-C Drain and 1-C-7-Drain	Not recorded, noted in Wilt et al. 1995 survey	1906–1907	0.3 mile northeast
Isolate 1	Six obsidian chunks	Minor 2004	N/A	0.4 mile east
N/A	Two structures	Not recorded, noted in Wilt et al. 1995 survey	Pre-1905	0.4 mile north
35-KL-2893	Historical debris scatter	Hoefer III 2000	1929–1950	0.5 mile west
OR-KL-132	Historical debris scatter	(Foothills Engineering Consultants 2002)	1930s or early 1940s	0.5 mile west
HLF-335	Summers Lane, wagon road to Stukel Ford	Not recorded, noted in Wilt et al. 1995 survey	1870–1889	0.7 mile north
Site One	House and outbuildings	Fleming et al. 2004	1948–1970	0.8 mile west-southwest
Isolate 1	Basalt scraper	Riddle et al. 2004	Pre-contact	0.9 mile west

Source: SWCA Environmental Consultants (SWCA), Cultural Resource Inventory for Taxiway G Improvements at Kingsley Field, Klamath Falls Airport, Klamath County, Oregon. SWCA Cultural Resources Report No. 14-648. Portland, Oregon.

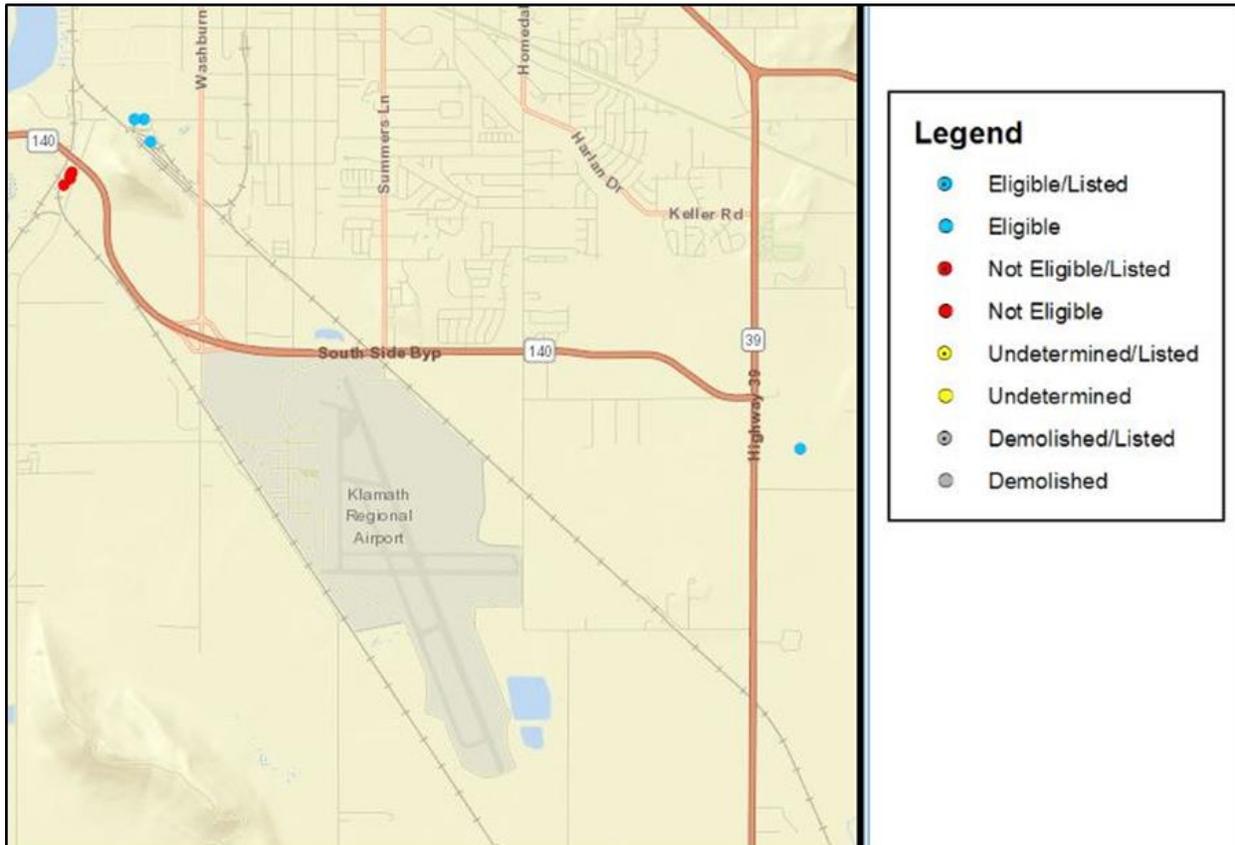
A literature review did not identify previous comprehensive archaeological or cultural resources studies of the Airport property as a whole. While the Airport conducted the studies mentioned above in support of specific projects, these investigations focused on project-specific limits of disturbance and other areas of the Airport have not been studied. The previous studies concluded that due to the extensive disturbance that occurred during previous agricultural activities and airport construction, the overall potential to encounter cultural and archaeological resources within airport boundaries is low. Typically, future Section 106 compliance will include a review of existing studies to identify the needed supplemental studies that need to be performed prior to project approvals and construction; this will be completed for archaeological and cultural resources on a project-by-project basis. Based on project activities and the size and scale of ground disturbance activities, additional archaeological and cultural studies may be required.

8.2 ARCHITECTURAL HISTORY RESOURCES

The Oregon Historic Sites Database (OHSD) identifies existing historic properties in the built environment that have already been identified, evaluated, and listed on the National Register of Historic Places (NRHP) and state register. The OHSD indicated the nearest NRHP-listed properties were more than 1.5 miles east of LMT (see **Figure EO-7, Oregon Historic Sites near LMT**) (32). Section 106 requires additional studies to identify resources that are NRHP-eligible but have not yet been identified. Table EO-6 indicates the presence of other built environment resources that have been considered for their architectural or historical importance. These resources include various buildings (residences, barns, outbuildings) and structures (e.g., railroad bed segments, wagon roads, power lines, drainage features, and channels) on or near the Airport.

Background research indicates the airport was used as a WWII Navy Air Station; therefore, the buildings and structures at the Airport have the potential to be related to historic themes regarding the military and WWII. Below is a summary of the background research.

Figure EO-7 : Oregon Historic Sites near LMT



Source: Oregon Historic Sites Database.

In 1942, the Klamath Falls Municipal Airport was selected for the construction of a U.S. Naval Air Station. Construction was completed in early 1945, but the base operated for less than a year before the end of World War II led to base closure. Most of the facilities were given to the City for use as a general aviation airport; however, certain buildings were maintained by the United States Department of the Interior, Bureau of Reclamation as administrative offices or storage. In 1954 the remaining federally owned property and a portion of the airport previously given to the City was transferred to the United States Air Force (USAF) for use as a Fighter Interceptor complex. In 1980 the USAF transferred responsibility for training at the Airport to the Oregon ANG (14).

Commercial service began at LMT in 1947. The passenger terminal was constructed in 1959. The initial development and use of resources at the Airport for military purposes may represent an important historical theme and require further research to determine its significance at the local, state and national levels following NRHP criteria (14). A literature review and background research did not reveal previous comprehensive architectural history studies of the Airport.

The Airport contains a total of 68 structures, six of which are known to be at least 50 years in age. Research indicates facilities at LMT were constructed for military and/or civilian use during and after the WWII era. Further work is required to evaluate architectural history resources under Section 106.

CONSIDERATIONS

Proposed projects may have the potential to affect NRHP-eligible resources that have not been identified or evaluated yet. The NHPA requires that Section 106 be initiated for federal actions to identify and evaluate resources for NRHP-eligibility, which includes implementation of proposed projects identified in the master plan. Proposed projects in the master plan have the potential to result in the removal of three structures (building No. 9, 10 and 27), and the renovation two others (No. 1 and 7). Several structures at LMT are nearing 50 years of age and will require evaluation to determine their eligibility for inclusion on the NRHP. Buildings and structures that may be 50 years in age at the time of construction must be evaluated to determine whether they are eligible for the NRHP to comply with Section 106 and NEPA.

As proposed projects are identified, the FAA will initiate Section 106 review under the NHPA, which includes four general steps:

- ▶ **Step 1:** Consultation with the State Historic Preservation Office (SHPO), federally recognized tribes and Tribal Historic Preservation Officers (THPO);
- ▶ **Step 2:** Delineating an Area of Potential Effects (APE);
- ▶ **Step 3:** Identifying and evaluating historic properties within the APE (i.e. those eligible for the NRHP); and
- ▶ **Step 4:** Assessing and resolving adverse effects of the proposed project on historic properties.

Typically, Section 106 will include a review of existing cultural resource studies to identify the supplemental resource studies that need to be performed prior to project approvals and construction. The results of the studies will be used to determine, in consultation with the SHPO/THPO(s) and other consulting parties, whether proposed airport improvements would result in an adverse effect on historic properties. If so, then the FAA will continue consultation with the SHPO/THPO(s) to consider ways to avoid, minimize, or mitigate the project's adverse effects on historic properties per 36 CFR Part 800.6, Resolution of Adverse Effects.

9. LAND USE

Although LMT is located within incorporated city boundaries, it is surrounded by unincorporated land that is under the jurisdiction of Klamath County. The City and the Military are responsible for on-airport uses. The City and Guard are required to coordinate with the Klamath County. The City and County have undertaken a Joint Land Use Study (JLUS) to reduce potential conflicts between a military installation and surrounding areas while accommodating new growth and economic development, sustaining economic vitality, and protecting the general public's health and safety without compromising the operational missions of the installation.

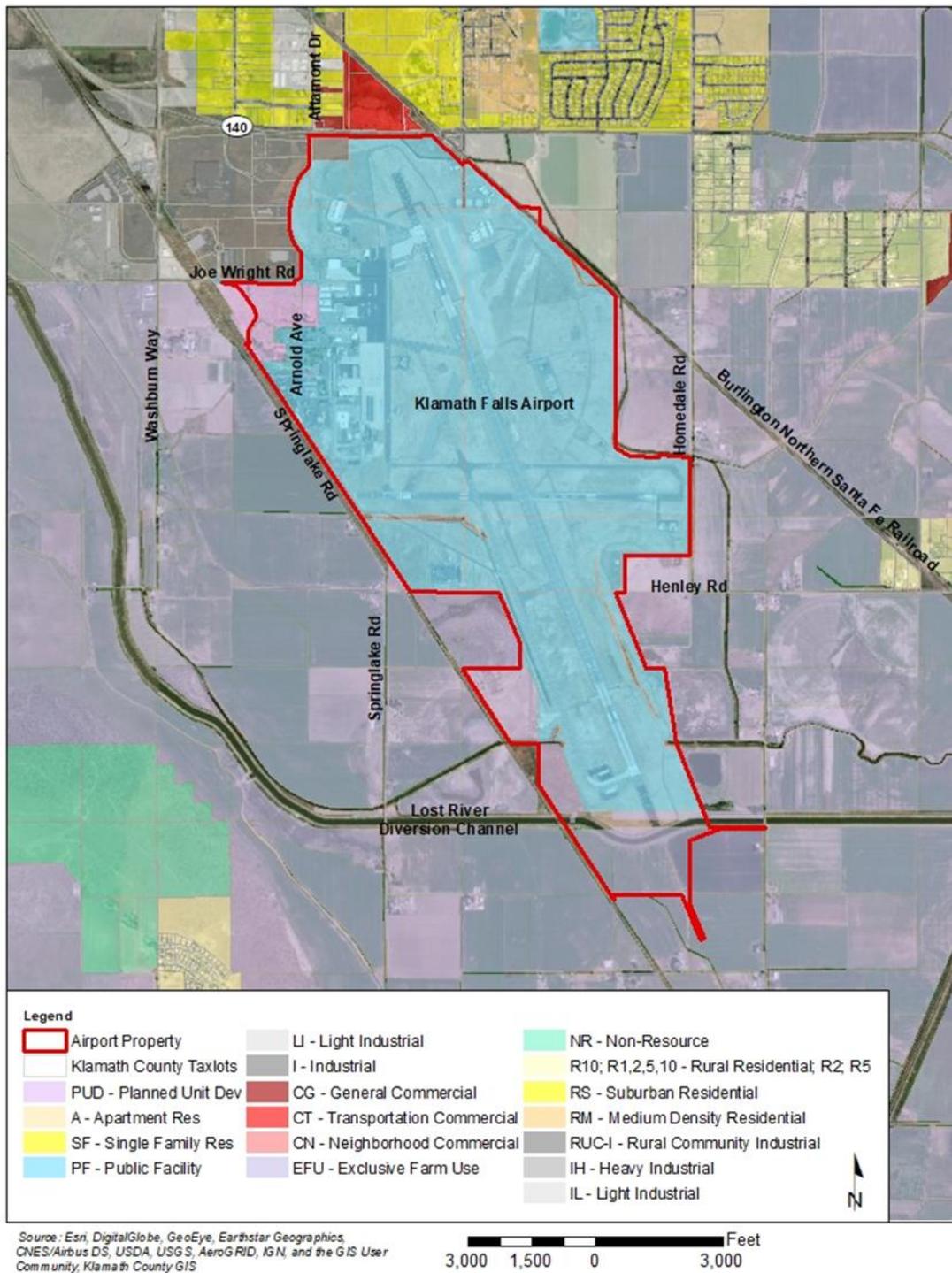
9.1 CITY OF KLAMATH FALLS

As shown on City's Land Use Map (**Figure EO-8, *City of Klamath Falls Land Use Diagram***) and in the City's 1981 Comprehensive Plan, LMT is designated for public facility use (i.e., public or quasi-public facilities generally used by government, non-profit organizations, or large numbers of persons) (15).

Although the City's zoning map also identifies LMT Public Facility development, the Airport is further designated for Planned Unit Development (PUD) (see **Figure EO-9, *City of Klamath Falls Zoning Map***). According to Zoning Ordinance No. 12.-02, "The purpose of the PUD is to provide a master plan for the layout of uses in the Klamath Falls Airport. It is intended to allow for a diversity of uses related directly to the operations of the airport and those complimentary uses that support and enhance the functioning of the airport" (see **Figure EO-10, *Planned Unit Development Diagram for LMT***).

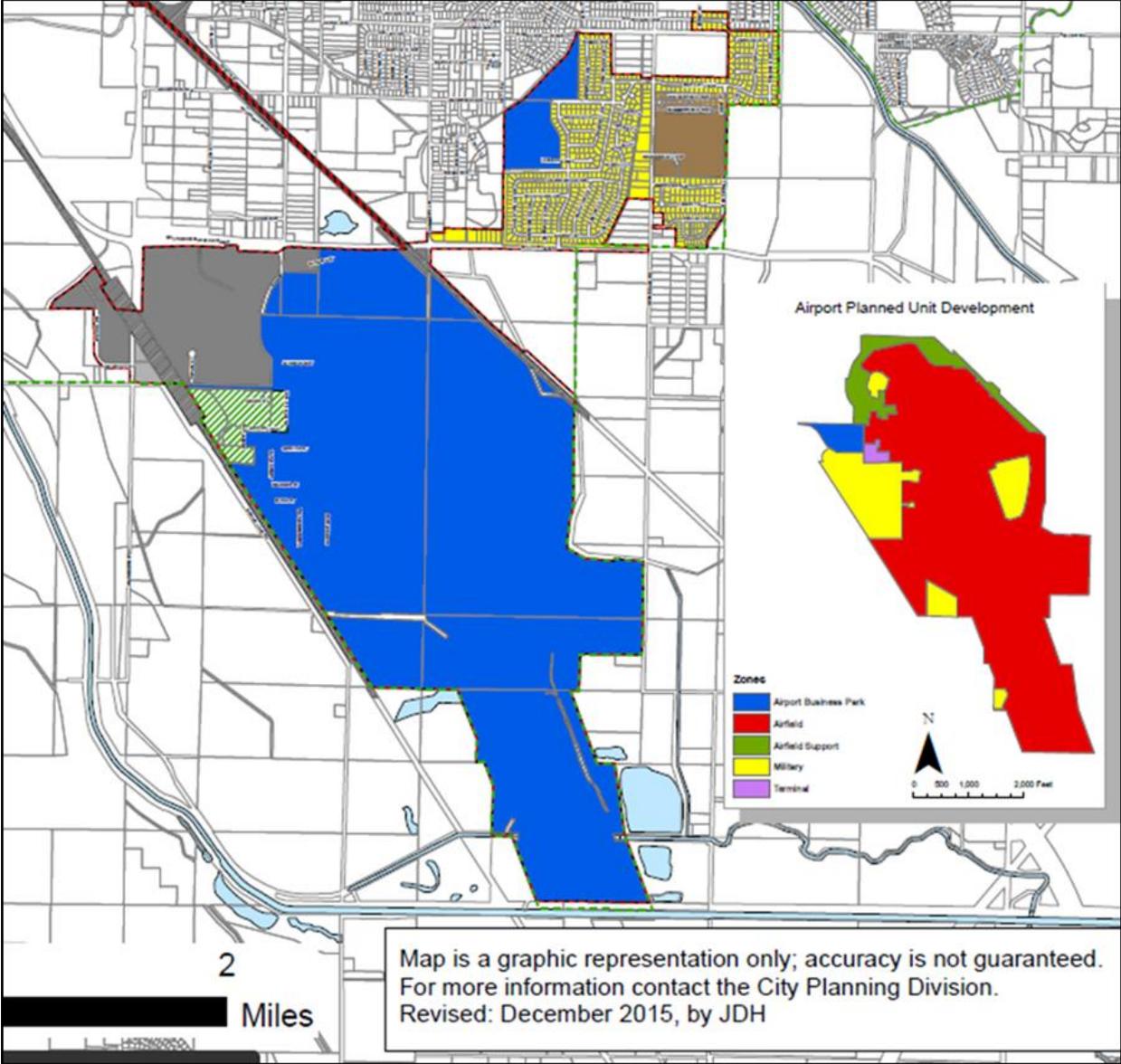
The PUD development ordinance also specifies that land uses must be developed in accordance with the PUD Diagram and in conformance with applicable sections of the City of Klamath Falls Community Development Ordinance associated with: Airfield, Airfield Support, Military, or Terminal use. The ordinance identifies a specific set of permitted uses and requirements for PUD campuses including, but not limited to, such items as building size, heights and lot coverage, parking, signage and circulation.

Figure EO-8 : City of Klamath Falls Land Use Diagram



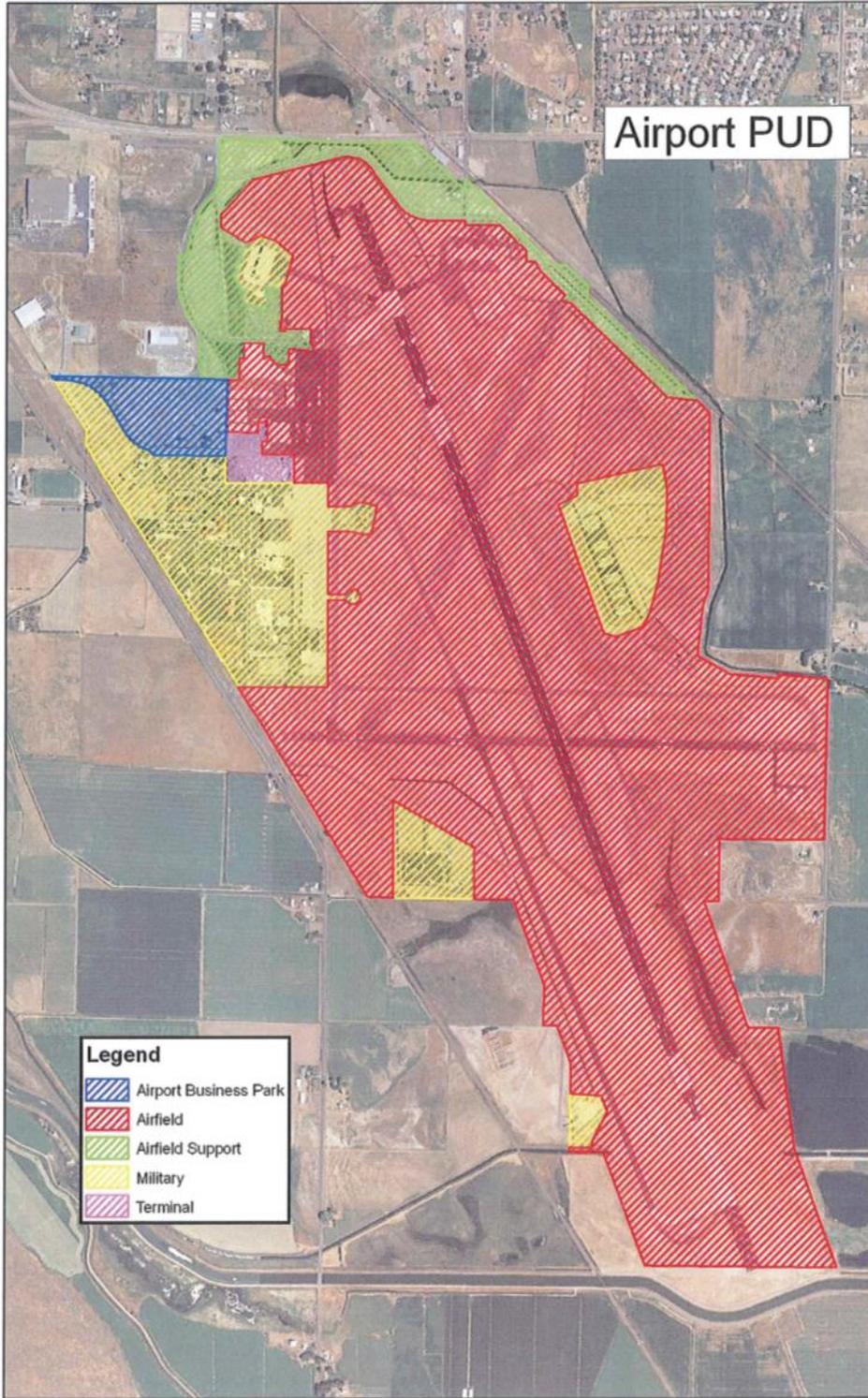
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community, Klamath County GIS

Figure EO-9 : Figure EO-9: City of Klamath Falls Zoning Map



Source: Mead & Hunt 2018

Figure EO-10 : City of Klamath Falls Planned Unit Development Diagram for LMT



Source: City of Klamath Falls, Ordinance 12-02.

9.1.1 Airport Overlay Zone

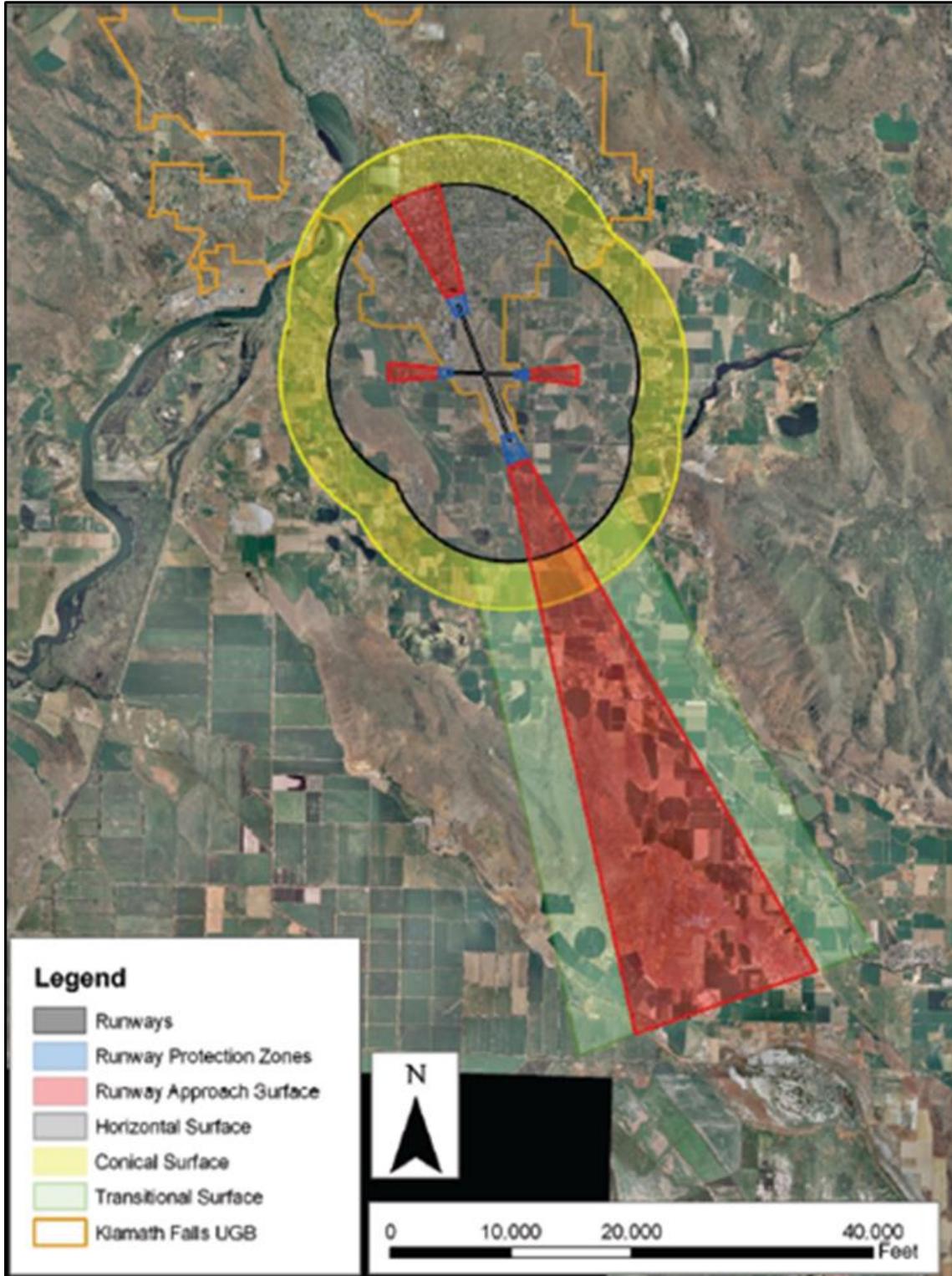
The State of Oregon acknowledges the importance of the aviation industry and the concerns posed to airport operators as a result of incompatible land uses. The State of Oregon Department of Aviation prepared an *Airport Land Use Compatibility Guidebook* (Guidebook), which provides tools, techniques, and recommendations to enhance safety through compatible land use (16).

The City of Klamath Falls adopted an Airport Safety Hazard Prevention and Overlay Zone (ASHPO) in 2009 in accordance with the Department of Aviation's Zoning Ordinance 12.600. The goal of the ordinance is to promote land use compatibility in accordance with federal and state statutes. The ASHPO identifies specific geographic areas that can be affected by aviation and provides specific guidance when considering proposed land use within these geographic areas. The areas identified in the guidance include:

- ▶ **Airport Hazard Zone.** The Airport Hazard Zone identifies the geographic area associated with airspace protection as defined by Federal Aviation Regulation (FAR) Part 77, Safe, Efficient Use, and Preservation of the Navigable Airspace (Figure EO-11, Hazard Zone Map). To comply with FAR Part 77, areas included in the Airport Hazard Zone may be subject to additional height limitations.
- ▶ **Airport Impact Area.** The Airport Impact Area Map identifies the geographic area that may be subject to land use restrictions or other limitations based on the presence of runway protection zones, FAR Part 77 surfaces, or safety risks to persons living or working near LMT. Paragraph 12.615 of the zoning ordinance includes a list of allowable land uses and limitations and restrictions on allowed uses based on guidance set forth in the Department of Aviation's Guidebook (Figure EO-12, Airport Impact Area).
- ▶ **Airport Needs Map.** The City recognizes that additional property may be necessary to avoid the development of incompatible land uses in the future and to support a logical pattern of airport growth. Paragraph 12.650 of the zoning ordinance includes a map that identifies adjacent property that may be needed to meet these goals and recommends that property be identified in subsequent airport master plans (Figure EO-13, Airport Needs Map).
- ▶ **Airport Noise Impact Boundary.** The overlay zone recognizes that exposure to aircraft noise is a primary concern when considering the compatibility of proposed land use near the airport. Noise and land use compatibility are discussed in Section 11, Noise.

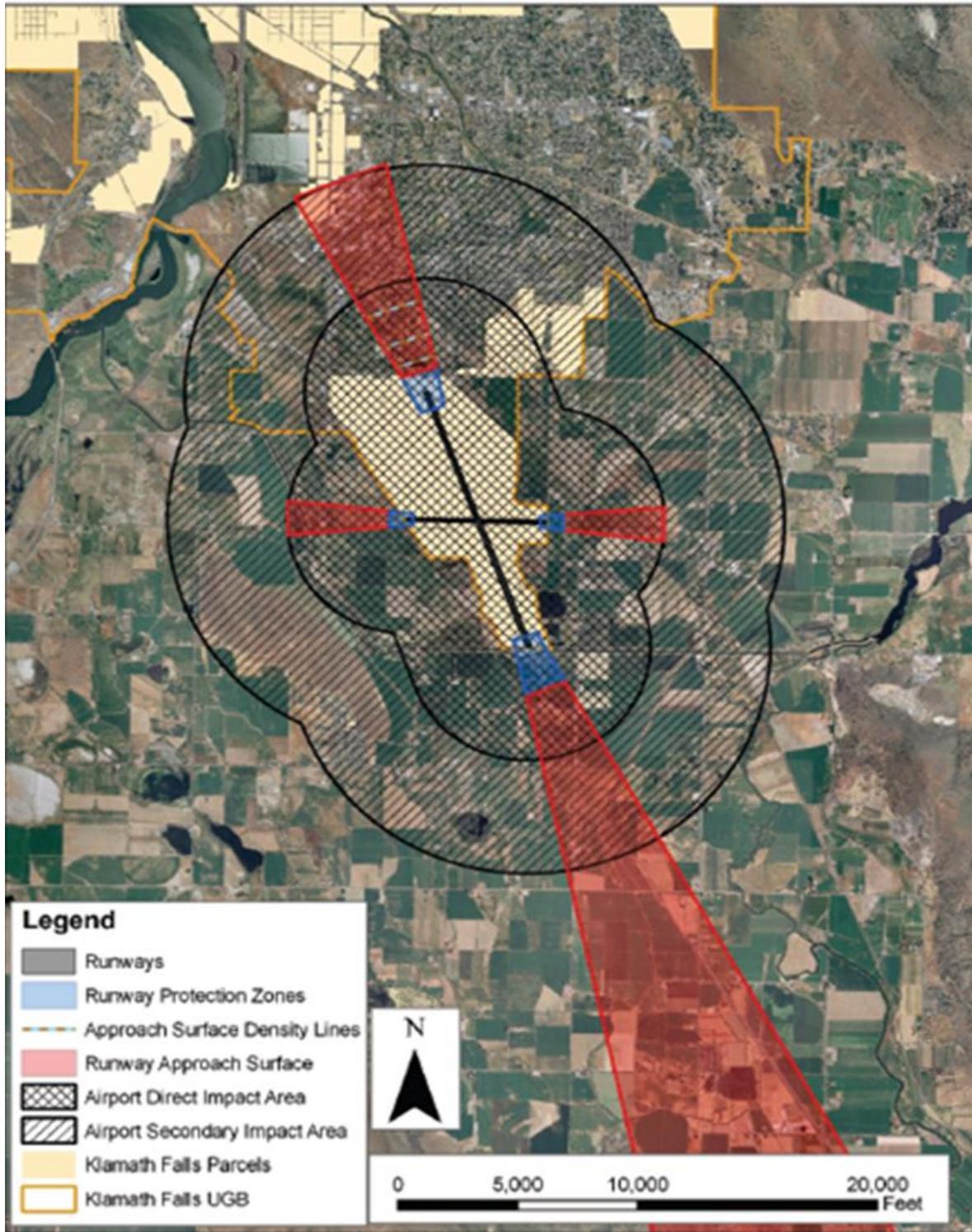
The City intends to update the ASHPO to reflect the future development and land acquisition proposals of this Master Plan update.

Figure EO-11 : Hazard Zone Map (Imaginary Surfaces)



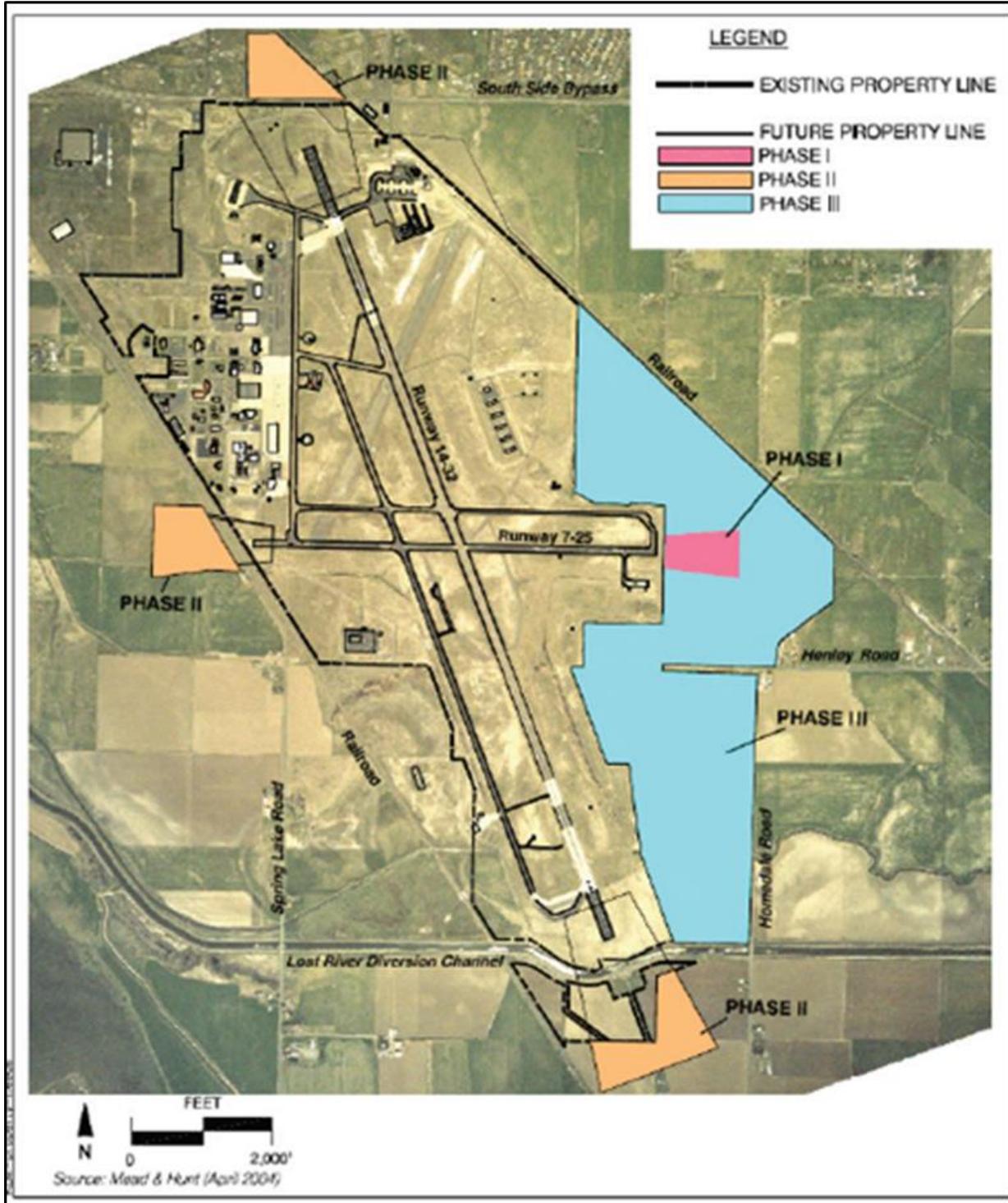
Source: City of Klamath Falls Ordinance 12.600

Figure EO-12 : Airport Impact Area (Areas Subject to Land Use Restrictions and Limitations)



Source: City of Klamath Falls Ordinance 12.600

Figure EO-13 : Airport Needs Map



Source: City of Klamath Falls Ordinance 12.600

9.1.2 Klamath County

Goal 2, Land Use Planning, of the *Comprehensive Plan for Klamath County, Oregon*, states that “City, county, and special district plans and actions related to land use shall be consistent with the Comprehensive Plans of cities and counties and regional plans adopted under Oregon Revised Statutes (ORS) 197.705 through 197.795.” As such, the County’s Comprehensive Plan also designates LMT for Public Facility uses (see **Figure EO-14, Klamath County Zoning Map**).

Land Use Goal 2, Policy 6 states that “Zoning shall be consistent with the land use map.” As shown on **Figure EO-14, Klamath County Zoning Map**, the agricultural uses adjacent to all but the north side of LMT have been assigned an implementing zone designation of Exclusive Farm Use-Cropland (EFU-C), which coincides with the agricultural land use designation associated with that area. Land use north of LMT also coincides with existing land use designations.

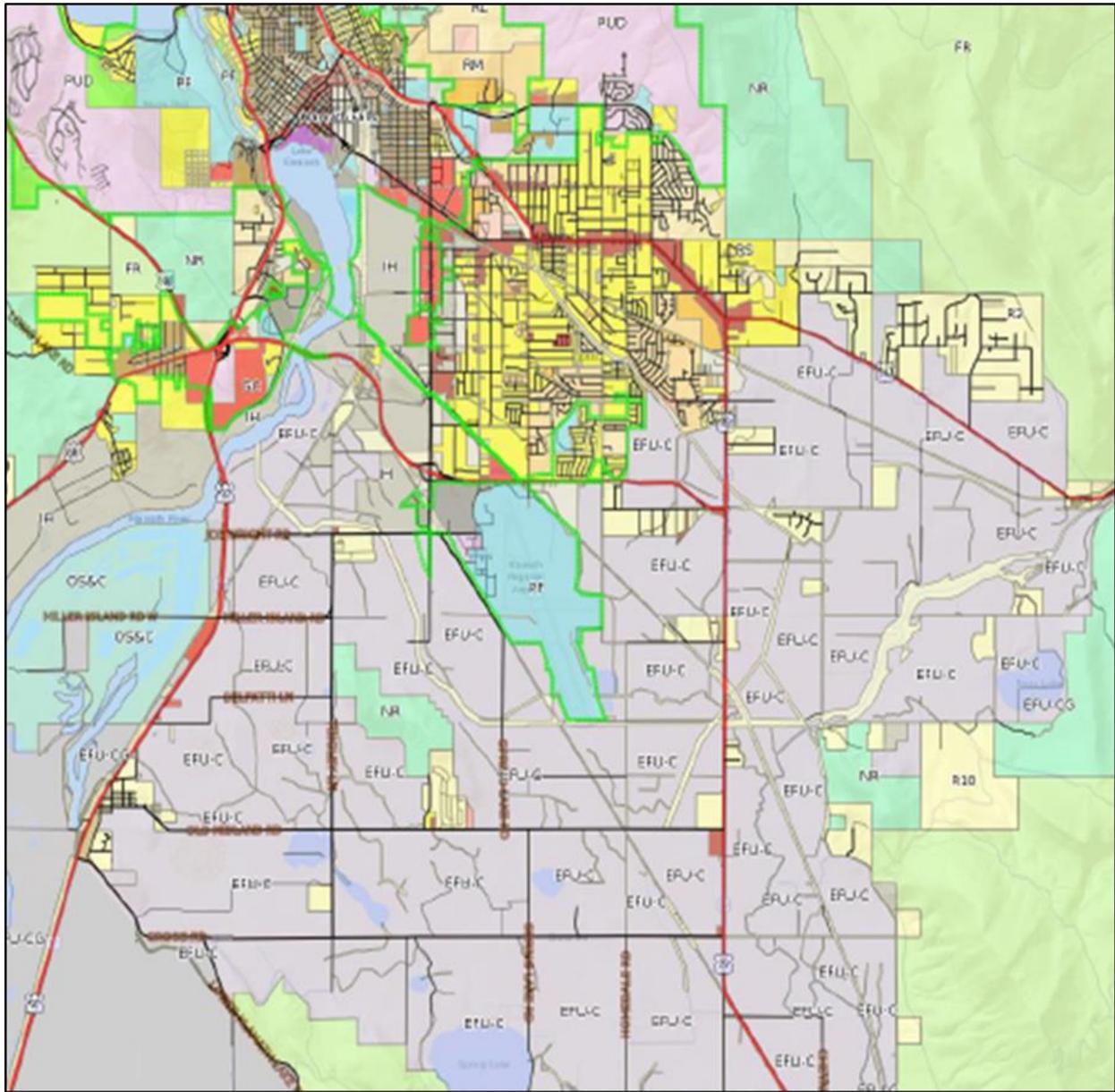
The City’s Airport Overlay Zone is extraterritorial, indicating that the land use policies presented in the overlay zone also apply to unincorporated county areas. The County’s Comprehensive plan is consistent with the City’s airport overlay zone (18). Specific policies that promote consistency include:

- ▶ Goal 7, Areas Subject to Natural Disasters and Hazards, identifies areas subject to natural disasters and hazards and seeks to “avoid the development of incompatible hazards in these areas.”
- ▶ Goal 7, Policy 5 states that “Areas of airport hazards will be kept free of development which increases the danger to human life, which poses a safety hazard to air traffic.”
- ▶ Additional comprehensive plan policies related to land use, noise exposure, and transportation are also consistent with the Airport Overlay Zone.

CONSIDERATIONS

To achieve NEPA compliance, potential land use conflicts must be identified and disclosed as well as the extent to which the City would need to reconcile the proposed action with the applicable land use plan. Pursuant to state laws and guidance, the City would be required to amend its Airport Overlay Zone to address potential changes to airfield configuration. The City would also be required to consider the consistency of proposed plans with the land use compatibility recommendations and policies presented in the JLUS following adoption.

Figure EO-14 : Klamath County Zoning Map



Source: Klamath County Comprehensive Plan, 2010 Amendment

10. NATURAL RESOURCES AND ENERGY SUPPLY

Proposed airport projects have the potential to increase the amount of energy required to operate the Airport, including fuel and power consumption. CEQ Regulations require federal agencies to consider the energy requirements and natural resource requirements associated with proposed projects. To do so, project sponsors must identify:

- ▶ The suppliers of energy resources found in the area, such as power plants, water utilities, sewage disposal utilities, and suppliers of natural gas and petroleum.
- ▶ The amount of other resources such as water, asphalt, aggregate, and wood used in the construction, operation, and maintenance of a project and where the suppliers are located.

Table EO-7, *Airport Utilities*, summarizes existing available utilities near the Airport (19).

Considerations

Pursuant to FAA guidance, proposed master plan projects will consider the highest standards, including principles of sustainability. Each project will identify connections to existing utilities, infrastructure, and energy supplies; will be evaluated for its potential to use energy requirements and depletable natural resources; and will identify whether adequate materials are available for construction.

Table EO-7 : Airport Utilities

Utility	Provider	System / Capacities / Remarks	Condition / Deficiencies
Electric Power	PacifiCorp	All lines are underground, except for the portion running along the west boundary (Spring Lake Road). The east side is supplied from the Hornet Substation south of Keller Road and west of Hwy 39 from Summers Lane. The west side is supplied from the substation north of Laverne Avenue and west of Washburn Way via Joe Wright Road.	No known deficiencies. The existing power on the East side of the airport is the most distant circuit from the Hornet Substation. Future development with high power loads may require upgrades to transformers, the substation, or conductors.
Water	City of Klamath Falls	The west side of the airport is served by a 16-inch ductile iron main running along Joe Wright Road. The east side is served by a 12-inch PVC main running along the Southside Expressway near Summers Lane, then along Brett Way and paralleling the railroad right of way to the air traffic control tower. An 8-inch PVC main continues east and then south along Homedale Road to the Agriculture Operations area near Homedale Road/Henley Road intersection.	Future airport development may require main or service extensions.
Sanitary Sewer	City of Klamath Falls	Sewage gravity drains from the west portion of the airport to the Oregon ANG lift station and then pumped to the KFI lift station located at the intersection of Altamont Drive and the Southside Expressway. The east side of the airport gravity drains via a 12-inch PVC main to the Wings Way lift station and is pumped to an 18-inch gravity main on the Southside Expressway, which then gravity drains to the KFI lift station.	Future airport development may require gravity main extensions.
Gas	Avista Utilities	The east side is supplied by a 2-inch main via Summers Lane. The west side of Airport is supplied by a 6-inch main extending from Washburn Way and Joe Wright Road to supply buildings on the west side of the airport.	The south east side of the airport along Homedale Drive is not equipped gas service. Both gas mains are high pressure (60 psi) and should be adequate for future development. The 2-inch main may not be adequate for high demand industrial use.
Stormwater Systems	City of Klamath Falls	Storm runoff drains to Klamath Irrigation District (KID) ditches, and eventually to the Lost River Diversion Canal.	No known deficiencies.
Solid Waste Removal	Waste Management	Trash service is provided by Waste Management.	No known deficiencies.
Communications	Hunter Communications	The west side of the airport has existing communications infrastructure stubbed to the intersection of Altamont Drive and Joe Wright Road. Future communications could be extended via an easement from that intersection northerly to the east side of the airport. An alternative would be extending from Summers Lane south to Brett Way and then easterly.	There is limited or no communications service to the north or east sides of the airport.
	Charter	Charter has fiber optic service to the north side of the railroad on Summers lane.	Extension to the airport boundary would require crossing under the railroad along the west side of Summers lane.
	Century Link	Century Link has fiber optic and phone service to the west side of the airport via Altamont Drive or Joe Wright Road. Phone service is supplied to the Forest Service air tanker base in the northeast corner of the airport.	Century Link has existing conduit to the Forest Service via Summers Lane and could extend fiber optic service to that location within their existing conduits.

Source: Adkins Consulting, 2018.

11. NOISE AND NOISE-COMPATIBLE LAND USE

Noise is often the predominant aviation environmental concern of the public. The FAA provides compatible land use guidelines for a variety of land uses in 14 CFR part 150, *Land Use Noise and Noise-Compatible Land Use*.

Aircraft Noise Exposure is addressed in the City of Klamath Falls' Airport Overlay Zone (see **Figure EO-15, Aircraft Noise Exposure**), and this map will be reflected in the forthcoming *Kingsley Field Joint Airport Land Use Study (JLUS)* (11). As previously mentioned, the JLUS is a planning process that focuses on identifying compatible land uses and growth management guidelines within, and adjacent to, active military installations (11). The JLUS identifies the relationship between the City's Zoning Map and the areas exposed to aircraft noise (see **Figure EO-16, City of Klamath Falls Zoning and Noise Contours**).

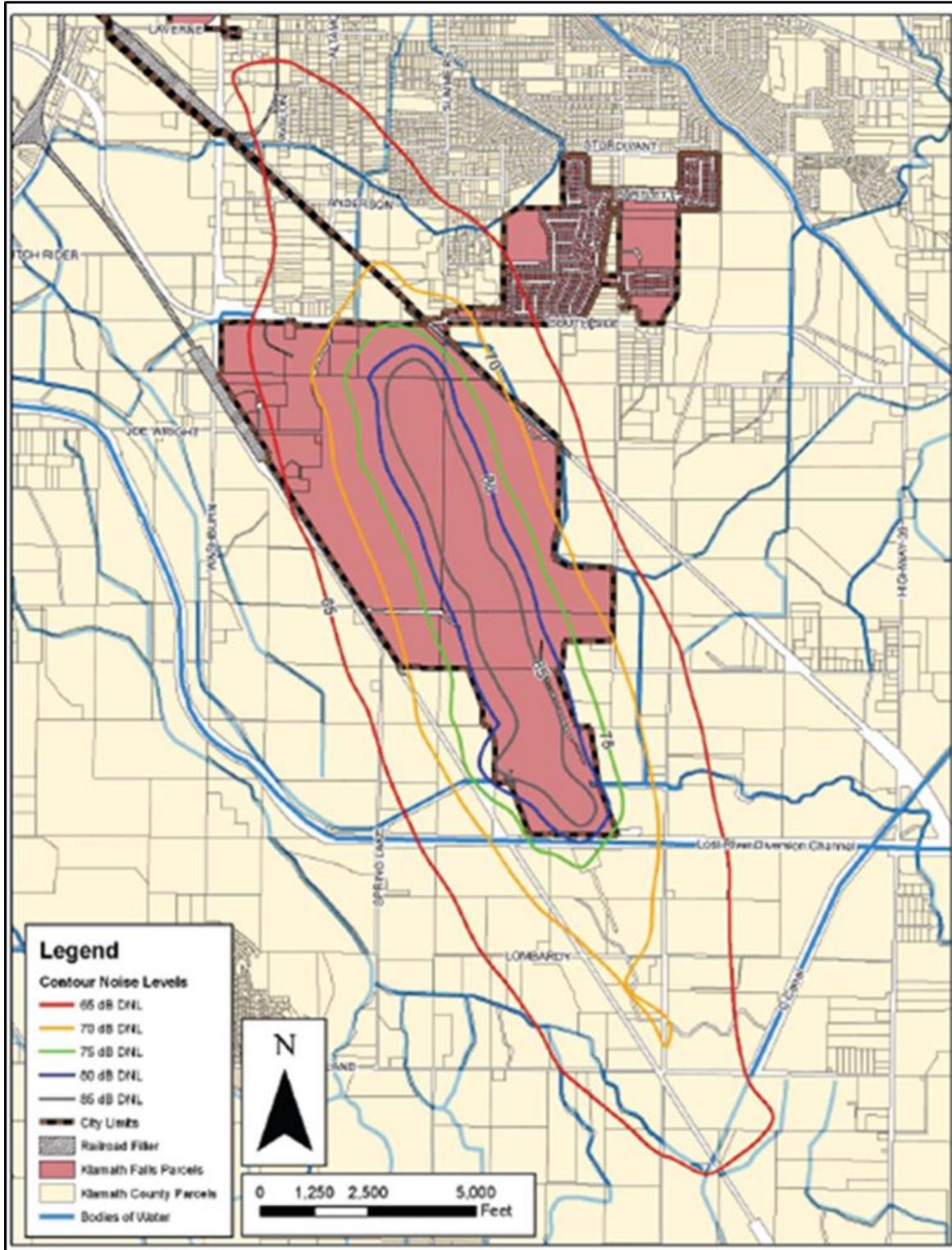
CONSIDERATIONS

A proposed action that affects the configuration of an airfield, such as a change in runway length, taxiway location or configuration, or engine run-up areas, can affect the extent and location of areas subject to aircraft noise exposure. Proposed projects can cause temporary increases in ambient noise during construction.

The FAA identifies a significance threshold for noise in Order 1050.1F, *Environmental Desk Reference* (2). According to FAA Order 1050.1F, a significant noise impact would occur if:

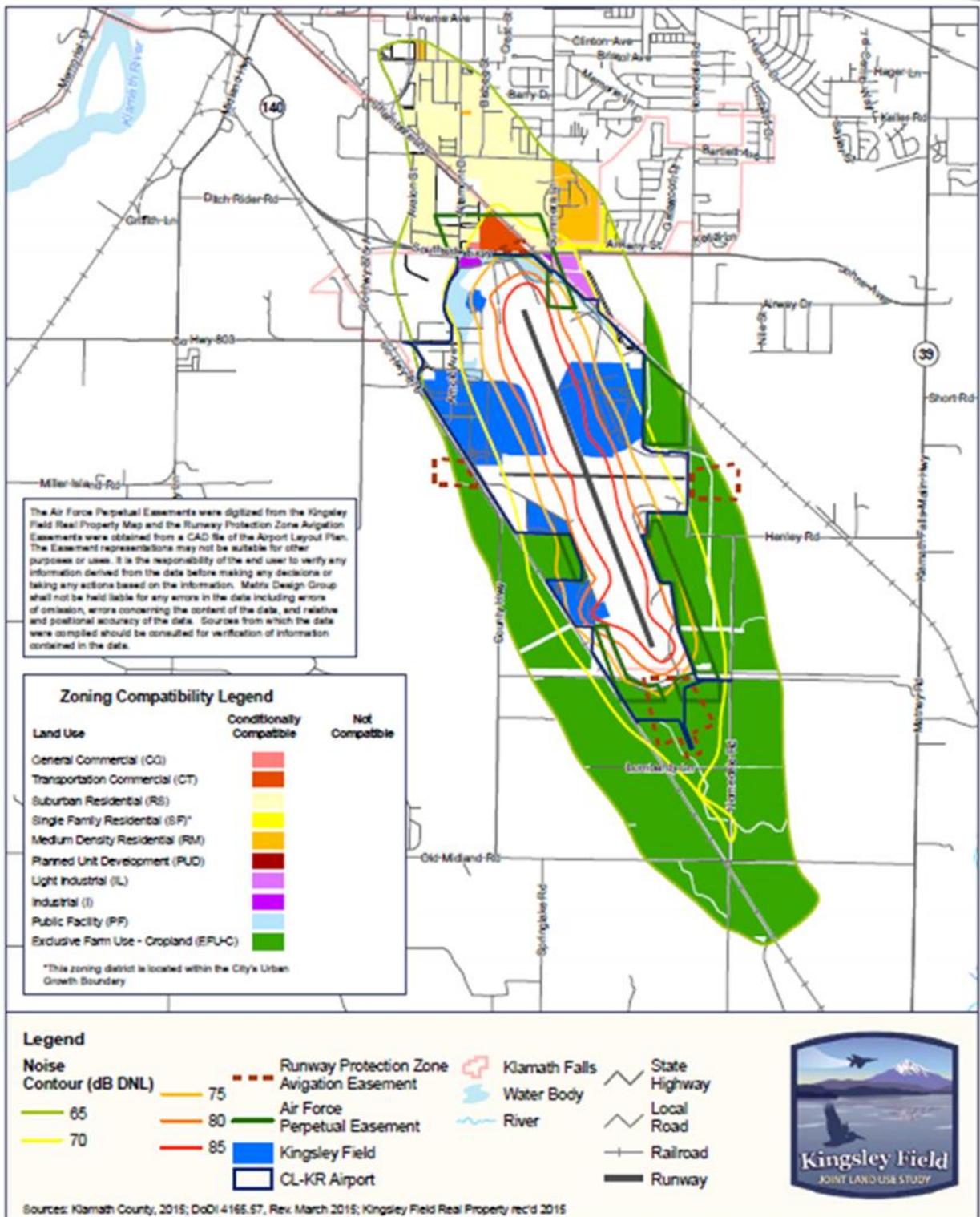
- ▶ A proposed action would increase noise by 1.5 dB Day-Night Average Sound Level (DNL) or more for a noise-sensitive area that is exposed to noise at or above the 65 dB DNL. For example, an increase from 65.5 dB to 67 dB DNL would be considered a significant impact.
- ▶ A proposed action will increase noise exposure above the DNL 65 dB level due to a DNL 1.5 dB or greater increase when compared to the noise exposure that would occur for no action alternative during the same timeframe. For example, an increase from DNL 63.5 dB to 65 dB would be considered a significant impact.
- ▶ Future Oregon ANG operations at LMT, could increase the area affected by exposure to noise from military aircraft, such as the potential beddown of an Adversary Air squadron or changes in the fleet mix. The 2018 Installation Complex Encroachment Management Plan Action Plan (ICEMAP) prepared for the Oregon ANG recommends that the 173rd Fighter Wing complete noise modeling as part of the Adversary Air squadron beddown to address the change in operations. The noise modeling could be included in a future Air Installation Compatible Use Study (AICUZ) (35). The revised data would be available to the City of Klamath Falls for future revision of its ASHPO and for use by both the City and County during future land use planning activities.

Figure EO-15 : Aircraft Noise Exposure



Source: City of Klamath Falls Airport Overlay Zone.

Figure EO-16 : City of Klamath Falls Zoning and Noise Contours



Source: Draft JLUS for Kingsley Field, Figure 5.10-2.

12. SOCIOECONOMICS, ENVIRONMENTAL JUSTICE, AND CHILDREN'S ENVIRONMENTAL HEALTH AND SAFETY RISKS

12.1 SOCIOECONOMICS

The potential effects of proposed airport projects can extend to nearby neighborhoods and communities to cause direct or indirect socioeconomic impacts. The principal social impacts that should be considered during project analyses include those associated with relocation or other community disruption, transportation, planned development, and employment. Proposed master plan projects, especially projects that would extend beyond current airport boundaries, could cause the relocation of residents or businesses, disrupt an established community, affect transportation patterns, or conflict with off-site development plans or land uses. Project implementation may also affect employment by creating temporary or permanent jobs associated with airport development or by relocating jobs to another location.

Considerations

To achieve NEPA compliance, proposed master plan projects must be evaluated for their potential to create temporary or permanent socioeconomic effects. Although socioeconomic impacts are unlikely, the NEPA analyses performed prior to FAA approvals will address the potential for proposed projects to cause temporary or permanent direct and indirect effects to off-site businesses, residents and neighborhoods, and employment.

12.2 CHILDREN'S ENVIRONMENTAL HEALTH AND SAFETY RISKS

NEPA requires project sponsors and federal agencies to consider environmental health risks and safety risks that may disproportionately affect children and to ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks. Children's Health and Safety Risks are generally risks that would be attributable to products or substances children are likely to encounter or ingest through air, food, drinking water, recreational waters, soil, or other products that children might use or to which they might be exposed. The Hosanna Christian Academy is located 0.6 miles northwest of the airport, and Brixner Junior High School is located about 1 mile northwest of the airport. In addition, Little League baseball fields are located approximately 200 feet from the airport's northern boundary

Considerations

Proposed master plan projects have the potential to create temporary and permanent impacts to air quality, soil, and water. Environmental studies will be performed to identify potential project-related effects to air quality, water quality, and other resources in accordance with NEPA, and the results of these analyses will be used to determine whether any project-related environmental impacts have the to cause direct and indirect effects to children.

12.3 ENVIRONMENTAL JUSTICE

Environmental justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people should bear a disproportionate share of the negative environmental consequences resulting from industrial, governmental, and commercial operations or policies. Meaningful Involvement means that people have an opportunity to participate in decisions about activities that may affect their environment and/or health.

Pursuant to Executive Order 12898 *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* and the FAA's implementing guidance, project sponsors must consider whether a proposed action could cause disproportionately high and adverse effects on low-income or minority populations. Demographic information for Klamath County is presented in **Table EO-8, Summary of Demographic Data for Klamath County, Oregon.**

Table EO-8 : Summary of Demographic Data for Klamath County, Oregon

Demographic	Data
Total County Population	66,935
White	88.60%
Black or African American	1.00%
American Indian and Alaska Native	4.90%
Asian	1.20%
Native Hawaiian and Other Pacific Islander	0.20%
Two or More Races	4.20%
Hispanic or Latino	13.10%
White (Non-Hispanic)	77.80%
Total number of Households	27,084
Persons per household	2.39
Percent persons in poverty	19.00%

Source: U.S. Census Bureau, Klamath Falls, Oregon (Population estimates, July 1, 2017)

CONSIDERATIONS

If potential impacts are identified in association with the preferred alternative, further analysis will be performed to determine whether those impacts could disproportionately affect minority or low-income populations.

- ▶ If environmental justice communities are identified that could be affected by proposed master plan projects, the City will make a concerted effort to reach out those communities to provide meaningful involvement early in the NEPA analysis.
- ▶ If potential environmental impacts would occur in association with proposed master plan projects, the City will perform further analysis to determine whether project-related impacts have the potential to disproportionately affect minority or low-income populations.

13. VISUAL EFFECTS (LIGHT EMISSIONS/VISUAL RESOURCES)

Visual effects refer to the extent to which a project would emit light that creates annoyance or interferes with other activities, contrasts with or detracts from visual resources, or affects the visual character of the existing environment.

13.1 LIGHT EMISSIONS

Light emissions include any light that originates from a light source into the surrounding environment. Airport light emissions include airfield and apron floodlighting, navigational aids, airport structures, parking facilities, and roadway lighting. Proposed master plan projects could introduce new light sources associated with new structures, roadways, and aviation facilities.

Considerations

New or relocated light sources have the potential to affect nearby visual receptors. Sensitive visual receptors include nearby residents on adjacent agricultural parcels and residents north of Highway 140. Potential light emissions associated with proposed airport projects have the potential to increase light exposure to nearby residents. Prior to approval of the ALP or near-term project approvals, the City will consider the potential impact of temporary construction lighting and permanent project-related lighting on adjacent properties, specifically nearby residences. To avoid and reduce potential effects, project designs will incorporate mitigation measures, such as light shields and downward facing lights to avoid impacts to off-site visual receptors.

13.2 VISUAL RESOURCES AND CHARACTER

Visual resources include buildings, cultural properties, and other natural or constructed landscape features that are visually important or have unique characteristics. LMT is situated near the eastern slopes of the Cascade Mountains and South of Upper Klamath Lake. Landmarks in the region include Mount Shasta and Crater Lake. The Airport and the City of Klamath Falls are surrounded by a pristine landscape of national

forests, mountains, marshes, and lakes that is well known for its abundance of diverse wildlife and its role as an important staging area for migratory birds. The areas immediately adjacent to the east, south, and west of the airport are characterized by farmland with open water ponds and basins. Although some open space is present north of the airport (south of the railroad line), the area north Highway 140 is characterized by suburban residential development.

Considerations

The Klamath County Comprehensive plan designates the airport as a Public Facility (PF). The implementation of master plan projects is unlikely to create visual contrast with existing facilities as they would remain within the visual context of an airport and other industrial uses. The implementation of proposed master plan projects will not obstruct views of nearby terrain or landforms.

14. WATER RESOURCES

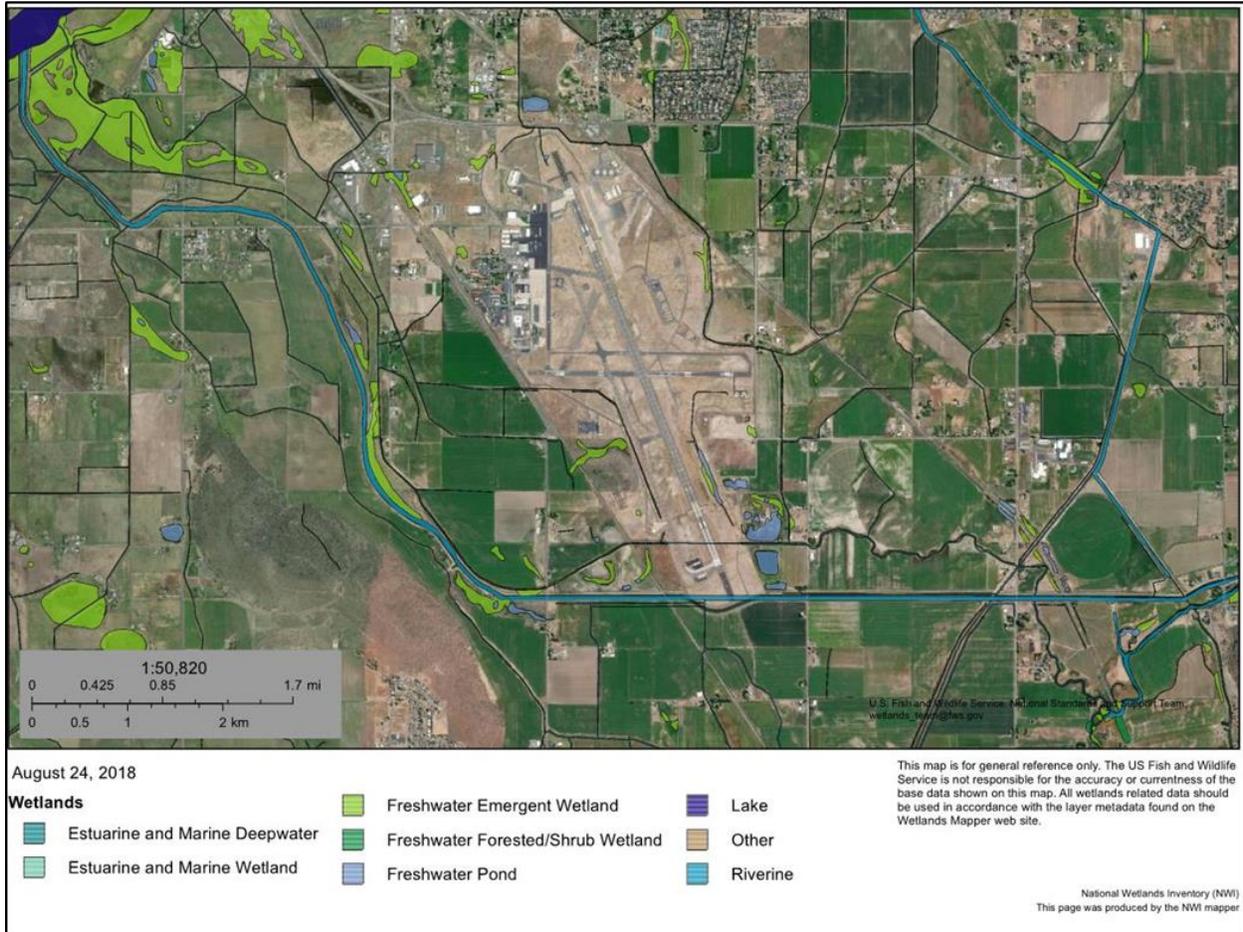
14.1 WETLANDS

Wetlands are protected under the Clean Water Act, Section 404, which requires a project applicant to obtain a permit from the U.S. Army Corp of Engineers (Corps) or authorized state for the discharge of dredged or fill material into waters of the United States. Executive Order 11990 directs Federal agencies to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands. Oregon's Removal-Fill Law (ORS 196.795-990), enacted in 1967, was created to ensure protection and the best use of Oregon's water resources for home, commercial, wildlife habitat, public navigation, fishing, and recreational uses. The Oregon Department of State Lands (DSL) is responsible for developing and maintaining the Statewide Wetlands Inventory (SWI). The inventory consists of the Local Wetlands Inventory (LWI), the National Wetlands Inventory (NWI), and DSL-approved wetland delineation mapping (22, 23).

The NWI map identifies freshwater emergent wetlands in the southern portion of the airport and adjacent to the eastern airport boundary (see **Figure EO-17, National Wetlands Inventory Map**). Freshwater ponds are identified adjacent to the airport's eastern and northern boundaries (22). No additional wetlands at LMT were listed on the LWI (23). (NWI maps provide an overview of potential resources for planning purposes. The presence and extent of these resources require confirmation through the performance of a wetland delineation.)

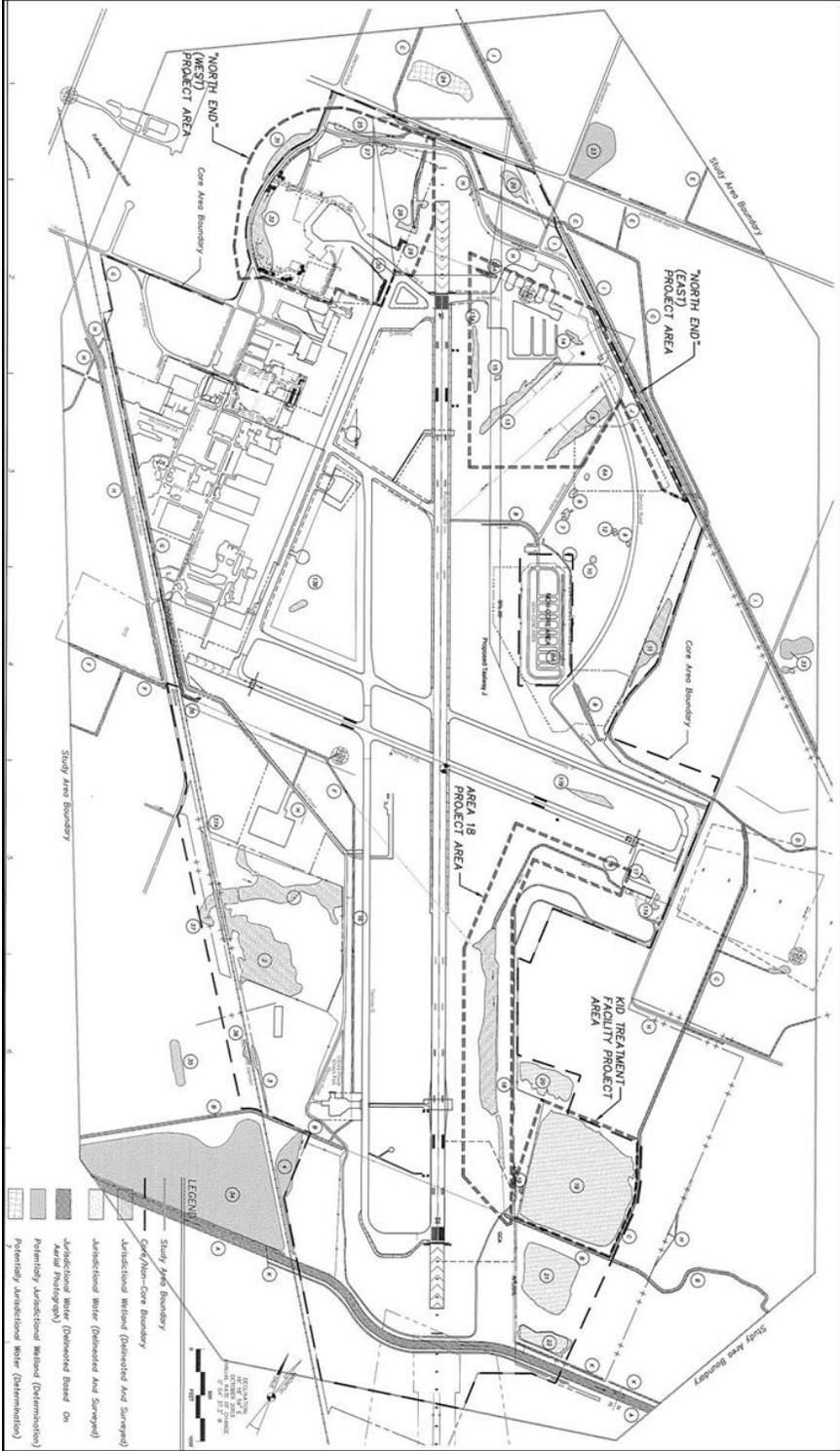
The City/Airport undertook a wetland delineation at the airport in 2006, in accordance with protocols set forth by the Corps (25), which includes several jurisdictional wetlands in the southern portion of the airport (see **Figure EO-18, 2006 LMT Wetland Delineation**).

Figure EO-17 : LMT Wetlands Inventory



Source: U.S. Fish and Wildlife Service

Figure EO-18 : 2006 LMT Wetland Delineation



Source: W & H Pacific, 2006.

Considerations

The FAA is the lead Federal agency under NEPA and is the lead for actions under its jurisdiction, including those that have the potential to affect jurisdictional wetlands and waters of the U.S. Otherwise, the Corps serves as the lead Federal agency when a proposed action has the potential to affect jurisdictional wetlands and waters of the U.S.

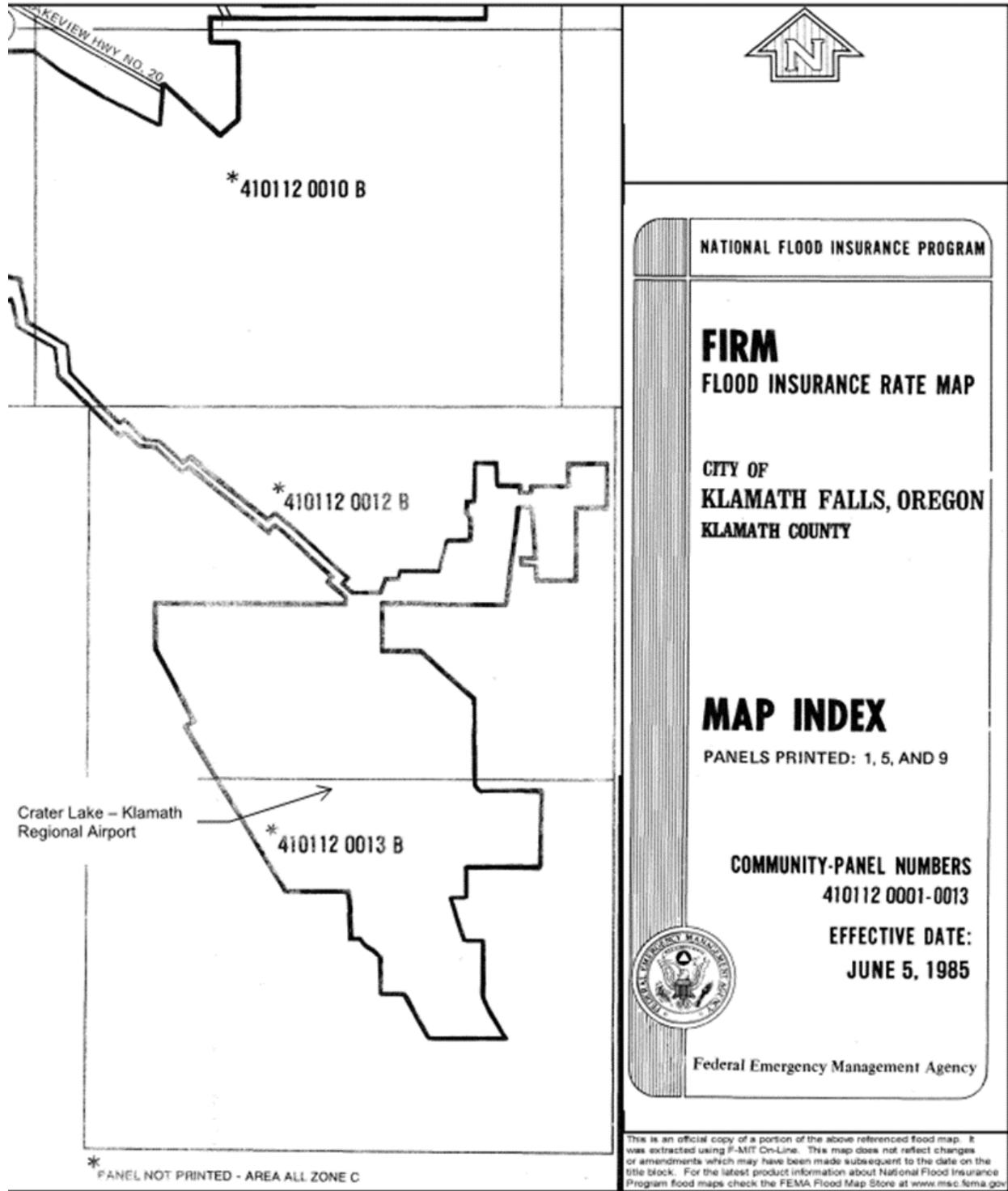
Wetland areas were identified at LMT during a 2006 delineation and NWI mapping. Based on the age of the current wetland delineation, it is likely that new delineation may be necessary using Corps methods to identify or verify the location of jurisdictional wetlands and waters of the U.S. The supplemental data will be used to determine the potential effect of proposed master plan projects on wetlands and waters of the U.S.

14.2 FLOODPLAINS

Executive Order 11988 requires federal agencies “to avoid, to the extent possible, the long and short-term adverse impacts associated with the occupancy and modification of 100-year floodplains (areas subject to inundation by a 1 percent annual chance of flood) and to avoid direct or indirect support of floodplain development whenever there is a practical alternative.” Any proposed project taking place in a Federal Emergency Management Agency (FEMA)-mapped floodplain must comply with the community’s FEMA-approved floodplain management plan, if such a plan exists. Klamath County Article 59, Flood Hazard Overlay, identifies potential flood hazard areas as those areas identified by FEMA Flood Insurance Rate Maps (FIRM) as land within the 100-year flood level (20).

The effective map index for the City of Klamath Falls, Oregon, shows that LMT is included within the bounds of FEMA’s FIRM Nos. 4101120012B and 4101120013B (see **Figure EO-19, Flood Insurance Rate Map for the City of Klamath Falls, Oregon**) (26). As shown, the entire airport is classified as Zone C, area of minimal flood hazard (25). However, in 2014, FEMA issued a Preliminary FIRM that shows LMT within the 100-year floodplain (see **Figure EO-20, Preliminary Flood Insurance Rate Map**). FEMA is in the process of revising the Preliminary FIRM which is scheduled for release in Summer 2019. The City and County are working with FEMA to identify appropriate flood protection measures that would enable LMT to remain outside of the 100-year floodplain (34).

Figure EO-19 : Flood Insurance Rate Map for the City of Klamath Falls, Oregon



Source: FEMA Map Panel, 2018.

Considerations

Under the current effective FIRM map, LMT is outside of the 100-year floodplain. If FEMA finalizes the preliminary map, LMT would be within the Klamath County Flood Hazard Overlay and subject to flood zone building restrictions. Proposed master plan projects would be designed in accordance with those restrictions. Section 12.55 of the City of Klamath Falls Comprehensive Plan includes a Flood Overlay Zone, which designates “Areas of Special Flood Hazard” as illustrated in the current FIRM (20). If FEMA revises its floodplain maps to identify airport property within the 100-year floodplain, LMT would be within the Klamath County Flood Hazard Overlay and subject to flood zone building restrictions. Pursuant to Order 11988, the FAA would require the City to prepare all proposed project designs to minimize adverse impacts to the floodplain. If FEMA finalizes its preliminary FIRM for the Klamath Falls area (26), the City would revise the Overlay Zone to include the airport property. Proposed master plan projects would be subject to applicable zoning ordinances and building codes for projects located within a floodplain.

14.3 SURFACE WATER

Surface waters include streams, rivers, lakes, ponds, estuaries, and oceans. Pursuant to FAA Order 1050.1F, project sponsors must identify the extent to which the construction and operation of proposed facilities may affect surface waters.

The Oregon Bureau of Reclamation constructed the Klamath Project, which provides irrigation water to the Klamath basin during the dry summer months. Stormwater runoff at LMT is collected in drainage channels that were constructed as part of the Klamath Project and ultimately discharge to the Lost River through the No. 1 Drain at the south end of the airport, which is regulated by the Klamath Irrigation District (KID).

The Lost River, which flows south and eventually discharges into Tule Lake located in northern California, is located approximately 3 miles east of LMT. The Klamath River, which flows to the southwest, is located approximately 3 miles west of LMT. The Klamath Project regulates the flow from the Lost River during the irrigation cycles. The Lost River Diversion Canal (LRDC) is an east-west flowing corridor located immediately south of the end of Runway 14-32 that connects the Lost River to the Klamath River at the Lost River Diversion Dam. During the non-irrigation season, flow is diverted from the Lost River westward through the LRDC to the Klamath River. During the irrigation season, flow is reversed, and water is diverted eastward from the Klamath River to the Lost River. However, the No. 1 Drain discharges to the Lost River downstream of the Lost River Diversion Dam. Therefore, the flow from LMT is not diverted to the Klamath River (10). The Lost River is classified under the Clean Water Act as a 303(d) Impaired Waterbody. The waterbody is specifically impaired for ammonia, chlorophyll, dissolved oxygen, and temperature. A Total Maximum Daily Loads for Lost River was issued in 2010.

Considerations

Proposed master plan projects have the potential to affect water quality and hydrology in nearby surface waters through increased run-off from new impermeable surfaces or changes in hydrologic patterns. Pursuant to FAA Order 1050.1f, the City must consider the extent to which proposed master plan projects may affect nearby surface water by exceeding federal, state, or local water quality standards or contaminating a public drinking water supply to adversely affect public health. Although runoff from LMT

eventually drains to an impaired water body, the runoff first discharges the No. 1 Drain, eliminating the need for surface water sampling (10). Surface water is not used as a source of drinking water. To comply with FAA Order 10501.F, water quality management will be considered during the design of proposed master plan projects. Examples of design-related mitigation measures include but are not limited to: reducing the amount of area disturbed construction, incorporating erosion and sediment control measures, and preparing plans in accordance with the City's SWPSPP.

14.4 GROUNDWATER

Groundwater is subsurface water that occupies the space between sand, clay, and rock formations. The Safe Water Drinking Act applies to projects proposed by federal agencies. The Act prohibits federal agencies from funding actions that would contaminate an EPA-designated sole source aquifer or its recharge area.

The City of Klamath Falls obtains water from deep groundwater wells ranging from 300 feet to more than 1,000 feet deep (27). The City's 2017 Water Quality Report indicates that water quality is excellent, exceeding federal and state drinking water standards (28). Based on the presence of a perched water table and shallow depth to groundwater, proposed projects are unlikely to affect the City's drinking water supply. LMT is located on a perched aquifer with a shallow depth to groundwater that averages 4 feet below the ground surface. Soil borings performed in support of Taxiway B improvements encountered groundwater at depths ranging from 3 to 11 feet below the ground surface. Groundwater has been encountered at depths as shallow as 18 inches during periods of heavy precipitation (29). In addition, the soils at LMT are porous soils but they are underlain by an impervious clay layer.

Considerations

Pursuant to FAA Order 1050.1F, the City will consider potential effects of the proposed project on shallow groundwater resources as well as the effect of elevated groundwater table on project design and construction.

14.5 WILD AND SCENIC RIVERS

Wild and scenic rivers are those rivers having remarkable scenic, recreational, geologic, fish, wildlife, historic, or cultural values as defined by the Wild and Scenic Rivers Act. The primary federal law governing Wild and Scenic Rivers is the Wild and Scenic Rivers Act. Four federal agencies administer the act: the Bureau of Land Management, the National Park Service, the USFWS, and the U.S. Forest Service. If the FAA or another federal agency proposes or authorizes an action that would affect resources covered by the Wild and Scenic Rivers Act, consultation with the appropriate federal agency is required.

The nearest designated Wild and Scenic River identified on the National Wild and Scenic Rivers map is a portion of the Klamath River, which is located 17.5 miles southwest of the project site (30). As identified in **Section 14.3, Surface Water**, flow from LMT is not diverted to the Klamath River but to the Lost River following conveyance to Klamath Irrigation District Drain No. 1.

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APPENDIX B : ENVIRONMENTAL OVERVIEW

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ATTACHMENT A – ENVIRONMENTAL OVERVIEW SUPPORTING DATA



United States Department of the Interior

FISH AND WILDLIFE SERVICE



Klamath Falls Fish And Wildlife Office
1936 California Avenue Klamath Falls, OR 97601

Phone: (541) 885-8481 Fax: (541) 885-7837

In Reply Refer To:

Consultation Code: 08EKLA00-2018-SLI-0133 Event Code: 08EKLA00-2018-E-00350

Project Name: Master Plan

August 20, 2019 Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed, and candidate species, as well as designated and proposed critical habitat that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). For anadromous fish species (i.e., salmon), please contact the National Marine Fisheries Service at http://www.westcoast.fisheries.noaa.gov/protected_species/species_list/species_lists.html.

Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat. These provisions apply to non-Federal lands when there is a Federal nexus (e.g., funding or permits).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally threatened, endangered, proposed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular

intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*; <http://www.fws.gov/midwest/eagle/protect/laws.html>). The Service developed the National Bald Eagle Management Guidelines (<http://www.fws.gov/northeast/ecologicalservices/eaglenationalguide.html>) to provide guidance on measures that may be used to avoid and minimize adverse impacts to bald eagles. Projects affecting bald or golden eagles may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (<http://www.fws.gov/windenergy/>) for minimizing impacts to migratory birds, including bald and golden eagles, and bats.

The Migratory Bird Treaty Act (16 U.S.C. 703-712; <http://www.fws.gov/midwest/eagle/protect/laws.html>) implements protections for migratory birds. Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: <http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm>; <http://www.towerkill.com>; and <http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html>.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any correspondence about your project that you submit to our office.

For projects in California, the office shown in the letterhead may not be the lead office for your project. Table 1 below provides lead Service field offices by county and land ownership/project type for northern California. Please refer to this table when you are ready to contact the field office corresponding to your project; a map and contact information for the Pacific Southwest Region field offices is located here: <http://www.fws.gov/cno/es/>.

Table 1: Lead Service offices by County and Ownership/Program in Northern California

County	Ownership/Program	Office Lead*
Lassen	Modoc National Forest	KFFWO
	Lassen National Forest	SFWO
	Toiyabe National Forest	RFWO
	BLM Surprise and Eagle Lake Resource Areas	RFWO
	BLM Alturas Resource Area	KFFWO
	Lassen Volcanic National Park	SFWO
Modoc	Modoc National Forest	KFFWO
	BLM Alturas Resource Area	KFFWO
	Klamath Basin National Wildlife Refuge Complex	KFFWO

APPENDIX B : ENVIRONMENTAL OVERVIEW

	BLM Surprise and Eagle Lake Resource Areas	RFWO
	All other ownerships	
Shasta	Shasta Trinity National Forest except Hat Creek Ranger District (administered by Lassen National Forest)	YFWO
	Hat Creek Ranger District	SFWO
	Whiskeytown National Recreation Area	YFWO
	BLM Alturas Resource Area	KFFWO
	Caltrans	SFWO/AFWO
	Ahjumawi Lava Springs State Park	SFWO
Siskiyou	Klamath National Forest (except Ukonom District)	YFWO
	Six Rivers National Forest and Ukonom District of Klamath National Forest	AFWO
	Shasta Trinity National Forest	YFWO
	Lassen National Forest	SFWO
	Modoc National Forest	KFFWO
	Lava Beds National Volcanic Monument	KFFWO
	BLM Alturas Resource Area	KFFWO
	Klamath Basin National Wildlife Refuge Complex	KFFWO
	All	FERC-ESA

*Office Leads:

AFWO=Arcata Fish and Wildlife Office BDFWO=Bay Delta Fish and Wildlife Office KFFWO=Klamath Falls Fish and Wildlife Office
RFWO=Reno Fish and Wildlife Office YFWO=Yreka Fish and Wildlife Office

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries
- Migratory Birds
- Wetlands

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Klamath Falls Fish And Wildlife Office

1936 California Avenue
Klamath Falls, OR 97601
(541) 885-8481

This project's location is within the jurisdiction of multiple offices. Expect additional species list documents from the following office, and expect that the species and critical habitats in each document reflect only those that fall in the office's jurisdiction:

Oregon Fish And Wildlife Office

2600 Southeast 98th Avenue, Suite 100
Portland, OR 97266-1398
(503) 231-6179

Project Summary

Consultation Code: 08EKLA00-2018-SLI-0133
Event Code: 08EKLA00-2018-E-00350
Project Name: Master Plan
Project Type: ** OTHER **
Project Description: Airport Master Plan
Project Location: Approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/place/42.156816045489734N121.73404121657015W>



Counties: Klamath, OR

Endangered Species Act Species

There is a total of 8 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries¹, as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

1. [NOAA Fisheries](#), also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
<p>Gray Wolf <i>Canis lupus</i></p> <p>Population: U.S.A.: All of AL, AR, CA, CO, CT, DE, FL, GA, IA, IN, IL, KS, KY, LA, MA, MD, ME, MI, MO, MS, NC, ND, NE, NH, NJ, NV, NY, OH, OK, PA, RI, SC, SD, TN, TX, VA, VT, WI, and WV; and portions of AZ, NM, OR, UT, and WA. Mexico.</p> <p>There is final critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/4488</p>	Endangered
<p>North American Wolverine <i>Gulo gulo luscus</i></p> <p>No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/5123</p>	Proposed Threatened

Birds

NAME	STATUS
<p>Yellow-billed Cuckoo <i>Coccyzus americanus</i></p> <p>Population: Western U.S. DPS</p> <p>There is proposed critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/3911</p>	Threatened

Flowering Plants

NAME	STATUS
Applegate's Milk-vetch <i>Astragalus applegatei</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/5497	Endangered
Slender Orcutt Grass <i>Orcuttia tenuis</i> There is final critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/1063	Threatened

Conifers and Cycads

NAME	STATUS
Whitebark Pine <i>Pinus albicaulis</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/1748	Candidate

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

USFWS NATIONAL WILDLIFE REFUGE LANDS AND FISH HATCHERIES

Any activity proposed on lands managed by the [National Wildlife Refuge](#) system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

REFUGE INFORMATION WAS NOT AVAILABLE WHEN THIS SPECIES LIST WAS GENERATED. PLEASE CONTACT THE FIELD OFFICE FOR FURTHER INFORMATION

MIGRATORY BIRDS

Certain birds are protected under the Migratory Bird Treaty Act¹ and the Bald and Golden Eagle Protection Act².

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described [below](#).

1. The [Migratory Birds Treaty Act](#) of 1918.
2. The [Bald and Golden Eagle Protection Act](#) of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

The birds listed below are birds of particular concern either because they occur on the [USFWS Birds of Conservation Concern](#) (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ [below](#). This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the [E-bird data mapping tool](#) (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found [below](#).

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	DESCRIPTION	BREEDING SEASON
Bald Eagle <i>Haliaeetus leucocephalus</i>	This is not a Bird of Conservation Concern (BCC) in this area but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Dec 1 to Aug 31
Clark's Grebe <i>Aechmophorus clarkii</i>	This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska	Breeds Jan 1 to Dec 31
Golden Eagle <i>Aquila chrysaetos</i>	This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA. https://ecos.fws.gov/ecp/species/1680	Breeds Dec 1 to Aug 31
Lesser Yellowlegs <i>Tringa flavipes</i>	This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9679	Breeds elsewhere
Lewis's Woodpecker <i>Melanerpes lewis</i>	This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska	Breeds Apr 20 to Aug 5
Willet <i>Tringa semipalmata</i>	This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9408	Breeds Apr 20 to Sep 30
Olive-sided Flycatcher <i>Contopus cooperi</i>	This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3914	Breeds May 20 to Aug 31
Tricolored Blackbird <i>Agelaius tricolor</i>	This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3910	Breeds Mar 15 to Aug 10

Probability Of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ “Proper Interpretation and Use of Your Migratory Bird Report” before using or attempting to interpret this report.

Probability of Presence ■

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish

a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high. How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is $0.25/0.25 = 1$; at week 20 it is $0.05/0.25 = 0.2$.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

Breeding Season ■

Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort |

Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

Survey Timeframe

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

■ probability of presence ■ breeding season | survey effort - no data



Additional information can be found using the following links:

- Birds of Conservation Concern <http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php>
- Measures for avoiding and minimizing impacts to birds <http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php>
- Nationwide conservation measures for birds <http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf>

Migratory Birds FAQ

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

[Nationwide Conservation Measures](#) describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. [Additional measures](#) and/or [permits](#) may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS [Birds of Conservation Concern \(BCC\)](#) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the [Avian Knowledge Network \(AKN\)](#). The AKN data is based on a growing collection of [survey, banding, and citizen science datasets](#) and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle ([Eagle Act](#) requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the [E-bird Explore Data Tool](#).

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the [Avian Knowledge Network \(AKN\)](#). This data is derived from a growing collection of [survey, banding, and citizen science datasets](#) .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: [The Cornell Lab of Ornithology All About Birds Bird Guide](#), or (if you are unsuccessful in locating the bird of interest there), the [Cornell Lab of Ornithology Neotropical Birds guide](#). If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are [Birds of Conservation Concern](#) (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the [Eagle Act](#) requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the [Northeast Ocean Data Portal](#). The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the [NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf](#) project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the [Diving Bird Study](#) and the [nanotag studies](#) or contact [Caleb Spiegel](#) or [Pam Loring](#).

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to [obtain a permit](#) to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ “What does IPaC use to generate the migratory birds potentially occurring in my specified location”. Please be aware this report provides the “probability of presence” of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the “no data” indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ “Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds” at the bottom of your migratory bird trust resources page

WETLANDS

Impacts to [NWI wetlands](#) and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local [U.S. Army Corps of Engineers District](#).

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

FRESHWATER EMERGENT WETLAND

- [PEM1C](#)
- [PEM1F](#)
- [PEM1A](#)

FRESHWATER POND

- [PABF_x](#)

RIVERINE

- [R2UBH_x](#)
- [R4SBC_x](#)
- [R5UBF_x](#)
- [R5UBH](#)
- [R2ABF_x](#)

Appendix C

Airport Recycling Plan



CRATER LAKE

**KLAMATH REGIONAL
AIRPORT**

Appendix C: Airport Recycling Plan

Report: Airport Master Plan Recycling, Reuse, and Waste Reduction Plan



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OVERVIEW

An Airport Recycling, Reuse, and Waste Reduction Plan (the Plan) was prepared as part of the Airport Master Plan for the Crater Lake–Klamath Regional Airport (LMT) in accordance with the Federal Aviation Administration Modernization and Reform Act of 2012 (FMRA) requirements. The purpose of this Plan is to evaluate the existing airport waste program and recommend ways to increase landfill diversion through waste reduction, reuse, and recycling.

Data collection and interviews with LMT Airport Staff provided background on current conditions and practices. This information formed the basis for recommendations appropriate for the waste stream at LMT and in accordance with FMRA. Recommendations are:

- ▶ Establish and document quantifiable Plan goals and objectives.
- ▶ Install recycling containers and signage at each garbage collection point or waste station.
- ▶ Incorporate waste and recycling into all LMT tenant contracts/leases.
- ▶ Establish a recycling purchasing/procurement policy.
- ▶ Provide Plan education (LMT employees, tenants, janitorial services, contractors).
- ▶ Develop a Plan-Do-Check-Act process to oversee Plan progress.

As summarized in detail by **Table C-3**, the Plan recommendations allow LMT to structure and prioritize recycling activities that are compatible with changing LMT conditions, site expansion, and available LMT Airport Staff resources.

BACKGROUND

PROJECT PURPOSE AND REGULATORY BACKGROUND

Section 132(b) of the FMRA expanded the definition of airport planning to include “developing a plan for recycling and minimizing the generation of airport solid waste.” FMRA Section 133 added a requirement for airports preparing or updating a master plan to receive FAA Airport Improvement Program (AIP) funding to address issues related to solid waste recycling. The FAA Memorandum *Guidance on Airport Recycling, Reuse, and Waste Reduction Plan* dated September 2014 outlines FAA procedures in developing the Plan in accordance with FMRA.

The key Plan elements include:

- ▶ The feasibility of solid waste recycling
- ▶ Minimizing the generation of solid waste
- ▶ Operation and maintenance requirements
- ▶ Review of waste management contracts
- ▶ The potential for cost savings or revenue generation

The specific Plan recommendations depend on the following unique LMT factors:

- ▶ The airport size, location, and layout
- ▶ The type and quantity of airport waste generated
- ▶ Waste and recycling infrastructure and collection systems
- ▶ The costs and market commodity
- ▶ LMT and City recycling initiatives

AIRPORT DESCRIPTION

LMT is a FAA Part 139 commercial service airport owned and operated by the City of Klamath Falls and is a public-use facility included in the FAA *National Plan of Integrated Airport Systems (NPIAS)*. LMT serves commercial, general aviation (GA), US Forest Service (USFS), and military activity. In 2017/2018, LMT aircraft traffic totaled 48,500 operations with 85 civilian based aircraft and 32 military based aircraft.

DEFINITIONS AND WASTE PLAN FOCUS

Defined terms and acronyms used in this Plan:

City:	City of Klamath Falls (department responsible for waste/recycle programs)
LMT:	Crater Lake–Klamath Regional Airport (civilian areas)
LMT Airport Staff:	Airport Administrative Staff (City employees)
FAA:	Federal Aviation Administration

Municipal Solid Waste (MSW) consists of everyday items that are used and then discarded. There are five primary types of MSW generated at airports; recyclable materials include paper, plastic, plastic bottle, aluminum cans, and cardboard.

Municipal Solid Waste Types	
General waste	Consists of common inorganic waste, such as product packaging, disposable utensils, plates and cups, bottles, and newspaper. Less common items include furniture and clothing.
Food waste	Consists of either food that is not consumed or the waste generated and discarded during food preparation. Food waste and green waste make up a waste stream known as <i>compostable</i> waste.
Green waste	Consists of tree, shrub, and grass clippings, leaves, weeds, small branches, seeds, pods and similar debris generated by landscape maintenance activities. Green waste and food waste together may be referred to as <i>compostables</i> .

Deplaned waste	Consists of waste removed from aircraft, typically scheduled passenger flights. These materials include plastic bottles, aluminum cans, newspaper, mixed paper, plastic cups, service ware, food waste, food soiled paper, and paper towels.
Construction and Demolition Waste (C&D)	Consists of non-hazardous solid waste from land clearing, excavation, and/or the construction, demolition, renovation or repair of structures, roads, and utilities. C&D waste commonly includes concrete, wood, metals, drywall, carpet, plastic, pipes, land clearing debris, cardboard, and salvaged building components.

This Plan focuses on the management of MSW and other materials that can be either recycled or disposed of in a landfill. This Plan does not address the management of other types of waste regulated by federal, state, and local laws, specifically:

- ▶ Hazardous waste material
- ▶ Industrial waste
- ▶ Construction and Demolition special requirements (such as asbestos and lead special handling)

AIRPORT FACILITIES

LMT civilian buildings include a terminal passenger building, airport operations building, airport administration building, Special Aviation Service Operator (SASO)/Fixed-Based Operator (FBO) buildings/hangars, flight schools, general aviation tenant facilities, United States Forest Service (USFS), agricultural facilities, and air cargo facilities. The Oregon Air National Guard (Oregon ANG) buildings, which are excluded from this study, are located on leased property. See **Attachment A**, *Airport Site Location Map*, for building locations. See **Attachment B**, *Airport Site Photos*, for waste and recycling collection items by location.

PLAN AREA OF INFLUENCE

In accordance with FAA FMRA guidance, areas over which the LMT Airport Staff has direct control or influence should be included in the Recycling, Reuse, and Waste Reduction Plan; areas outside of the LMT Airport Staff control or influence may be excluded. This Plan does not include adjacent properties owned or operated by the City.

The LMT Airport Staff can influence the management of waste and recyclables in tenant spaces through lease agreements and contracts. The LMT buildings and areas over which the LMT Airport Staff has direct and indirect control of waste management are identified on **Table C-1**. Excluded facilities include the Oregon Air National Guard (military leased areas). **Table C-1** is a summary of the buildings and facility users under direct (operated by LMT), indirect (LMT civilian tenant), and excluded (LMT military tenant) LMT Airport Staff control of recycling programs.

EXISTING RECYCLING PROGRAM

LOCAL RECYCLING

Waste Management of Oregon, Inc. is the City's exclusive franchise contractor for the collection of residential and businesses waste and recyclable materials and includes collection at LMT. The LMT waste and recycling activities fall under the City contract program. LMT recycles all waste material types collected by Waste Management of Oregon.

Waste Management of Oregon hauls the recyclables to the Klamath Regional Disposal transfer station, which is located approximately three miles north of LMT. At the transfer station, Waste Management pays to have the recyclable items sorted, compacted, and shipped to a facility near Portland, Oregon, where the items are recycled. Waste materials are taken to the Dry Creek Landfill, which is located in White City, approximately 70 miles west of LMT.

AIRPORT RECYCLING INFRASTRUCTURE

LMT uses carts to collect comingled recyclables as well as a variety of waste dumpsters supplied by Waste Management. The hauling contractor collects the waste and recyclable materials from LMT and transfers them for processing or disposal. Waste materials are transported for disposal at Klamath Falls Landfill. Recyclable materials are transported to a recycling center at a local transfer station. In addition to the residential and commercial pick-up collection programs, Klamath County operates several disposal sites, including Klamath Falls Landfill and eight community transfer stations. These facilities are used for disposal of waste and processing of recyclables generated at LMT.

LMT provides a network of trash cans and recycling stations in and around the facilities it operates. These receptacles are often co-located for convenient use by employees, tenants, and patrons. The contents of these receptacles are collected and emptied into waste dumpsters and recycling carts strategically located adjacent to LMT facilities. Photographs of specific locations and sizes of the waste receptacles within the terminal building, administration building, operations building, and airport public-use parking lots are shown in **Attachment B**.

Table C-1 : Airport Recycling Areas

Buildings and Facility User	Facility Description	LMT Direct Control	LMT Indirect Control	LMT Excluded Control	Recycling Collection
Airline Passenger Building	A two-story facility that houses an airline operating area, a restaurant, restrooms, office space, and rental car company counter areas. The Passenger Terminal Building has recycling collection.	X			Yes
Airport Operations Building	Located west of the terminal building. This building houses vehicles, machinery, equipment, and tools necessary to maintain the airport grounds and facilities. The Airport Operations Building has recycling collection.	X			Yes
Airport Administration Building	The single-level administrative building, located northwest of the passenger terminal building, contains administrative office space. This building is occupied by LMT Staff, and has recycling collection.	X			Yes
Air Cargo Building Facilities	Both FedEx and UPS provide air cargo services. The cargo facilities are located north of the FBO hangar building, and include a storage building, aircraft ramp, and vehicle parking. The on-airport cargo facilities are occupied by FedEx. The UPS and FedEx sort facility is located off-airport.		X		Yes
Special Aviation Service Operator (SASO) / Fixed Base Operator (FBO) Facilities	Century Aviation offers pilot and aircraft services including hangar rental, fueling, passenger charter, emergency air ambulance, hangar storage, and aircraft tie-down parking.		X		Yes
Aviation Training and Flight School(s)	Pelican Aviation and Precision Aviation provide pilot instruction and aircraft training. The flight schools are located in a building-hangar along the north westside apron.		X		Yes
General Aviation and Tenant Facilities	Tenant and General Aviation hangars are located on the northwest and northeast side of Runway 14/32. These facilities include various hangars types (box and T-hangars) and tie-down parking.		X		Yes
United States Forest Service (USFS)	The USFS is located in a leased area northeast of Runway 14, and occupies buildings, parking areas, and storage tanks to conduct aerial-firefighting.		X		Yes
Agricultural Spray Operator Facilities	The agricultural facilities are located in a leased area south of the Runway 25 end and along Taxiway H, and occupies buildings, parking areas, and storage tanks to conduct aerial-spray operations.		X		Yes
Oregon Air National Guard	Multiple LMT lease and operating areas, including the Air Traffic Control Tower (ATC) and Aircraft Rescue and Fire Fighting (ARFF) facility.			X	Yes

Source: Mead & Hunt, Inc. – Airport Records and Site Visit, March, 2019.

- ▶ **Passenger Terminal Building:** Multiple trash cans and recycling stations are placed throughout the terminal building public spaces (**Figure C-1**). An exterior 2-yard open-top dumpster used for non-recycled waste is available to building tenants.
- ▶ **Restaurant (Airport Tenant):** The restaurant area includes space for food preparation, dishwashing, ingredient and supply storage, and other related activities. In order to reduce food waste, the restaurant shops for ingredients weekly. Garbage is collected in a large container and taken to the shared terminal dumpster.
- ▶ **Rental Car (Airport Tenants):** The rental car tenants are responsible for disposing of the contents from their bins into the dumpster and recycling carts. The recycling cart and waste dumpster used to consolidate materials generated in the terminal are positioned within a fenced enclosure adjacent to the terminal building.
- ▶ **Airport Operations Building:** A 1-yard dumpster is located at the operations building. This container is moved outside the fence on the day of pick-up for service.
- ▶ **Airport Administration Building:** One 64-gallon cart for comingled recyclables is for staff use. The LMT administration staff is responsible for cleaning their own areas within the administrative building. Reusable kitchen utensils and ceramic mugs are available in the breakroom for use by staff and guests. Plastic bottles and aluminum cans generated in this area are collected in separate bins. The items collected in these bins are taken to a redemption location by the LMT Airport Staff.

Figure C-1 :
Terminal Building Recycling Bins and Trash Cans



RECYCLING OPERATION AND MAINTENANCE RESPONSIBILITIES

The LMT waste and recycling program is administered by LMT Airport Staff (City employees reporting to the City Manager's Department) and implemented under City contract with Waste Management of Oregon, the hauling service provider. The LMT Airport Staff also contracts janitorial cleaning services, and manages waste and recycling through various LMT tenants, service providers, and contractors.

Roles and Responsibilities

- ▶ Waste Management of Oregon is the City contracted waste hauler responsible for collecting waste material from LMT dumpsters and transporting this material for recycling or disposal.
- ▶ The LMT Airport Director reports to the City Manager; LMT has three administration staff (Airport Director, Airport Business Manager, Airport Operations Manager) and three operations staff responsible for day to day airport operations.

- ▶ The Airport Business Manager oversees the airport recycling program, including directing housekeeping activities, adjusting the program, purchasing custodial supplies, and collection services. The Airport Business Manager is also responsible for communicating with the collection service providers and processing invoices.
- ▶ The LMT janitorial service contractor is responsible for cleaning the public and common spaces within the airport passenger terminal building, including collecting waste and recyclables from cans and bins and transferring these materials to the appropriate dumpsters.
- ▶ The LMT airport tenants (restaurant, rental cars, FBO/SASO, US Forest Service) contract custodial services within their operating areas, including depositing waste materials in the dumpsters or appropriate recycle bins.

AIRPORT REDUCTION, REUSE, AND RECYCLING EFFORTS

Waste Reduction

Waste reduction refers to reducing the volume of waste produced at the source. Printing methods and office supply purchasing are effective practices to reduce waste. LMT Airport Staff employs the following practices to reduce waste:

- ▶ Double-sided printing
- ▶ Email and internal websites for inter-office communication
- ▶ On-screen print preview and PDF printer or other electronic printing.

Reuse

Reuse refers to using materials and items more than once and as many times as possible before disposal. Reuse can include using items and materials for the original purpose or repurposing for a different use. Reuse can require purchasing durable materials instead of disposable or single use options. The following are common LMT Airport Staff reuse practices:

- ▶ Ceramic coffee mugs and durable silverware in breakroom and offices
- ▶ Office supplies, including inter-office envelopes
- ▶ Towels/rags in maintenance areas

Airport Recycling

LMT Airport Staff recycles cardboard, plastic bottles, paper, aluminum cans, and scrap metal. The paper stream includes high volumes of printer paper, disposed mail, envelopes, and other paper-related items. Cardboard waste is typically generated in the form of shipping boxes. The plastic and aluminum streams are typically comprised of beverage containers collected from the public areas of the terminal, administrative building, and restaurant. Glass is accepted by Klamath Regional Disposal, but glass is not currently offered as a pick-up service by the City contract hauler. Glass recycling involves challenges due

to market value and a tendency to cross-contaminate other recycling materials. Plastic bottles and aluminum cans are collected by employees and tenants for refund under the State's bottle bill.

Construction and Demolition (C&D) Debris, Green Waste, and Other Waste

LMT Airport Staff requires the waste generated during construction projects to be hauled off site. Green waste generated from LMT property maintenance is managed on-site as compost (wood pile location) or it is hauled to the landfill. LMT Airport Staff also collects scrap metal, which is taken to a recovery facility and recycled.

Airport Tenants (Civilian/Military)

Airport tenants are also likely collecting waste material for recycling, whether through the LMT recycling program or on their own. LMT Airport Staff do not monitor tenant waste activity or use of recycling containers. The Oregon Air National Guard (OR ANG), which operates facilities within restricted leased airport area premises, has a solid waste plan; the Oregon ANG has adopted the Department of Defense's goal of 40 percent solid waste diversion.

AIRPORT TRACKING AND PERFORMANCE

The LMT Airport Staff tracks waste hauling invoices and paper materials purchased. At present, LMT does not have waste diversion or recycling goals.

WASTE AUDIT

LMT Airport Staff have informally observed employee and tenant waste and recycling related behaviors and how waste flows through the facility. The LMT Airport Staff have also described waste and recycling collection and hauling practices. LMT Airport Staff provided information about:

- ▶ The LMT Airport buildings and facilities (civilian areas)
- ▶ The areas that generate waste
- ▶ The types of waste generated in each area
- ▶ The materials that can be recycled under the current program

An evaluation of LMT Airport Staff recycling information and records under the City's direct control or influence supported efforts to identify the source, composition, and quantity of waste generated. This information, combined with aviation industry waste and recycling trends, served to identify opportunities to improve and monitor program effectiveness.

QUANTITY AND SOURCES

According to invoices provided by LMT Staff, the following containers and service schedules are as follows:

- ▶ Waste: One 2-yard dumpster – collected twice per week (terminal building)
- ▶ Recycling: One 64-gallon cart – collected once per week (terminal/administration building)
- ▶ Waste: One 1-yard dumpster – collected twice per week (operations building)

According to the United States Environmental Protection Agency (EPA), one cubic yard of comingled recycled material, excluding glass, totals 155 pounds. It is estimated that LMT generates 14,000 pounds (7 tons) of waste and 3,700 pounds (1.82 tons) of recyclable material each year. Based on the same load factor and an appropriate volume to weight conversion factor from the EPA, the 2-yard dumpster is equivalent to 200 pounds of MSW per week, which is approximately 5 tons per year. The smaller dumpster is estimated to contain an estimated 100 pounds of MSW each week, equating to approximately 2 tons per year. From this, it is estimated that the LMT current recycling rate is 21 percent; this is calculated by dividing the total tons of recycled material by the total recycled and MSW.

COMPOSITION

A varied waste stream can be expected at LMT based on the various aeronautical and non-aeronautical activities. According to industry case studies and previous waste planning projects, an airport’s waste stream is approximately 40 percent recyclable, 35 percent compostable, and 25 percent waste that cannot be recycled or composted using current technologies and, as a result, must be placed in a landfill. **Table C-2** lists the LMT waste and material types.

Table C-2 : Airport Waste by Area and Material

Area/Material	Office Paper	Newspapers	Magazines	Plastics	Aluminum	Cardboard	Food Waste	Paper Products	Liquids	Packaging	Metals	Greenyard Waste	Construction and Demolition (C&D)	Other Waste
Passenger Terminal Building		X	X	X	X		X	X	X	X				X
Airport Administrative Office	X	X	X	X	X	X	X	X	X					X
Airport Operations Building	X			X	X	X			X	X		X	X	X

Source: LMT Airport Staff records.

The following describes, in more detail, airport waste and recyclable materials typically generated.

Airline Service - Transportation Security Administration Restrictions

The Transportation Security Administration (TSA) restricts the volume of liquids, gels, and aerosols that can be carried onto an aircraft. Items such as toiletries, food, and beverages are restricted by TSA. Passengers are allowed three-ounce containers of toiletries in one, one-quart baggie (3-1-1) in their carry-on luggage. Even though these restrictions have been in place for longer than 10 years, security screening regularly reveals toiletries, beverages, and food items that do not meet the requirements contained in passenger luggage. When these items are found, the TSA gives passengers three options: pack the item in a checked bag, give the item to a non-traveling family member or friend, or forfeit the item.

By law, the TSA cannot retain any items removed from passenger luggage, so items that passengers do not repack or hand off end up in the trash. Of the items that end up in the trash, some items include bottled water, other bottled or canned beverages, toothpaste, shampoo and/or conditioner, sunscreen, and lotion moisturizers; other unallowable items are peanut butter, yogurt, applesauce, and maple syrup. It is expected that the garbage cans and recycling station located in the TSA security queuing area receive a fair amount of liquids and beverage containers due to TSA restrictions. These items end up in the waste stream where the liquids are difficult to manage, and the containers cannot be recycled. Liquids add significant weight to the waste stream, contaminate other materials such as paper, and may be rejected by a recycler, which can result in disposal at a landfill. In addition, discovery of a restricted item in a passenger's carry-on or bag may subject the passenger to additional screening, which requires extra time and can interrupt the flow at a security screening checkpoint. Liquids contaminate and degrade other materials within the recycling stream and add weight to recycling or waste streams where they are found. In some cases, liquids are thrown away in their containers, which means the recyclable material in water bottles, aluminum soda cans, and plastic beverage containers is not captured for recycling.

PURCHASES

LMT Airport Staff tracks some of the types of the disposable items and supplies purchased for the facility. This information provided insight on some of the materials coming into LMT that will go back out as waste (other materials are brought on-site by employees and tenants). The purchase list provided under this project includes:

- ▶ Printing Paper (Certified Forest Stewardship Council [FSC] mix)
- ▶ Paper Towels (may contain recycled content)
- ▶ Bathroom Tissue (may contain recycled content)
- ▶ Janitorial Supplies.

Potentially, identifying and tracking the type and quantity of disposable items purchased for use at LMT will allow the LMT Staff to identify opportunities to reduce its outgoing waste, including:

- ▶ Items that have reusable or recyclable alternatives (water coolers instead of bottled water)
- ▶ Items that could be eliminated (by converting paper forms to digital to reduce paper waste generated)
- ▶ Items that indicate scale of the activity.

REVIEW OF WASTE MANAGEMENT CONTRACTS

The LMT Airport Staff provides means to recycle all the waste material types that the commercial recycling program accepts. LMT contracts and leases address housekeeping and related expectations for managing trash and providing recycling. These LMT agreements do not appear to require conformance with the City's recycling and sustainability related initiatives. The following describe the content of various contracts related to LMT waste and recycling.

CUSTODIAL AND WASTE HAULING CONTRACTS

The contract for janitorial services within the passenger terminal building public spaces references recycling responsibilities. The agreement states that the contractor shall "make reasonable efforts to ensure, to the maximum extent economically feasible, the utilization of materials that may be recycled or reused when discarded. If this contract involves demolition, the Contractor shall salvage or recycle construction and demolition debris, if feasible and cost-effective." It appears these clauses are standard for City contracts. The City's franchise agreement takes the place of an individual contract between the Airport and the hauler. The City's solid waste ordinance outlines the responsibilities of the collection contractor, including:

- ▶ Dispose of waste at site owned and/or operated by City
- ▶ Provide opportunity to recycle in accordance with State law and DEQ rules
- ▶ Provide necessary collection vehicles, containers, facilities, and personnel

TENANT LEASES AND SERVICE CONTRACTS

The following are the most cost common LMT aeronautical leases:

- ▶ **Rental Car Company (Standard Agreement):** An agreement with one of the rental car companies (dated March 2017) states that the responsibilities of the City within the terminal building include "trash pickup and disposal service from central location, with such location to be designated by the city" (Article 7- *Responsibilities of the City*). This agreement does not mention recycling responsibilities.
- ▶ **US Forest Service Lease:** The USFS lease requires the tenants to keep the leased premises free from junk, rubbish, and other material. This agreement also requires the USFS to pay for all utilities on the leased site, including janitorial and related services. Recycling is not mentioned within this lease agreement.
- ▶ **Restaurant:** The lease agreement with the restaurant (dated September 2010) requires the restaurant to reimburse the City for one half of the monthly garbage fee for the dumpsters located near the terminal building. This agreement also requires the tenant to provide the necessary management and labor for trash and garbage removal services. No reference is made to recycling.
- ▶ **FBO:** The FBO lease agreement (dated October 2017) requires the tenant to pay for all utilities, including waste disposal. Recycling is not mentioned as a requirement.

- ▶ **Hangar Lease (Standard Agreement):** An example of a hangar lease was provided, which requires garbage disposal and other utilities to be paid by the tenant. It also states, “Tenant shall not commit, or suffer to be committed, any waste upon the Premises.” This is likely standard GA hangar tenant lease language, which does not include information about recycling.

EXPIRING LEASES AND CONTRACTS

Specific information regarding the expiration, extension, or renewal dates of all LMT tenant leases were not reviewed under this project. As outlined in the FAA guidance memo, “this information can signal the Airport’s next opportunity to add recycling, reuse, and waste reduction objectives to existing leases and contracts.”

FUNDING

LMT waste and recycling collection costs, for civilian areas, are funded by the airport operating budget.

RECYCLING FEASIBILITY

The following describes various internal and external factors influencing waste and recycling collection.

COMMITMENT AND SUPPORT

The combined willingness of stakeholders (airport staff, contractors, tenants, public users, and patrons) to support recycling is critical. Without a commitment to participate and manage recycling resources, a waste and recycling Plan could struggle. The LMT Airport Staff supports recycling, as they are currently under contract to recycle all the waste materials that the commercial recycling program accepts. This level of involvement in recycling is expected to continue.

AIRPORT POLICY AND CONTRACTOR DEDICATION

The City promotes and supports recycling waste management practices. The City provides residents and businesses with recycling information and resources. The City’s waste management contractor’s website states, “As your collection company and your neighbor, Waste Management is dedicated to excellent customer service, protection of our environment and preservation of valuable resources. We ‘Think Green.’”

LOCAL MARKET FACTORS

Recycling materials can be processed as a commodity; however, the financial aspects of recycled waste fluctuates based on various market, collection, and supplier factors. Local waste haulers typically accept materials that can be recycled cost-effectively. Manufacturers purchasing recycled material want it to be predictable and ready for use; therefore, recycling facilities are discriminatory about what materials they

accept; they prefer materials that are of high value, clean, and easy to separate. The materials listed in **Table C-3** are accepted under the City contractor’s commercial recycling program.

CONTRACTUAL ISSUES

There are no major contractual issues with the current recycling practices at LMT, and none are evident or anticipated. The LMT Airport Staff, City, and contracted waste and recycling collection contractor will need to continue collaborating to support the LMT recycling Plan.

Table C-3 : Waste Materials Accepted for Recycling in the City of Klamath Falls

Recycling Material	Waste Items
Cardboard	Shipping Boxes
Paper	Mixed Paper, Newspaper, Magazines
Metal	Scrap Metal, Cans
Plastic	Bottles, Jugs

Source: City of Klamath Falls, Waste Management-Commercial and Industrial.

LOGISTICAL CONSIDERATIONS AND CONSTRAINTS

Certain basic elements of LMT recycling must be in place. These include:

- ▶ A janitorial contractor
- ▶ An affordable hauling contractor
- ▶ Space for bins, dumpsters, and compactors.

These elements are available, provide sufficient frequency/capacity, and appear unconstrained. Additional recycling resources are expected, including containers and stations, as waste material increases due to greater user demands, changing conditions, and/or new expanded facilities.

RECYCLING AND LANDFILL REQUIREMENTS

The recycling facility and landfill that accept LMT waste have specific acceptance criteria and requirements. Adherence to these specifications protects the safety of employees handling these materials, the integrity and operation of the equipment, and infrastructure used to transfer, sort, convert these materials, and the value of the recyclable stream.

The Klamath County landfills and transfer stations only accept corrugated cardboard and glass for recycle when dropped-off by patrons. However, Waste Management collects paper, metal, cardboard, and plastic from commercial businesses and sorts them at the Klamath Regional Disposal transfer station where they are shipped off and processed. Waste material that may be generated at LMT, but is prohibited by the

Klamath Regional Disposal, includes hazardous waste, used oil, industrial appliances, paint, electronics, and light bulbs. Some waste items cannot be recycled or disposed of in a landfill, such as hazardous waste and chemicals, paint, light bulbs, and electronics. These items must be managed through hazardous waste or universal waste programs or disposed of at a specialized landfill.

Costs

The costs associated with a recycling program depend on available infrastructure, material markets, and the type of waste generated at a facility. These costs sometimes include capital costs for containers, landfill tipping fees, hauling costs, material rebates, and labor. In accordance with FMRA, an evaluation of the potential cost savings and revenue generation opportunities is required for a waste and recycling Plan.

GUIDELINES AND POLICIES

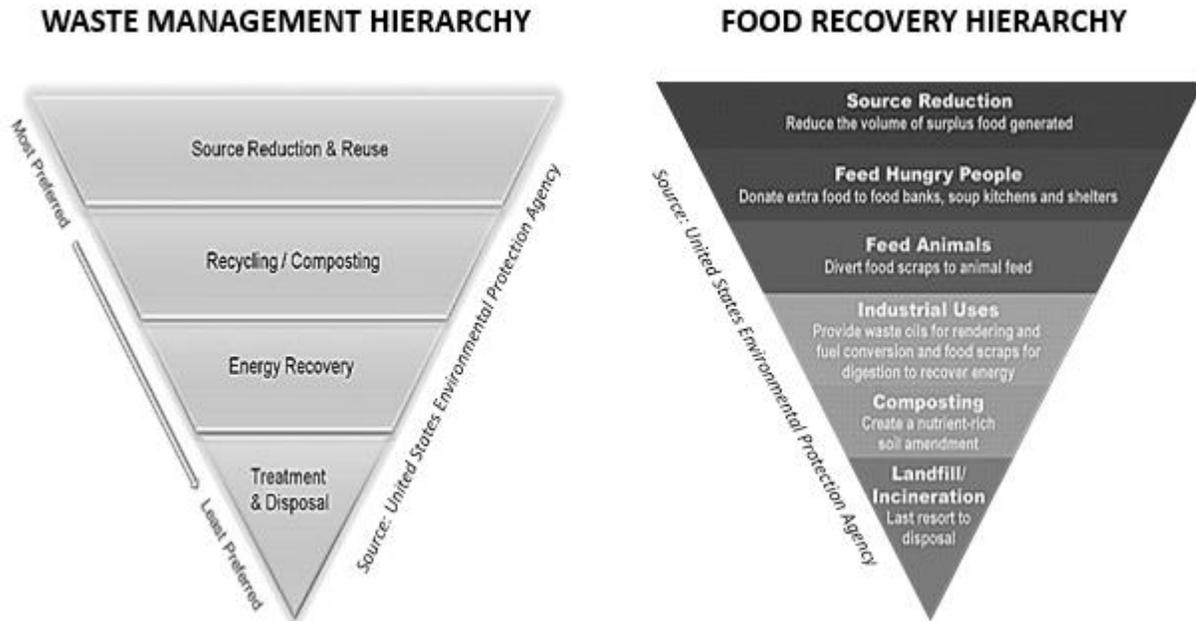
The following are federal, state, and local guidance used in preparing the LMT waste and recycling Plan.

Federal

At the federal level, the EPA is responsible for developing a solid waste management program under the Resource Conservation and Recovery Act (RCRA). RCRA provides the framework for management of hazardous and non-hazardous waste. All generators of hazardous waste, including airports, are required to comply with RCRA and all other federal waste laws and regulations. The EPA has developed a ranking-hierarchy of waste management and food recovery strategies (See **Figure C-2**).

In addition, the FAA provides guidance on airport waste and recycling in the September 2014 FAA Memorandum and in a 2013 Transportation Research Board synthesis report (https://www.faa.gov/airports/environmental/airport_recycling/).

Figure C-2 : Waste Management Hierarchy (Federal EPA)



State

The State of Oregon’s 1971 Bottle Bill, administered by the Oregon Liquor Control Commission, was the first of its kind in the country designed to reduce litter. Outside of the Bottle Bill, the base recycling law is the Opportunity to Recycle Act (Act), first passed in 1983 and last amended in 2015. The Oregon DEQ establishes Recycling and Waste Reduction administrative rules to elaborate on the Act and is responsible for regulating cities, counties, and other local governments regarding waste. The DEQ has developed a policy and integrated plan for managing waste materials, *Materials Management in Oregon: 2050 Vision and Framework for Action*. The Opportunity to Recycle Act prioritizes certain waste management strategies over others in alignment with the hierarchy promoted by the EPA.

The State’s material recovery rate goal is 52 percent for 2020 and 55 percent for 2025. In addition, the state’s recovery rate goals for food waste, plastic waste, and carpet waste are all 25 percent by 2020. Each county (and some metropolitan areas) set their own voluntary recovery goals by statute. To make progress under the 2050 Vision, cities of a certain size or within a certain region must implement three to five listed reduction and reuse elements. All other cities must implement a minimum number of recycling program elements, based on their size and location, chosen from the thirteen options listed in Senate Bill 263. The State’s laws and plans allow the local units to implement programs to meet the statewide mandatory and individual voluntary goals.

Local

According to the Code of Klamath County, Article 77, *Solid Waste*, all uses that fall within the City Urban Growth Area that require solid waste or recycled material collection will conform to specific collection standards. These standards require the community to:

- ▶ Cover receptacles
- ▶ Screen containers greater than 66-gallons from a public street or adjoining property
- ▶ Ensure contractual agreement for collection includes keeping the site clean and free of debris

The City and County codes do not appear to include waste reduction or recycling goals. However, it is assumed the City and surrounding governmental jurisdictions follow the waste management goals and efforts stated within the *Materials Management in Oregon: 2050 Vision and Framework for Action*. Klamath County's recycling rate is currently 25.7 percent. The County hosts several recycling events throughout the year to help residents dispose of electronics, hazardous waste, and other large items in the proper manner.

COST SAVINGS OR REVENUE GENERATION

LMT Airport Staff provided waste and recycling collection invoices including the costs for waste collection fees. On average, the LMT Airport Staff spends \$330 each month, or \$3,960 per year, on waste collection services. These invoices also include fees for excess yard waste, which is approximately \$65 for each pick-up occurrence. According to these invoices, recycling collection is part of the waste collection fee, with no additional charge for pick-up. The waste dumpsters are picked up twice a week. LMT Airport Staff can maximize saving by diverting more material from the waste dumpsters to the recycling cart and refund program. If LMT Airport Staff maximizes the waste diversion, pickups may be reduced. Potential savings could be as much as \$560 for each ton diverted annually.

RECOMMENDATIONS

This section provides Plan recommendations, including waste reduction, reuse, and recycling strategies. These recommendations, consistent with FMRA guidance and industry best-practices, are presented for LMT Airport Staff and City consideration.

TARGET GOALS AND OBJECTIVES (SMART)

It is recommended that the LMT Airport Staff set SMART specific (S), measurable (M), achievable (A), realistic (R), and time-bound (T) goals for waste and recycling. An established set of SMART targets, which requires periodic tracking, provides performance measures tied to quantity and financial benchmarks. The following are suggested SMART targets:

- ▶ Recover 55 percent of waste generated by 2025
(based on State of Oregon goal, the City's current rate at LMT is 21 percent)
- ▶ Incorporate recycling provisions in all LMT tenant leases (template agreement)

TRACKING AND REPORTING

LMT Airport Staff tracks the waste hauling invoices and paper materials purchased. It is recommended that LMT Airport Staff expand their tracking to include the volume of waste sent to the landfill, the volume of material collected for recycling, and the costs for supplying these services. Trends associated with waste generation, landfill, recycling, and cost can be assessed for issues or opportunities for improvement.

REDUCE AND REUSE

To reduce the facility's environmental impacts, LMT Airport Staff should focus on reducing waste by shifting waste materials to reuse and recycling. According to the EPA, waste reduction is the most environmentally preferred waste management strategy. Waste reduction strategies can be accomplished in many ways:

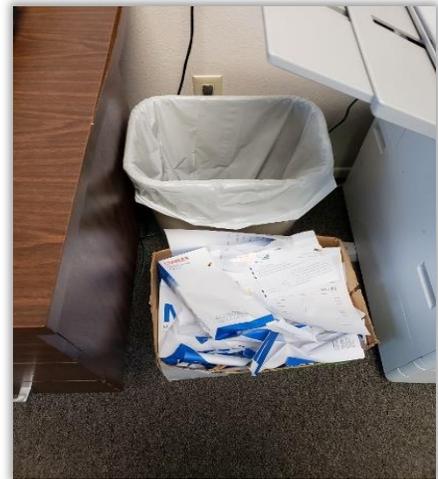
- ▶ Substitute disposable items with durable alternatives.
- ▶ Reuse disposable consumer items and materials.

RECYCLE AND COMPOST

According to the EPA, recycling is the second preferred waste management strategy following waste reduction/reuse. Recycling allows waste items to be processed into raw materials to make new products. The FAA guidance expects the Airport's waste and recycling Plan to document, at a minimum, the existing recycling of paper, plastic bottles, aluminum cans, and plastic cups. LMT Airport Staff recycles most of these items, including cardboard. Future practices and considerations are described below.

- ▶ **Paper:** LMT Airport Staff recycles paper (printer paper, mail, envelopes, and other items) collected from the administration offices as well as from the terminal. These paper items (See Figure C-3) are mixed together but kept separate from aluminum cans and plastic bottles. It is recommended that LMT Airport Staff continue recycling these materials.
- ▶ **Plastic Bottles and Aluminum Cans:** LMT Airport Staff recycles plastic bottles and aluminum cans collected in the terminal, administration building, and Airport Operations facility. Plastic bottles and aluminum cans are not comingled with paper materials; they are placed in a separate bin. These items are collected by LMT Airport Staff and tenant employees for a refund. It is recommended that the LMT Airport Staff continue to support the return of containers,

Figure C-3 :
**Airport Administrative
Building Scrap Paper Bin**



whether individually or through bulk collection. This reduces the environmental impacts associated with disposing of waste material in a landfill and manufacturing new material.

- ▶ **Plastic Cups:** Plastic cup volumes are typically generated aboard commercial flights. It is recommended that airlines add plastic cups from deplaned waste to the LMT recycling program.
- ▶ **Cardboard:** LMT Airport Staff currently recycles cardboard. It is recommended cardboard be recycled separately in order to reduce contamination from other water and recycled material.
- ▶ **Glass:** Glass is not collected for recycle at LMT, as consistent with the City recycling program and services. In the future, as glass potentially becomes a collected City recycled material, it is recommended that glass be collected for recycle at LMT. Glass bottles, along with plastic and aluminum cans, are eligible for a refund under Oregon's Bottle Bill, which provides as small revenue return.
- ▶ **Other Recyclables:** As other recyclable materials in the LMT waste stream, including glass, become recyclable, it is recommended that LMT Staff work with the waste hauling contractor to design and implement strategies to separate, collect, and process such materials.

C&D Waste, Green Waste, and Other Waste

LMT yard waste is composted at a designated on-airport wood pile site or hauled to the public landfill. LMT construction and demolition (C&D) waste is typically handled by the project contractor as part of each construction project, with bulk waste items hauled directly to the landfill. It is recommended the LMT Airport Staff explore how green C&D waste is managed; for example, reusing material where possible (chipped branches as mulch, asphalt millings), composting (multiple composting sites per type of material), and disposing waste materials off site as a last resort.

Donations

According to the EPA, feeding people is the second preferred strategy for addressing food waste. Federal and state laws protect organizations that donate food in good faith from liability. Some charitable organizations will pick up food at the source, which would reduce restaurant employee demands. It is recommended that LMT Airport Staff explore food donation opportunities as part of the on-airport restaurant.

Education and Outreach

It is recommended that LMT Airport Staff provide basic education for LMT employees, janitorial staff, tenants, and contractors to explain the waste and recycling Plan. This effort would further increase recycling and materials deposited in the landfills. The format could take any number of forms, including pamphlets, posters, maps, email notifications, and meeting sessions. The educational content could include:

- ▶ Materials accepted for LMT recycling
- ▶ Location of the waste and recycling containers at LMT
- ▶ Benefits.

Waste and Recycle Containers and Bins

Collocation of waste and recycling containers decrease contamination and increase recycling participation. It is recommended that all garbage collection points and stations include adjacent recycling bins (see **Figure C-4**).

Signage and Labeling

Some waste station signage could be improved with color, images, and short, clear, instructive text to provide understanding of which items are recyclable and which should be thrown away. The LMT Airport Staff could consider providing additional signage adjacent to recycling stations and bottle collection bins, similar to the passenger terminal building (see **Figure C-4**).

Tenant Contracts and Leases

Tenant contracts and lease agreements are a vehicle through which LMT can influence tenant waste and recycling behavior. As contracts and leases expire, extend, or renew, it is recommended that LMT Airport Staff consider include language to include waste and recycling provisions. This could be a general clause stating a preference that tenants reduce, reuse, and recycle where practicable or specific information about recycling, reuse, or waste reduction objectives and requirements. The language could eventually apply consistently to all existing and future civilian tenant leases.

Purchasing/Procurement Policy

It is recommended that LMT Airport Staff consider adopting a purchasing policy that prioritizes procured items that are durable (versus disposable), reusable, recyclable, compostable, and/or made from recycled content. Once established, this policy could be shared with the existing and future tenants to encourage their own adoption of sustainability-minded purchasing practices.

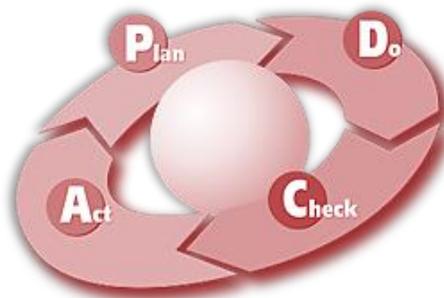
Figure C-4 :
Passenger Terminal Building Garbage Can and Recycling B



CONTINUOUS PLAN

It is recognized the LMT Airport Staff and City have finite resources to commit towards the waste and recycling Plan; therefore, the management and tracking of the LMT waste and recycling Plan should not be arduous. To make the best use of resources, it is recommended that LMT Airport Staff use the PDAC process of Plan (P), Do (D), Check (C), and Act (A) to manage the Plan (See **Figure C-5**).

Figure C-5 : Plan Do Check Act



- ▶ **Plan:** Defining success, for example: 55 percent recycling by 2025, establishing materials and areas of focus, collecting baseline information through a waste audit or surveys, identifying sub-goals, and identifying strategies are all part of planning.
- ▶ **Do:** Implementation of strategies included in this Plan represents the **Do** portion of the process. This involves implementing the recommendations and making progress toward achieving the Plan goals. In doing this, LMT Airport Staff will continue developing a culture of awareness for waste and recycle management at LMT.
- ▶ **Check:** As strategies are implemented, the check portion of the process involves reporting based on regular tracking of and checking the progress toward meeting the Plan and Do actions. The following scenarios may trigger the **Check** actions:
 - New LMT or City goals
 - Changes in waste hauling contractors
 - New infrastructure, for example, composting facility
- ▶ **Act:** The **Act** portion of the process encompasses taking what has been learned in the previous stages and actively responding. By re-evaluating the strategies, stakeholder activities, goals, and metrics, adjustments can be identified and put into action.

SUMMARY CONCLUSION

This Plan documents ways to support LMT’s compliance with the FMRA. The Plan recommendations for recycling, reuse, and waste reduction will lead to increased landfill diversion generated by LMT waste materials. These Master Plan recommendations are permissive and do not require significant staff commitments, organizational changes, tenant coordination, costs, or capital improvements. **Table C-4** summarizes the Plan recommendations for LMT.

Table C-4 : Waste and Recycle Plan Recommendation Summary

LMT Waste and Recycling Program Recommendations	
<p>Objectives and Targets</p> <ul style="list-style-type: none"> ▶ Set SMART goals, see Section 7 Recommendations. 	<p>Food Waste</p> <ul style="list-style-type: none"> ▶ Collect and donate unopened food and beverages.
<p>Tracking and Reporting</p> <ul style="list-style-type: none"> ▶ Continue to regularly estimate and track: <ul style="list-style-type: none"> • Volume of waste to landfill • Volume of material collected for recycling • Recycling rate • Costs for waste and recycling services. ▶ Assess waste generation, landfill, recycling, and cost trends for issues or opportunities for improvement. 	<p>Green Waste</p> <ul style="list-style-type: none"> ▶ Evaluate how this material is managed and explore opportunities to align with the EPA hierarchy.
	<p>Other Recyclables</p> <ul style="list-style-type: none"> ▶ Work with the waste hauling contractor to design and implement strategies for other materials as they are identified in the waste stream.
<p>Reduce and Reuse</p> <ul style="list-style-type: none"> ▶ Substitute disposable items with durable alternatives. ▶ Reuse items and materials. ▶ Encourage reuse by staff, tenants, and contractors. 	<p>Education and Outreach</p> <ul style="list-style-type: none"> ▶ Provide simple, on-going training for employees, tenants, and contractors.
	<p>Signage and Labeling</p> <ul style="list-style-type: none"> ▶ Install and expand signage to elaborate on the program.
<p>Plastic Bottles and Aluminum Cans, Plastic Cups</p> <ul style="list-style-type: none"> ▶ Continue the plastic bottle and aluminum can recycling program. ▶ Expand the program to additional areas, specifically airline deplaned beverage containers. ▶ Support the return of containers included in the bottle bill refund program. 	<p>Containers and Bins</p> <ul style="list-style-type: none"> ▶ Expand the collocation of recycling bins and garbage cans to additional building and waste station areas..
	<p>Contracts and Leases</p> <ul style="list-style-type: none"> ▶ Revise new contract language to include waste management requirements/preferences.
<p>Cardboard</p> <ul style="list-style-type: none"> ▶ Continue the cardboard recycling program. ▶ Separate cardboard from other materials in order to reduce contamination. 	<p>Purchasing Policies and Requirements</p> <ul style="list-style-type: none"> ▶ Adopt a purchasing policy that prioritizes materials that are durable, reusable, recyclable, compostable, and/or made from recycled content.
<p>Glass</p> <ul style="list-style-type: none"> ▶ Introduce a glass recycling program. <ul style="list-style-type: none"> • Encourage glass bottle recycling, by recycling it with the plastic bottles and aluminum cans for a refund. 	<p>Additional Facilities and New Development</p> <ul style="list-style-type: none"> ▶ Collaborate with operators of areas excluded from this Plan to expand the program. ▶ Consider recycling and waste management as part of designing and constructing new development.
<p>Paper</p> <ul style="list-style-type: none"> ▶ Continue the paper recycling program. 	<p>Continuous Improvement</p> <ul style="list-style-type: none"> ▶ Maintain and improve the recycling and waste program according to the Plan Do Check Act cycle.

Source: Mead & Hunt, Inc. – April, 2019.

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U.S. Department of Transportation
Federal Aviation Administration

Memorandum

Subject: **ACTION:** Guidance on Airport Recycling, Reuse, and Waste Reductions Plans

From: Frank SanMartin
Manager, Airports Financial Assistance Division, APP-500

Danielle J. Rinsler, AICP
Acting Manager, Airport Planning and Environmental Division, APP-400

To: Regional Airports Division Managers

Date: September 30, 2014

Reply to Attn. of: Patrick Magnotta
202-267-9609

KLAMATH FALLS & KLAMATH COUNTY CURBSIDE RECYCLING MADE EASY



Klamath Falls and Klamath County residents inside the Urban Growth Boundary can mix all paper, cardboard, metal and plastic bottles in their recycling carts.

Los residentes del Condado Klamath y Klamath Falls dentro del límite del Crecimiento Urbano pueden mezclar todo el papel, cartón, metal, todos los contenedores y las botellas de plástico en sus carros de reciclado.

1-800-808-5901
www.wmorthwest.com/klamathfalls



CURBSIDE RECYCLING GUIDE

Garbage and recycling are picked up weekly. We recommend that you wait until the cart is full to bring it to the curb.

Mix these items together in your recycling cart when they are clean, dry, and empty.

MIXED RECYCLING



KEEP OUT

- No plastic bags
- No tissue, paper towels, frozen food boxes or coffee cups
- No pizza boxes or food soiled cardboard
- No plastic bags or bottles that contained hazardous materials.

GLASS BOTTLES AND JARS



Glass is not collected at the curb. Bring it to Waste Management's office for recycling.
WM Klamath Falls
1812 Greensprings Drive
No light bulbs, broken glass, ceramic, window glass

COLLECTION GUIDELINES

Garbage and recycling are collected weekly.

Please place containers at the curb the night before your service day.

- Three (3) feet apart with lids opening toward street
- At least three (3) feet from cars, trees, mailboxes
- Residents may place up to three 32-gallon bags of yard debris at the curb

- Maximum allowable weights:
- Yard debris bags - 35 lbs
 - 32-gallon can - 60 lbs
 - 64-gallon cart - 100 lbs
 - 96-gallon cart - 145 lbs



Mail-in Recycling Programs

Waste Management offers affordable mail-in collection programs for batteries, electronics, sharps, toner cartridges and compact fluorescent light bulbs.

Visit www.thinkgreenfromhome.com for more information.

Billing Information

You may pay your bill online at www.wm.com/pay-my-bill or sign up for paperless billing at no cost. Watch for more information when you receive your customer ID number on your WM invoice.

Electronics Recycling

Computers, monitors and TVs CANNOT be disposed of in the garbage or at landfills. Call 1.800.5.RECYCLE or visit www.oregonrecycles.org to find a FREE recycling location near you!

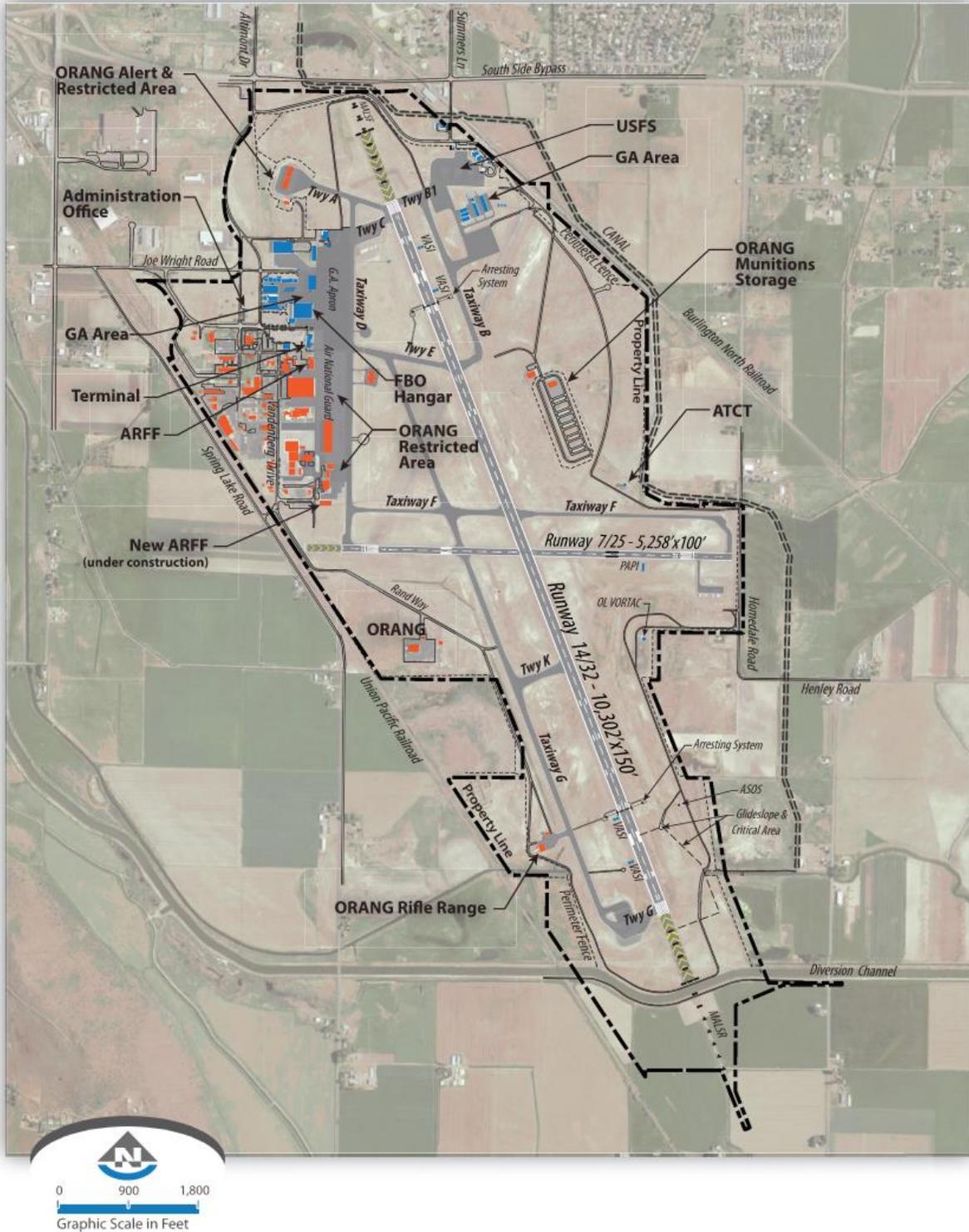


Mobile App

Use the WM app to manage your account and check your collection schedule on the go. Available in Apple and Android: wm.com/wm-mobile.jsp



ATTACHMENT A: AIRPORT SITE LOCATION MAP



ATTACHMENT B: LMT SITE PHOTOS

PASSENGER TERMINAL BUILDING (INTERIOR)

Public Foyer



Restaurant



Restaurant Kitchen



Rental Car Counters



PASSENGER TERMINAL BUILDING (EXTERIOR)

2-Yard Dumpster



2-Yard Dumpster



(2) Recycling Roll-Off



Waste Bin



AIRPORT ADMINISTRATIVE BUILDING

Office



Kitchenette



Office



Office



AIRPORT OPERATIONS BUILDING

Workshop



Scrap



(2) 64-Gallon Roll-Off



2-Yard Dumpster



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Appendix D

Forecast Supporting Data



CRATER LAKE

KLAMATH REGIONAL
AIRPORT

Appendix D: Forecast Supporting Data

Attachment D1: FAA Forecast Approval Letter

Attachment D2: Forecast Data Reference Sources

Attachment D3: LMT Airline Forecast Background Data

Attachment D4: LMT Air Cargo Forecast Background Data

Attachment D5: LMT Aircraft Operations Background

Attachment D6: FAA Critical Aircraft Guidance

ATTACHMENT D1: FAA FORECAST APPROVAL LETTER



U.S. Department
of Transportation
**Federal Aviation
Administration**

Northwest Mountain Region
Seattle Airports District Office 1601
2200 South 216th Street
Des Moines, Washington 98198

February 11, 2019

Mr. John Barsalou
Airport Director
City of Klamath Falls
6775 Arnold Avenue
Klamath Falls, OR 97603

**Crater Lake-Klamath Regional
Airport (LMT)
Aviation Forecast Approval**

Dear Mr. Barsalou:

The Federal Aviation Administration (FAA), Seattle Airports District Office has reviewed the aviation forecast for the Crater Lake-Klamath Regional Airport (LMT) Master Plan Update, submitted January 31, 2019. The FAA approves these forecasts for airport planning purposes, including for Airport Layout Plan (ALP) development. The FAA approval is based on the following:

1. The FAA also approves the existing critical aircraft as D-III and the future critical aircraft as D-IV.
2. The forecast is based on reasonable planning assumptions, current data, and appropriate forecasting methodologies.

The approval of the forecast and critical aircraft does not automatically constitute a commitment on the part of the United States to participate in any development recommended in the master plan or shown on the ALP. All future development will need to be justified by current activity levels at the time of proposed implementation. Further, the approved forecasts may be subject to additional analysis or the FAA may request a sensitivity analysis if this data is to be used for environmental or other planning purposes.

If you have any questions about this forecast approval, please call me at (206) 231-4137.

Sincerely,

Mathew T Wilder Digitally signed by Mathew T Wilder
Date: 2019.02.11 10:41:21 -08'00'

Mathew T. Wilder, PE
Civil Engineer, FAA Seattle Airports District Office

cc: Jeff Smith, Mead & Hunt Aviation Services



**Master Plan
Report**

ATTACHMENT D2: FORECAST DATA REFERENCE SOURCES

FAA AVIATION SOURCES

FAA Aerospace Forecasts

https://www.faa.gov/data_research/aviation/aerospace_forecasts/

FAA Terminal Area Forecasts

<http://taf.faa.gov/>

FAA Traffic Flow Management System Counts (TFMSC)

<http://aspmhelp.faa.gov/index.php/TFMSC>

FAA Review and Approval of FAA Forecasts (June 2008)

https://www.faa.gov/airports/planning_capacity/.../approval_local_forecasts_2008.pdf

Airport Cooperative Research Program (ACRP) Synthesis 2: Airport Aviation Activity Forecasting

<http://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=157>

FAA Asset (GA Role and Service Area Characteristics)

https://www.faa.gov/airports/planning_capacity/ga_study/

INDUSTRY PUBLICATIONS

General Aviation Manufacturing Association (GAMA) Factbook

<https://gama.aero/facts-and-statistics/statistical-databook-and-industry-outlook/>

National Business Aviation Association (NBAA) Factbook

<https://www.nbaa.org/business-aviation/fact-book/>

AIRPORT-LOCAL / OTHER

LMT Airport

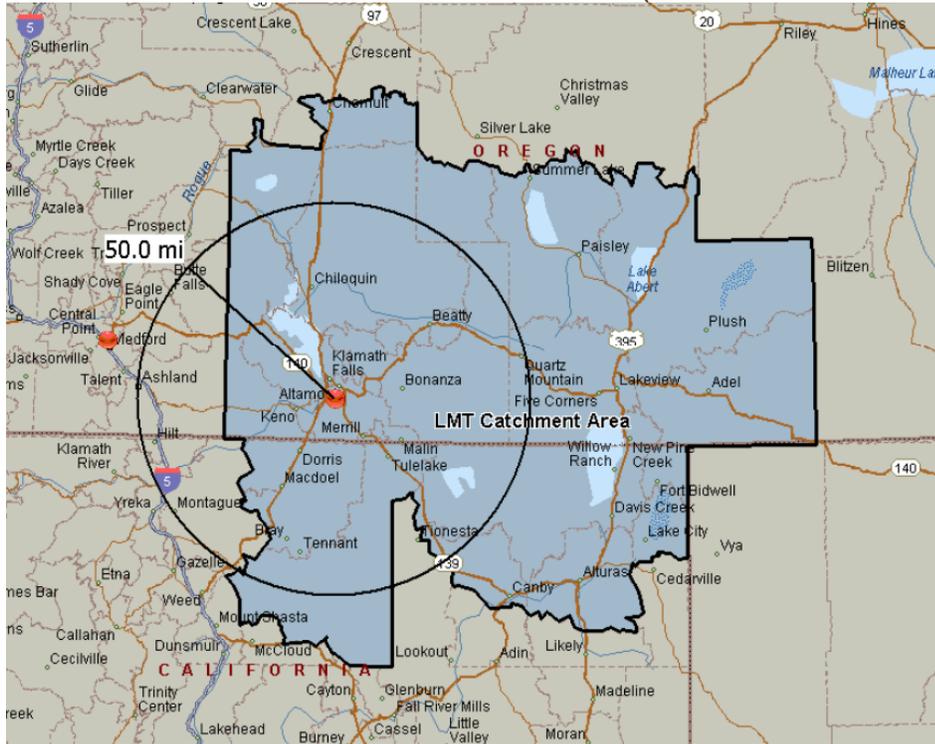
<http://www.flykfalls.com/>

US Census Data - Woods and Poole Economic, Inc.

<https://www.woodsandpoole.com>

ATTACHMENT D3: LMT AIRLINE FORECAST BACKGROUND DATA

LMT AIRLINE CATCHMENT AREA (2018 AIRLINE SERVICE MEMO)



True Market Estimate

LMT’s true market is estimated at 153,037 origin and destination passengers per year (209.6 passengers daily each way). **Table 1** shows the estimated split between domestic and international travel. Domestic travel was 141,309 of the total (92 percent) while international travel accounted for the remaining 11,728 passengers or 8 percent.

LMT retained 7 percent of travelers. MFR served 62 percent of catchment area travelers, and PDX served 15 percent. Other airports served the remaining 16 percent of catchment area travelers. LMT retained 8 percent of domestic travelers, while MFR served 64 percent, PDX 15 percent and other airports 13 percent of passengers. For international passengers, LMT retained less than 1 percent, while MFR garnered 42 percent, SFO 25 percent, PDX 16 percent, SMF 15 percent and other airports 2 percent.

Top 25 Domestic Destinations

TABLE 1 TRUE MARKET SUMMARY

ORIGINATING AIRPORT	PAX	PDEW	RETENTION
Domestic			
MFR	90,616	124.1	64%
PDX	21,517	29.5	15%
LMT	10,499	14.4	8%
SMF	7,227	9.9	5%
SFO	4,416	6.0	3%
Other	7,034	9.6	5%
Subtotal	141,309	193.6	100%
International			
MFR	4,872	6.7	42%
SFO	2,937	4.0	25%
PDX	1,887	2.6	16%
SMF	1,733	2.4	15%
LMT	10	0.0	0%
Other	289	0.4	2%
Subtotal	11,728	16.1	100%
Total			
MFR	95,488	130.8	62%
PDX	23,404	32.1	15%
LMT	10,509	14.4	7%
SMF	8,960	12.3	6%
SFO	7,352	10.1	5%
Other	7,323	10.0	5%
Total	153,037	209.6	100%

LMT True Passenger Market (September 15, 2017 Memo)

LMT True Passenger Market

(Passengers, retention rates, and passengers daily each way – PDEW)

- ▶ Crater Lake-Klamath Regional (LMT): 10,500 passengers | 7% retention | 14.4 PDEW
- ▶ Rogue Valley International-Medford (MFR): 95,500 passengers | 62% retention | 130.8 PDEW
- ▶ Portland International (PDX): 23,400 passengers | 15% retention | 31.1 PDEW
- ▶ Sacramento International (SMF): 8,900 passengers | 6% retention | 12.3 PDEW
- ▶ San Francisco International (SFO): 7,300 passengers | 5% retention | 10.1 PDEW
- ▶ Other Airports Combined: 7,300 passengers | 5% retention | 10.0 PDEW

Potential Destinations (Airport/City-Pair Market and Aircraft Type):

- ▶ Portland (PDX): Alaska (Horizon) with Q400 | Horizon (SkyWest) with CRJ-200
- ▶ San Francisco (SFO): United (SkyWest) with CRJ-200
- ▶ Denver (DEN): United (SkyWest) with CRJ-200
- ▶ Seattle (SEA): Alaska (Horizon) with Q400 | Delta (SkyWest) with CRJ-200
- ▶ Las Vegas (LAX): Multiple Airlines with Regional Jet
- ▶ Salt Lake (SLC): Delta (SkyWest) with CRJ-200
- ▶ Phoenix (PHX): American (Regional Affiliate) with Regional Jet

Historically, PDX and SFO have served as the predominate destinations.

Potential Airlines (Regional Affiliate):

- ▶ Alaska Airlines (Horizon/SkyWest)
- ▶ United (SkyWest)
- ▶ Delta (SkyWest)
- ▶ American (Various Regional Affiliate)

Potential Aircraft (Type/Model):

- ▶ CRJ-200 Regional Jet (45 to 50 passenger seats)
- ▶ Q400 Regional Turboprop (72 to 76 passenger seats)

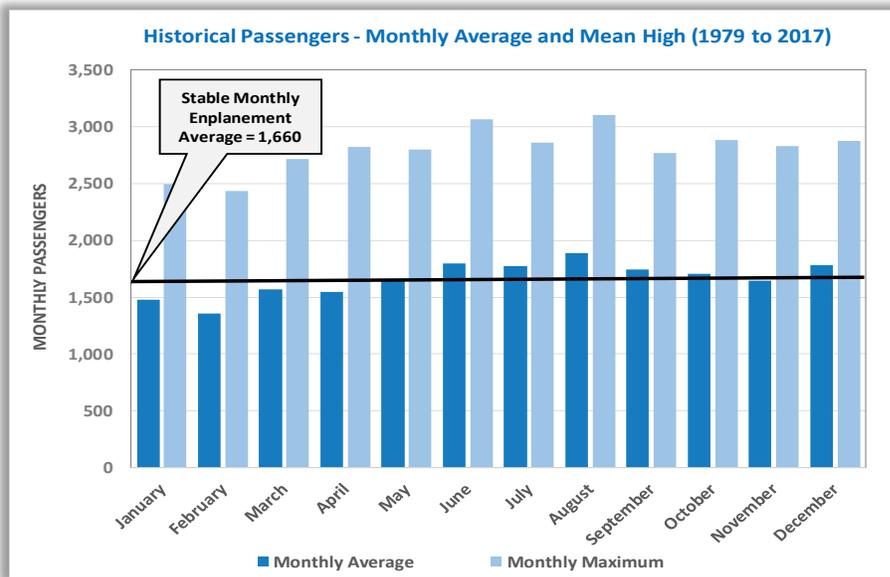
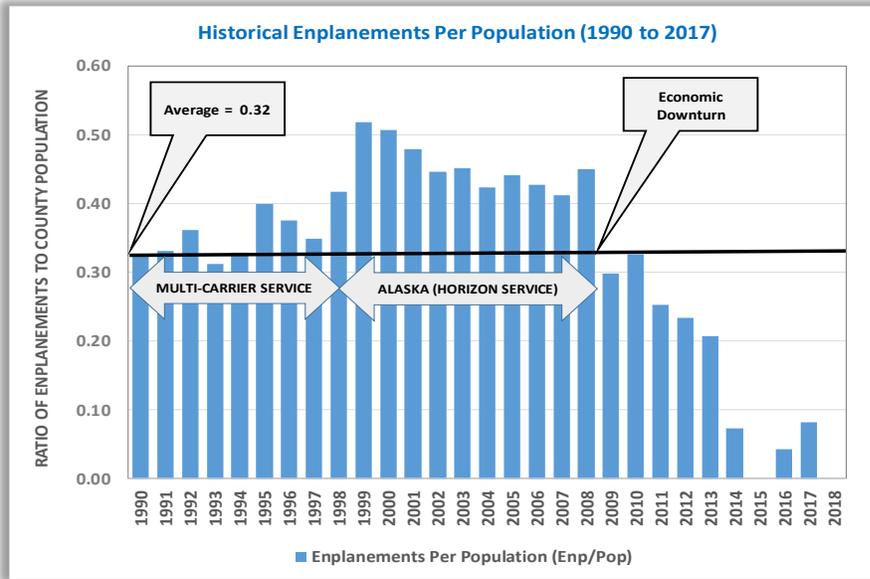
Potential Flight Frequency:

- ▶ One to two daily flights which will yield 2 to 4 aircraft operations per day.
- ▶ Flight offered six to seven days per week which could yield 624 to 1,456 annual operations.

Potential Load Factors (Passenger Seats to Available Seats):

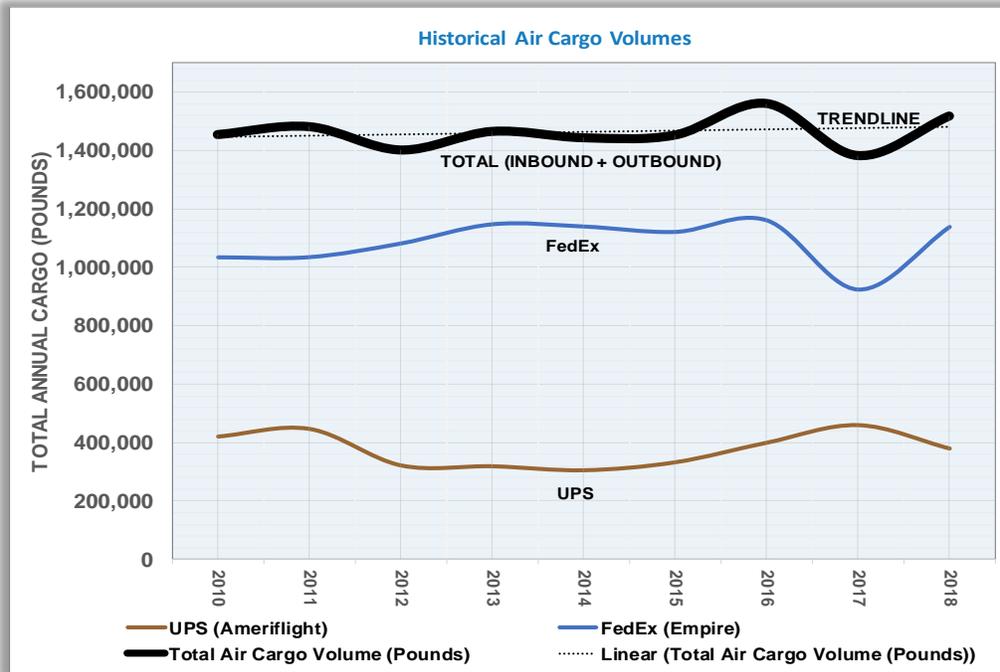
- ▶ 30 to 60 percent (typical rural regional airport load factor)
- ▶ 60 to 80 percent (regional airline industry load factor)

LMT AIRLINE TRENDS: AIRLINE PASSENGER AVERAGES



ATTACHMENT D4: LMT AIR CARGO FORECAST BACKGROUND DATA

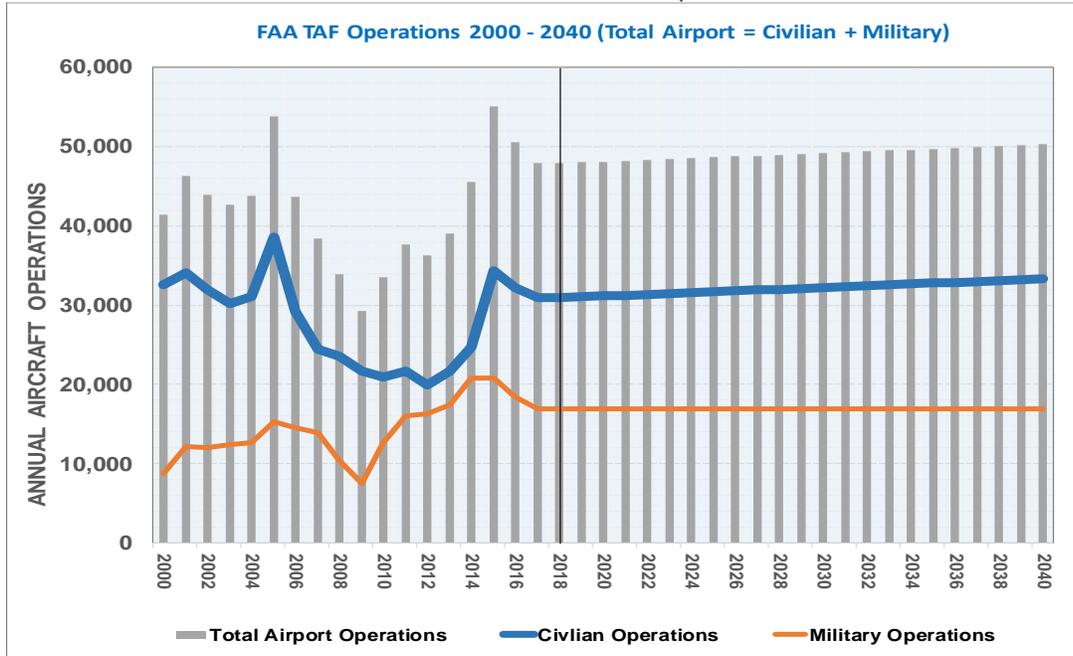
LMT HISTORIC AIR CARGO VOLUMES



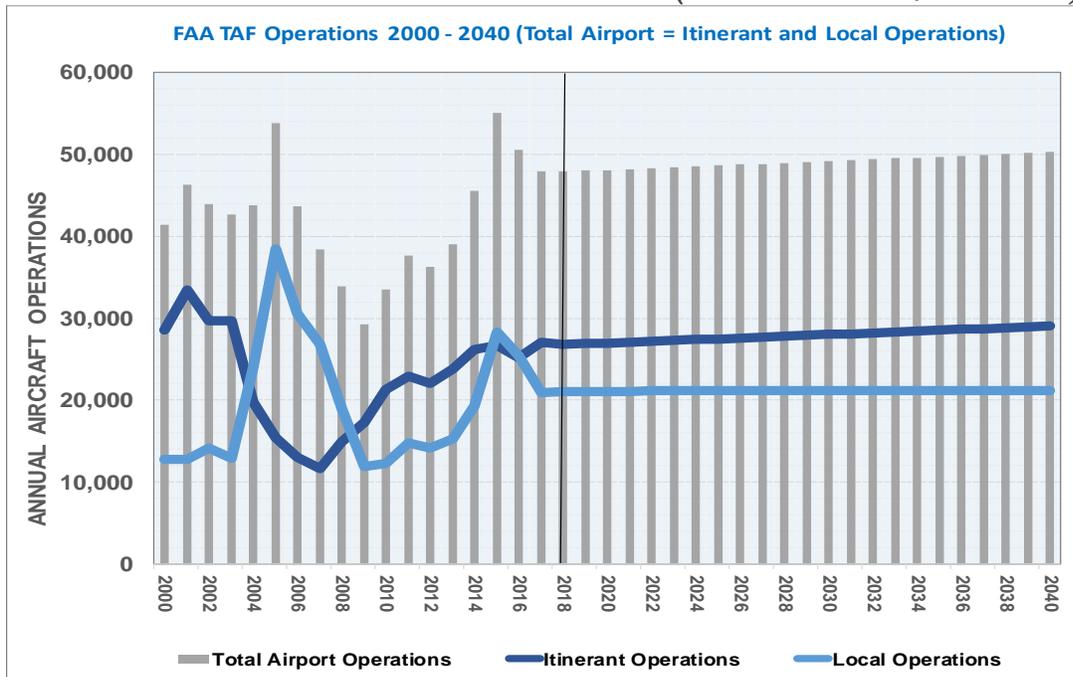
Historic Air Cargo Activity					
Year	Cargo Inbound		Cargo Outbound		Total Cargo
	UPS (Ameriflight)	FedEx (Empire)	UPS (Ameriflight)	FedEx (Empire)	
2010	302,971	556,214	116,756	479,362	1,455,303
2011	328,128	558,536	117,641	477,701	1,482,006
2012	236,412	559,907	83,946	523,059	1,403,324
2013	262,337	600,389	55,145	548,052	1,465,923
2014	257,698	601,672	46,080	539,125	1,444,575
2015	279,277	642,125	51,993	480,239	1,453,634
2016	324,708	736,827	73,743	425,020	1,560,298
2017	376,195	586,512	82,663	339,043	1,384,413
2018	311,615	745,404	66,795	394,006	1,517,821
Averaged Total	297,705	620,843	77,196	467,290	1,463,033
Percent of Total	20.3%	42.4%	5.3%	31.9%	-
Averaged Total	918,547		544,485		-
Percent of Total	63%		37%		-

ATTACHMENT D5: LMT AIRCRAFT OPERATIONS BACKGROUND

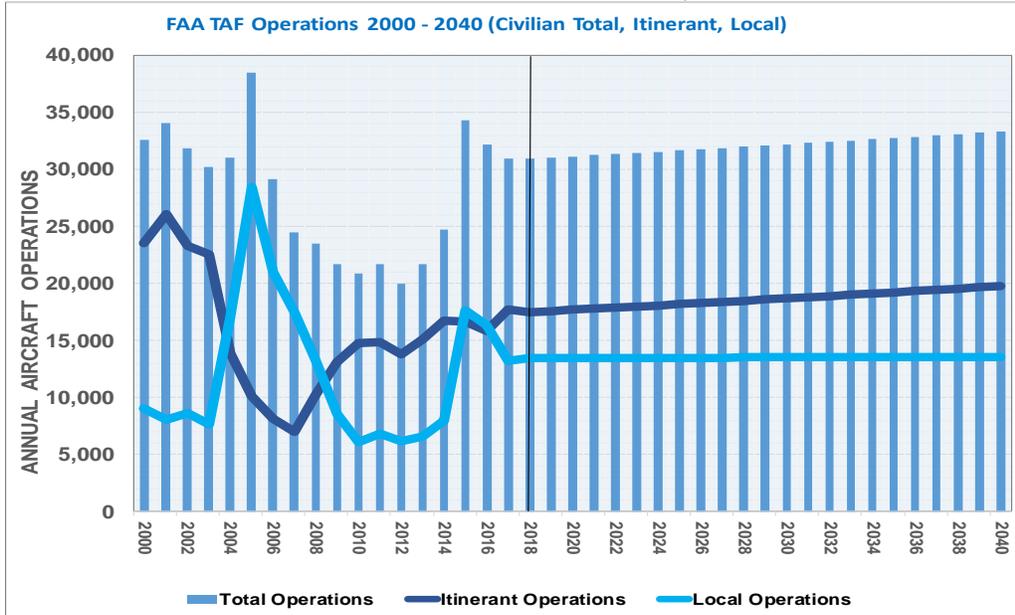
LMT TOTAL AIRPORT OPERATIONS (CIVILIAN / MILITARY)



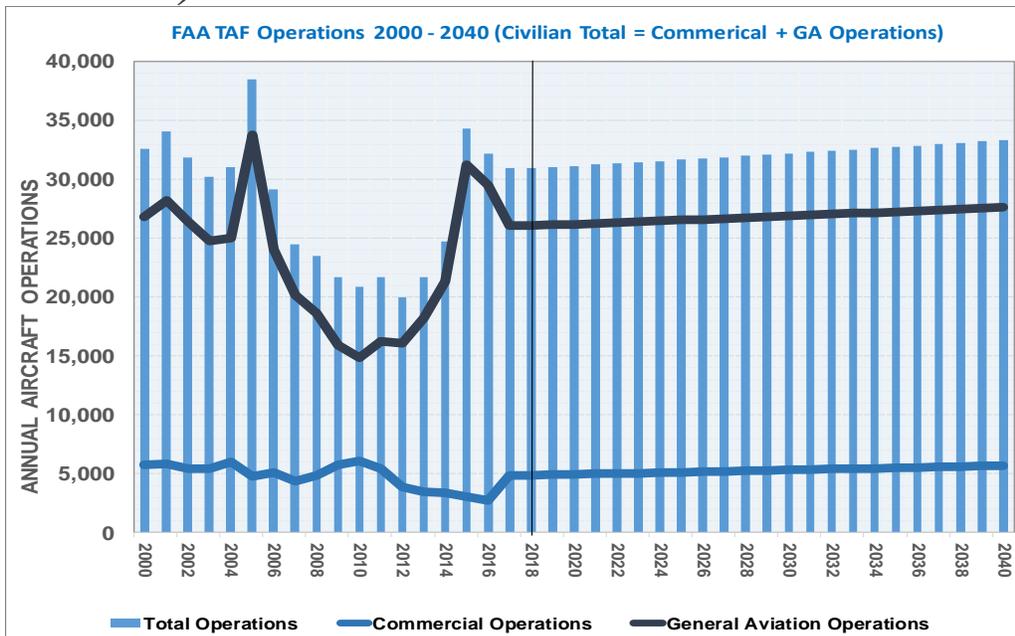
LMT TOTAL AIRPORT OPERATIONS (ITINERANT / LOCAL)



LMT TOTAL CIVILIAN OPERATIONS (ITINERANT / LOCAL)



LMT TOTAL CIVILIAN OPERATIONS (COMMERCIAL / GENERAL AVIATION)



APPENDIX D : FORECAST SUPPORTING DATA

LMT 2018 OPERATIONS SUMMARY

AIRPORT ANNUAL OPERATIONS: EXISTING CONDITIONS (2017/2018)						
Aircraft Operations	Total Airport Operations (2017/2018)	Total Airport Percent (2017/2018)	Runway 14/32 (# Operations)	Runway 14/32 (% Operations)	Runway 7/25 (# Operations)	Runway 7/25 (% Operations)
TOTAL	48,500	100.0%	42,424	87.5%	6,076	12.5%
Operations by Type						
Itinerant Operations	27,500	56.7%	24,942	90.7%	2,558	9.3%
Commercial	3,600	7.4%	3,498	7.2%	102	0.2%
Air Carrier	0	0.0%	0	0.0%	0	0.0%
Air Cargo - UPS	250	0.5%	238	95.0%	13	5.0%
Turboprop - Twin	250					
Air Cargo - FedEx	750	1.5%	713	95.0%	38	5.0%
Turboprop - Single	750					
GA Air Taxi / Medical	2,600	5.4%	2,548	98.0%	52	2.0%
Business Jet - Large	390					
Turboprop - Single	1,300					
Turboprop - Twin	260					
Helicopter	650					
General Aviation	14,600	30.1%	12,144	25.0%	2,456	5.1%
General Aviation / FBO	11,050	22.8%	9,945	90.0%	1,105	10.0%
Business Jet - Large	380					
Business Jet - Small	720					
Turboprop - Twin	803					
Turboprop - Single	876					
Piston - Twin	2,066					
Piston - Single	5,840					
Helicopter	365					
Flight Training - Pelican	1,300	2.7%	1,040	80.0%	260	20.0%
Piston - Twin	0					
Piston - Single	1,300					
Helicopter	0					
Flight Training - Precision	1,125	2.3%	956	85.0%	169	15.0%
Piston - Twin	0					
Piston - Single	506					
Helicopter	619					
US Forest Service	225	0.5%	203	90.0%	23	10.0%
Jet - Large	34					
Turboprop - Twin	79					
Turboprop - Single	113					
Agriculture	900	1.9%	0	0.0%	900	100.0%
Turboprop - Single	900					
Piston - Single	0					
Other						
Military	9,300	19.2%	9,300	100.0%	0	0.0%
Oregon Guard	8,835	18.2%	8,835	100.0%	0	0.0%
Other Military	465	1.0%	465	100.0%	0	0.0%

LMT 2018 OPERATIONS SUMMARY (CONTINUED)

Aircraft Operations	Total Airport Operations (2017/2018)	Total Airport Percent (2017/2018)	Runway 14/32 (# Operations)	Runway 14/32 (% Operations)	Runway 7/25 (# Operations)	Runway 7/25 (% Operations)
Local Operations	21,000	43.3%	17,483	83.3%	3,518	16.8%
General Aviation	13,400	27.6%	9,883	73.8%	3,518	26.3%
General Aviation / FBO	5,200	10.7%	4,160	80.0%	1,040	20.0%
Piston - Single	4,940					
Piston - Twin	260					
Flight Training - Pelican	3,900	8.0%	2,730	70.0%	1,170	30.0%
Piston - Twin	0					
Piston - Single	3,900					
Helicopter	0					
Flight Training - Precision	3,375	7.0%	2,700	80.0%	675	20.0%
Piston - Twin	0					
Piston - Single	1,519					
Helicopter	1,856					
US Forest Service	325	0.7%	293	90.0%	33	10.0%
Jet - Large	49					
Turboprop - Twin	114					
Turboprop - Single	163					
Agriculture	600	1.2%	0	0.0%	600	100.0%
Turboprop - Single	600					
Piston - Single	0					
Other						
Military	7,600	15.7%	7,600	0.0%	0	0.0%
Oregon Guard	6,840	14.1%	6,840	100.0%	0	0.0%
Other Military	760	1.6%	760	100.0%	0	0.0%
SubTotal - Civilian Traffic	31,600	65%	25,524	81%	6,076	19%
Civilian - Fixed Wing	28,440	90.0%	--	--	--	--
Civilian - Helicopter	3,160	10.0%	--	--	--	--
SubTotal - Military Traffic	16,900	35%	16,900	100%	0	0%

ATTACHMENT D6: FAA CRITICAL AIRCRAFT GUIDANCE

This FAA Advisory Circular provides guidance on the use of Critical Aircraft in facility planning, and related FAA decision making, for federally obligated airports. Specifically, this AC establishes a common, uniform definition of Critical Aircraft for all deliberations of the FAA Office of Airports, inclusive of planning and environmental, design and engineering, and financial decision making regarding airport development. Clarifications regarding Section 2.4 and 2.5 are shown below.



U.S. Department
of Transportation
**Federal Aviation
Administration**

Advisory Circular

Subject: Critical Aircraft and Regular Use
Determination

Date: 6/20/2017

AC No: 150/5000-17

Initiated By: APP-400

2.4 Can Military Aircraft or Other Federal Agency Aircraft Be Included in Documenting Aeronautical Activity to Establish Regular Use?

2.4.1 Yes. Prudent facility planning should include consideration of the requirements of military aircraft or other federally-owned aircraft operating at the airport. However, this determination is made for airport planning purposes only. Federal law does not allow FAA to fund projects that solely benefit another federal agency. Therefore, in some cases, the FAA will need to designate a Critical Aircraft for AIP or PFC eligibility that is separate and distinct from the Critical Aircraft used in planning the airfield.

2.5 Can Civil Aircraft Operated Under a Federal Contract Be Included in Documenting Aeronautical Activity to Establish Regular Use?

Yes, if these types of flights are operated under applicable FAA regulations in 14 CFR Parts 91, 121, or 135. Aircraft operated by civil operators under military or other federal government agency contracts as civil operations are counted as civil aircraft activity for the purposes of documenting aeronautical activity, and for AIP or PFC funded projects. This includes civil aircraft operating under contract with the U.S. Forest Service for aerial firefighting activities or unscheduled military aircraft charter flights.

Appendix E

Facility Requirements Supporting Data

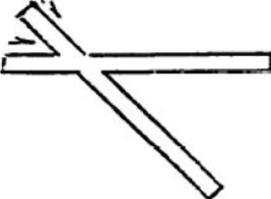


Appendix E: Facility Requirements Data

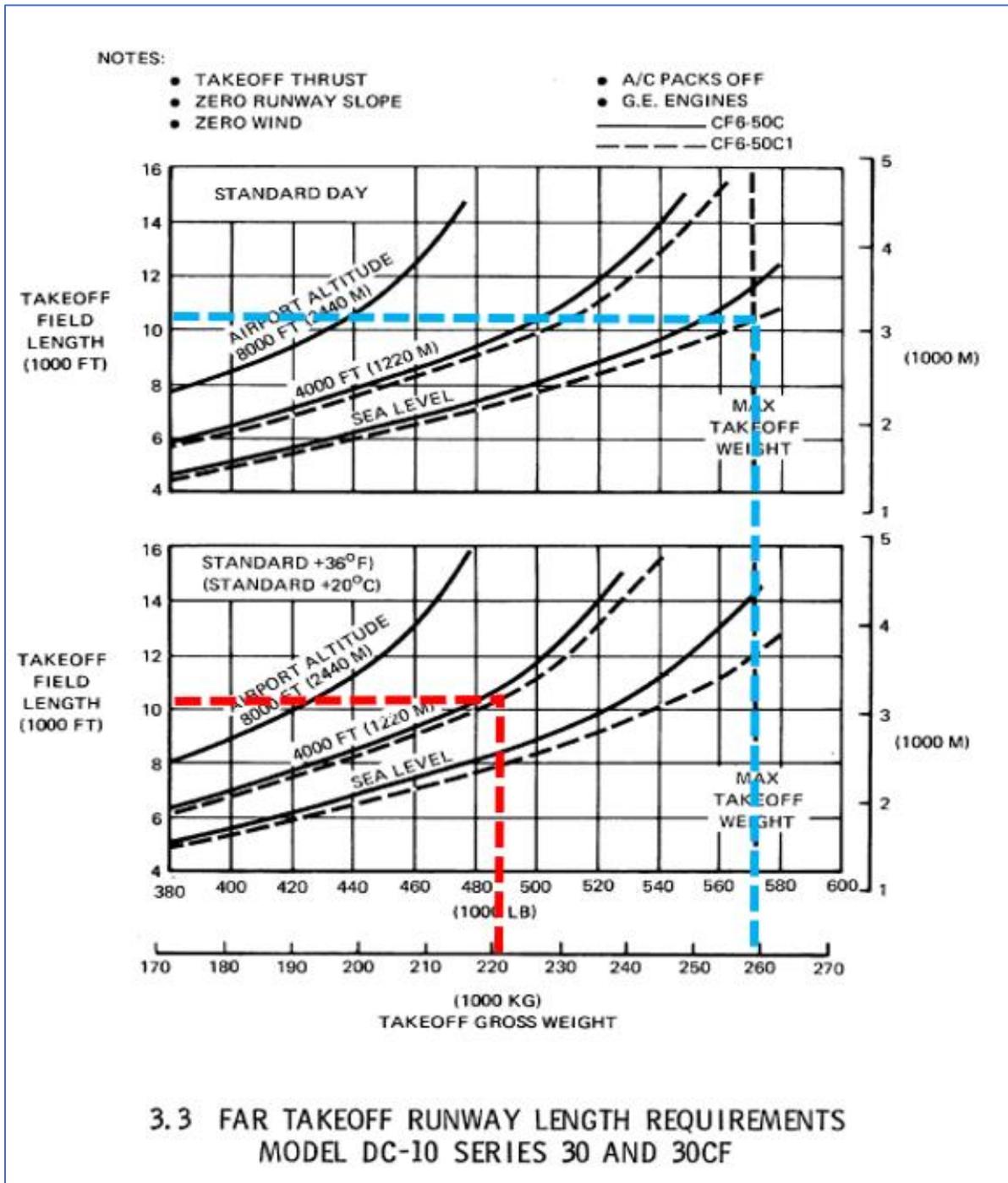
- Attachment E1:** LMT Annual Service Volume (ASV) and Capacity/Demand Calculations Factors
- Attachment E2:** Runway 14/32 Length Curve (Future Critical Aircraft DC-10-30 Series)
- Attachment E3:** Taxiway System Critical Aircraft
- Attachment E4:** Unified Facilities Criteria (UFC) Airfield and Heliport Planning and Design – General Requirements
- Attachment E5:** UFC Airfield and Heliport Planning and Design – EOR Pads

ATTACHMENT E1: LMT ANNUAL SERVICE VOLUME (ASV) AND CAPACITY/DEMAND CALCULATIONS FACTORS

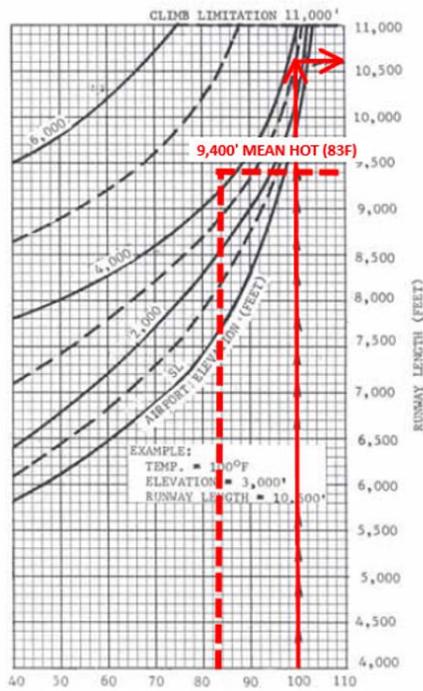
ANNUAL SERVICE VOLUME (ASV)					
Capacity Component	2018	2023	2028	2033	2038
ASV Total Annual Aircraft Operations	48,500	52,955	51,655	53,355	54,955
ASV Peak Month Operations	5,335	7,943	7,748	8,003	8,243
ASV Average Day Peak Month (ADPM) Operations	175	261	255	263	271
ASV Total Peak-Hour Operations	21	31	31	32	33
Annual Service Volume (ASV) and Demand/Capacity (D/C) Outputs (% Capacity Used)					
ASV - Annual Operations	200,000	200,000	200,000	200,000	200,000
ASV - Annual Demand/Capacity (% Used)	24%	26%	26%	27%	27%
Hourly Demand/Capacity (% Used)	24%	35%	34%	35%	36%
VFR Demand/Capacity (% Used)	21%	31%	30%	31%	32%
IFR Hourly Operations (% Used)	4%	6%	6%	6%	7%

NO.	Runway-use Configuration	Mix Index %(C+3D)	Hourly Capacity Ops/Hr		Annual Service Volume Ops/Yr
			VFR	IFR	
1.		0 to 20	98	59	230,000
		21 to 50	74	57	195,000
		51 to 80	63	56	205,000
		81 to 120	55	53	210,000
		121 to 130	51	50	240,000
9.		0 to 20	98	59	230,000
		21 to 50	77	57	200,000
		51 to 80	77	56	215,000
		81 to 120	76	59	225,000
		121 to 180	72	60	265,000

ATTACHMENT E2: RUNWAY 14/32 LENGTH CURVE (FUTURE CRITICAL AIRCRAFT DC-10-30 SERIES)

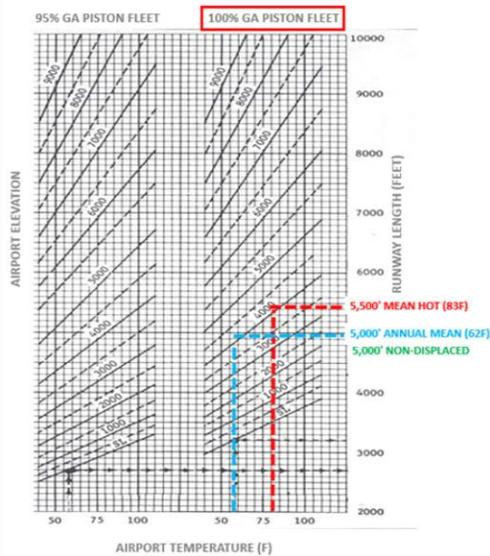


FAA Runway Length Curves (Charts)



FAA Recommended Runway Length (Civilian Users) 100% Business Jet Fleet @ 90% Load:

9,400' = FAA length at LMT mean maximum ambient temperature (83F) and LMT field elevation (4,085')



Recommended Crosswind Runway Length (100% GA Fleet):

5,000'± = Corrects existing runway end displaced threshold(s)

5,000' = FAA length at standard ambient temperature (62F) and LMT field elevation (4,095')

5,500' = FAA length at LMT mean maximum ambient temperature (83F) and LMT field elevation (4,095')

ATTACHMENT E3: TAXIWAY SYSTEM CRITICAL AIRCRAFT

TAXIWAY SYSTEM - FUTURE FACILITY REQUIREMENTS						
Aircraft Type/Category	User/Operator	FAA RDC	Aircraft Type	MTOW	Gear Type	Existing or Future User
RUNWAY 14-32 - MOST DEMANDING AIRCRAFT						
Falcon 50 / 900 Series	FBO - Medical/Charter	B/C-II	Large Business Jet	45,500	DWG	Existing
Gulfstream 400 Series	FBO - Medical/Charter	D-II	Large Business Jet	74,000	DWG	Forecast
Gulfstream 500 Series	FBO - Medical/Charter	D-III	Large Business Jet	90,000	DWG	Forecast
DC-10 Air Fire Tanker	US Forest Service	D-IV	Transport - Jet	590,000	DTWG	Existing
MD-87 / DC-9 (or Similar)	US Forest Service	C-III	Transport - Jet	149,500	DWG	Existing
Avro RJ-85 / 146 (or Similar)	US Forest Service	C-III	Transport - Jet	97,200	DWG	Existing
DC-7	US Forest Service	B-III	Transport - Turboprop	120,000	DWG	Existing
C-130 Hercules (or Similar)	US Forest Service	C-IV	Transport - Turboprop	155,000	DTWG	Existing
Grumman S2-T (or Similar)	US Forest Service	B-II	Transport - Turboprop	26,100	DWG	Existing
B-737	US Forest Service	C-III	Transport - Jet	160,000	DWG	Forecast
F-15 Eagle	ORANG Guard	D-I	Fighter Jet	68,000	SWG	Existing
F-16 Falcon	Military Branches	D-I	Fighter Jet	42,000	SWG	Existing
F-18 Hornet	Military Branches	D-I	Fighter Jet	52,000	SWG	Existing
F-35 Lightning	Military Branches	D-I	Fighter Jet	70,000	SWG	Existing
C-130 Hercules	Military Branches	C-IV	Transport - Turboprop	155,000	DTWG	Existing
KC-10 Extender	Military Branches	D-IV	Fuel Transport - Jet	590,000	DTWG	Existing
KC-135 Stratotanker	Military Branches	D-IV	Fuel Transport - Jet	325,000	DTWG	Existing
C-17 Globemaster	Military Branches	C-IV	Cargo Transport - Jet	585,000	DTWG	Existing
Boeing P-8 Poseidon (B-737)	Military Branches	C-III	Cargo Transport - Jet	160,000	DWG	Existing
KC-46A Pegasus (Replace KC-135)	Military Branches	D-IV	Fuel Transport - Jet	395,000	DTWG	Existing
RUNWAY 7/25 - MOST DEMANDING AIRCRAFT						
King Air 350/1900 Series	Critical Aircraft	B-II	Twin Turboprop	18,000	DWG	Existing
Falcon 50 / 900 Series	FBO - Medical/Charter	B/C-II	Large Business Jet	45,500	DWG	Existing
Cessna Citation 500 Series	GA	B-II	Small Business Jet	18,000	SWG	Existing
Cessna Caravan - 208	Cargo	A-II	Single Turboprop	9,000	SWG	Existing
Beechcraft 99	Cargo	B-I	Twin Turboprop	16,000	DWG	Existing
Air Tractor - AG	Ag - Tenant	B-II	Single Turboprop	15,000	SWG	Existing
Air Tractor - 800 Series	USFS	B-II	Single Turboprop	16,000	SWG	Existing
S-2T Grumman	USFS	B-II	Twin Turboprop	26,000	DWG	Existing
Aero Commander	USFS	B-II	Twin Piston	9,000	SWG	Existing
Pilatus PC-12	Medical	A-II	Single Turboprop	10,400	SWG	Existing

ATTACHMENT E4: UNIFIED FACILITIES CRITERIA (UFC) AIRFIELD AND HELIPORT PLANNING AND DESIGN – GENERAL REQUIREMENTS

UFC 3-260-01
17 NOVEMBER 2008

CHAPTER 1 (Applicable sections)

GENERAL REQUIREMENTS

1-1 **PURPOSE OF THIS MANUAL.** This manual provides standardized airfield, heliport, and airspace criteria for the geometric layout, design, and construction of runways, helipads, taxiways, aprons, and related permanent facilities to meet sustained operations.

1-2 **SCOPE.** This manual prescribes dimensional and geometric layout criteria for safe standards for airfields, landing zones, heliports and helipads, and related permanent facilities, as well as the navigational airspace surrounding these facilities. Criteria in this manual pertain to all Department of Defense (DOD) military facilities in the United States, its territories, trusts, and possessions, and unless otherwise noted, to DOD facilities overseas on which the United States has vested base rights. For DOD facilities overseas; if a written agreement exists between the host nation and the DOD that requires application of either North Atlantic Treaty Organization (NATO), International Civil Aviation Organization (ICAO), or Federal Aviation Administration (FAA) standards, those standards shall apply as stipulated within the agreement; however, DOD proponents shall apply the criteria within this manual to the maximum extent practicable. United States Air Force (USAF) bases within the European theater may be authorized by Headquarters United States Forces in Europe (HQ USAFE) to use NATO criteria. Tenant organizations on civil airports in the continental United States (CONUS) will use these criteria to the extent practicable; otherwise, FAA criteria will apply. Specifically, on airfield areas that are joint-use or with restrictions and clear zones generated by joint-use areas, the FAA criteria contained in FAA Advisory Circular (AC) 150/5300-13 is applicable. For areas where airfield surfaces are Air National Guard (ANG) controlled, whether fee-owned or exclusive use leased, the criteria contained in this manual are applicable. Procedures for pavement structural design and pavement marking and lighting are beyond the scope of this manual.

1-4 APPLICATION OF CRITERIA

1-4.1 **Existing Facilities.** The criteria in this manual are not intended to apply to facilities located or constructed under previous standards. This includes cases where runways may lack paved shoulders or other physical features because they were not previously required or authorized. Existing airfield facilities need not be modified nor upgraded to conform to the criteria in this manual if these facilities meet current mission requirements. If a change in mission necessitates reconstruction, an upgrade to current standards should be accomplished where practical. Once upgraded, facilities must be maintained at a level that will sustain

compliance with current standards. USAF personnel must identify the status of features and facilities on airfield maps as exempt (because they were constructed under a previous, less stringent standard), as a permissible deviation (authorized as a deviation to airfield criteria and sited appropriately), or as a violation, with or without approved waiver. Building restriction lines (BRL) encompass vertical facilities along the flight line that are exempt because they were constructed under previous standards. For other items or features, annotate the airfield map to identify the status of the facility or feature and the date of construction or waiver number. See Appendix B, Section 18, for the guidelines used to establish the BRL.

1-4.3 New Construction. The criteria established in this manual apply to all new facilities. All new construction will comply with the criteria established in this manual unless the appropriate waivers are obtained as outlined in Appendix B, Section 1. For the USAF, new facilities within the appropriate category code may be constructed without a waiver if they are behind and beneath the boundaries of the BRL (see Appendix B, Section 18). All site plans for new facilities that will be sited within this area should clearly delineate the limits (including elevation) of the BRL and the relationship to the proposed facility. New facilities must be maintained at a level that will sustain compliance with the current standards.

1-4.5 Military Activities on Civil Owned Airfields. Air Force, Air Force Reserve Command (AFRC), and ANG installations on municipal airports or FAA-controlled airfields must apply FAA criteria to facilities such as runways and taxiways that are jointly used by civilian and military aircraft. Facilities that are for military use only, such as aircraft parking aprons, must apply Air Force/DOD criteria.

ATTACHMENT E5: UFC AIRFIELD AND HELIPORT PLANNING AND DESIGN – EOR PADS

UFC 3-260-01
February 4, 2019

6-10 ARM/DEARM PADS.

The arm/dearm pad is used for arming aircraft immediately before takeoff and for dearming (safing) weapons retained or not expended upon their return. Do not site arm/dearm pads, other aprons, hot cargo spots, or taxiways to these facilities in a way that will allow penetration of the approach-departure clearance surface.

6-10.2 Location.

Air Force arm/dearm pads should be located adjacent to runway thresholds and sited such that armed aircraft are oriented in the direction of least populated areas or towards revetments.

Appendix F

Capital Improvement Plan Pro Forma



CRATER LAKE

KLAMATH REGIONAL
AIRPORT

APPENDIX F: CAPITAL IMPROVEMENT PLAN PRO FORMA

Account Activity	Historical					Forecasted					
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Passenger Airline Aeronautical Revenue											
Passenger Airline Landing Fees	\$ -	\$ -	\$ 17,255	\$ 2,393	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Terminal Arrival Fees, Rents, and Utilities	\$ -	\$ -	\$ 15,485	\$ 8,465	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Terminal Area Apron Charges/Tiedowns	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Federal Inspection Fees	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Other Passenger Aeronautical fees	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Totals	\$ -	\$ -	\$ 32,740	\$ 10,858	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Non- Passenger Aeronautical Revenue											
Landing Fees from Cargo	\$ 13,471	\$ 11,684	\$ 11,812	\$ 10,838	\$ 10,887	\$ 11,000	\$ 11,100	\$ 11,300	\$ 11,500	\$ 11,700	\$ 11,900
Landing Fees from GA and Military	\$ 25,255	\$ 7,958	\$ 5,723	\$ 32,993	\$ 31,477	\$ 31,700	\$ 31,900	\$ 32,100	\$ 32,300	\$ 32,500	\$ 32,700
FBO Revenue	\$ 71,783	\$ 55,627	\$ 57,066	\$ 68,562	\$ 60,097	\$ 60,700	\$ 61,300	\$ 61,900	\$ 62,500	\$ 63,100	\$ 63,700
Cargo and Hangar Rentals	\$ 218,619	\$ 225,695	\$ 229,319	\$ 224,213	\$ 236,458	\$ 239,000	\$ 241,000	\$ 243,000	\$ 245,000	\$ 247,000	\$ 249,000
Aviation Fuel Tax- retained for Airport Use	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Fuel Sales Net profit/loss on Fuel Flowage Fees	\$ 40,368	\$ 31,585	\$ 35,073	\$ 50,578	\$ 44,308	\$ 44,700	\$ 45,100	\$ 45,500	\$ 45,900	\$ 46,300	\$ 46,700
Security Reimbursement from Federal Gov.	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Other- Non Passenger Aeronautical Revenue	\$ 68,856	\$ 68,856	\$ 68,856	\$ 68,856	\$ 68,856	\$ 68,900	\$ 68,900	\$ 68,900	\$ 68,900	\$ 68,900	\$ 68,900
Totals	\$ 438,352	\$ 401,405	\$ 407,849	\$ 456,040	\$ 452,083	\$ 456,000	\$ 459,300	\$ 462,700	\$ 466,100	\$ 469,500	\$ 472,900
Total Aeronautical Revenue	\$ 438,352	\$ 401,405	\$ 440,589	\$ 466,898	\$ 452,083	\$ 456,000	\$ 459,300	\$ 462,700	\$ 466,100	\$ 469,500	\$ 472,900
Non-Aeronautical Revenue											
Land and Non-Terminal Facilities Leases and Revenues	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Terminal- Food and Beverage	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Terminal- Retail Stores and Duty Free	\$ 181	\$ 118	\$ 193	\$ 187	\$ 225	\$ 200	\$ 200	\$ 200	\$ 200	\$ 200	\$ 200
Terminal -Services and Other	\$ 16,937	\$ 3,252	\$ 17,990	\$ 9,144	\$ 5,077	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000
Rental Cars-excludes CFC	\$ 39,085	\$ 40,306	\$ 51,597	\$ 40,863	\$ 34,564	\$ 35,000	\$ 35,000	\$ 35,000	\$ 35,000	\$ 35,000	\$ 35,000
Parking and Ground Transportation	\$ 1,800	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Hotel	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Other (Subtotals Below)	\$ 960,327	\$ 927,956	\$ 1,360,941	\$ 1,403,016	\$ 1,217,889	\$ 1,065,000	\$ 1,075,000	\$ 1,086,000	\$ 1,096,000	\$ 1,106,000	\$ 1,119,000
Taxes - Current & Delinquent	\$ 336,220	\$ 343,445	\$ 370,065	\$ 298,774	\$ 308,808	\$ 335,000	\$ 338,000	\$ 342,000	\$ 345,000	\$ 348,000	\$ 352,000
Hotel/Motel Tax	\$ 380,259	\$ 274,003	\$ 420,028	\$ 625,135	\$ 438,127	\$ 335,000	\$ 338,000	\$ 342,000	\$ 345,000	\$ 348,000	\$ 352,000
Utilities	\$ 14,008	\$ 12,245	\$ 12,078	\$ 14,636	\$ 11,126	\$ 13,000	\$ 13,000	\$ 13,000	\$ 13,000	\$ 13,000	\$ 14,000
Transfers In - Water	\$ 215,289	\$ 289,575	\$ 432,325	\$ 444,625	\$ 458,800	\$ 372,000	\$ 376,000	\$ 379,000	\$ 383,000	\$ 387,000	\$ 391,000
Advertising	\$ -	\$ -	\$ 14,250	\$ 1,344	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Contributions	\$ -	\$ -	\$ 100,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Sale of Capital Assets	\$ -	\$ 6,555	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Misc.	\$ 14,551	\$ 2,133	\$ 12,195	\$ 18,502	\$ 1,028	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000
Total Non-Aeronautical Revenue	\$ 1,018,330	\$ 971,632	\$ 1,430,721	\$ 1,453,210	\$ 1,257,755	\$ 1,105,200	\$ 1,115,200	\$ 1,126,200	\$ 1,136,200	\$ 1,146,200	\$ 1,159,200
Total Operating Revenue	\$ 1,456,682	\$ 1,373,037	\$ 1,871,310	\$ 1,920,108	\$ 1,709,838	\$ 1,561,200	\$ 1,574,500	\$ 1,588,900	\$ 1,602,300	\$ 1,615,700	\$ 1,632,100
Operating Expenses											
Personnel Compensation and Benefits	\$ 458,620	\$ 554,020	\$ 605,853	\$ 579,548	\$ 587,348	\$ 593,200	\$ 599,100	\$ 605,100	\$ 611,200	\$ 617,300	\$ 623,500
Communications and Utilities	\$ 112,866	\$ 119,159	\$ 131,253	\$ 122,923	\$ 135,118	\$ 136,500	\$ 137,900	\$ 139,300	\$ 140,700	\$ 142,100	\$ 143,500
Supplies and Materials	\$ 223,363	\$ 173,710	\$ 643,165	\$ 337,984	\$ 293,804	\$ 296,700	\$ 299,700	\$ 302,700	\$ 305,700	\$ 308,800	\$ 311,900
Contractual Services	\$ 98,660	\$ 168,482	\$ 100,966	\$ 109,173	\$ 219,634	\$ 222,000	\$ 224,000	\$ 226,000	\$ 229,000	\$ 231,000	\$ 233,000
Insurance, Claims, and Settlements	\$ 44,980	\$ 48,373	\$ 50,182	\$ 49,790	\$ 46,380	\$ 46,800	\$ 47,300	\$ 47,800	\$ 48,300	\$ 48,800	\$ 49,300
Other (Subtotals Below)	\$ 117,500	\$ 95,782	\$ 114,779	\$ 107,601	\$ 133,376	\$ 114,000	\$ 116,000	\$ 117,000	\$ 119,000	\$ 120,000	\$ 121,000
Admin Service Charge	\$ 106,750	\$ 86,500	\$ 100,200	\$ 101,475	\$ 131,475	\$ 106,000	\$ 107,000	\$ 108,000	\$ 110,000	\$ 111,000	\$ 112,000
Maintenance & Janitorial	\$ 10,400	\$ 8,655	\$ 12,277	\$ 4,195	\$ 1,445	\$ 7,000	\$ 8,000	\$ 8,000	\$ 8,000	\$ 8,000	\$ 8,000
Engineering	\$ 350	\$ 627	\$ 2,302	\$ 1,931	\$ 456	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000
Total	\$ 1,055,989	\$ 1,159,526	\$ 1,646,198	\$ 1,307,019	\$ 1,415,660	\$ 1,409,200	\$ 1,424,000	\$ 1,437,900	\$ 1,453,900	\$ 1,468,000	\$ 1,482,200
Depreciation	\$ 1,619,201	\$ 1,652,132	\$ 1,637,653	\$ 1,599,660	\$ 1,925,008	\$ 1,944,300	\$ 1,963,700	\$ 1,983,300	\$ 2,003,100	\$ 2,023,100	\$ 2,043,300
Total Operating Expenses	\$ 2,675,190	\$ 2,811,658	\$ 3,283,851	\$ 2,906,679	\$ 3,340,668	\$ 3,353,500	\$ 3,387,700	\$ 3,421,200	\$ 3,457,000	\$ 3,491,100	\$ 3,525,500
Operating Income (Loss)	\$ (1,218,508)	\$ (1,438,621)	\$ (1,412,541)	\$ (986,571)	\$ (1,630,830)	\$ (1,792,300)	\$ (1,813,200)	\$ (1,832,300)	\$ (1,854,700)	\$ (1,875,400)	\$ (1,893,400)

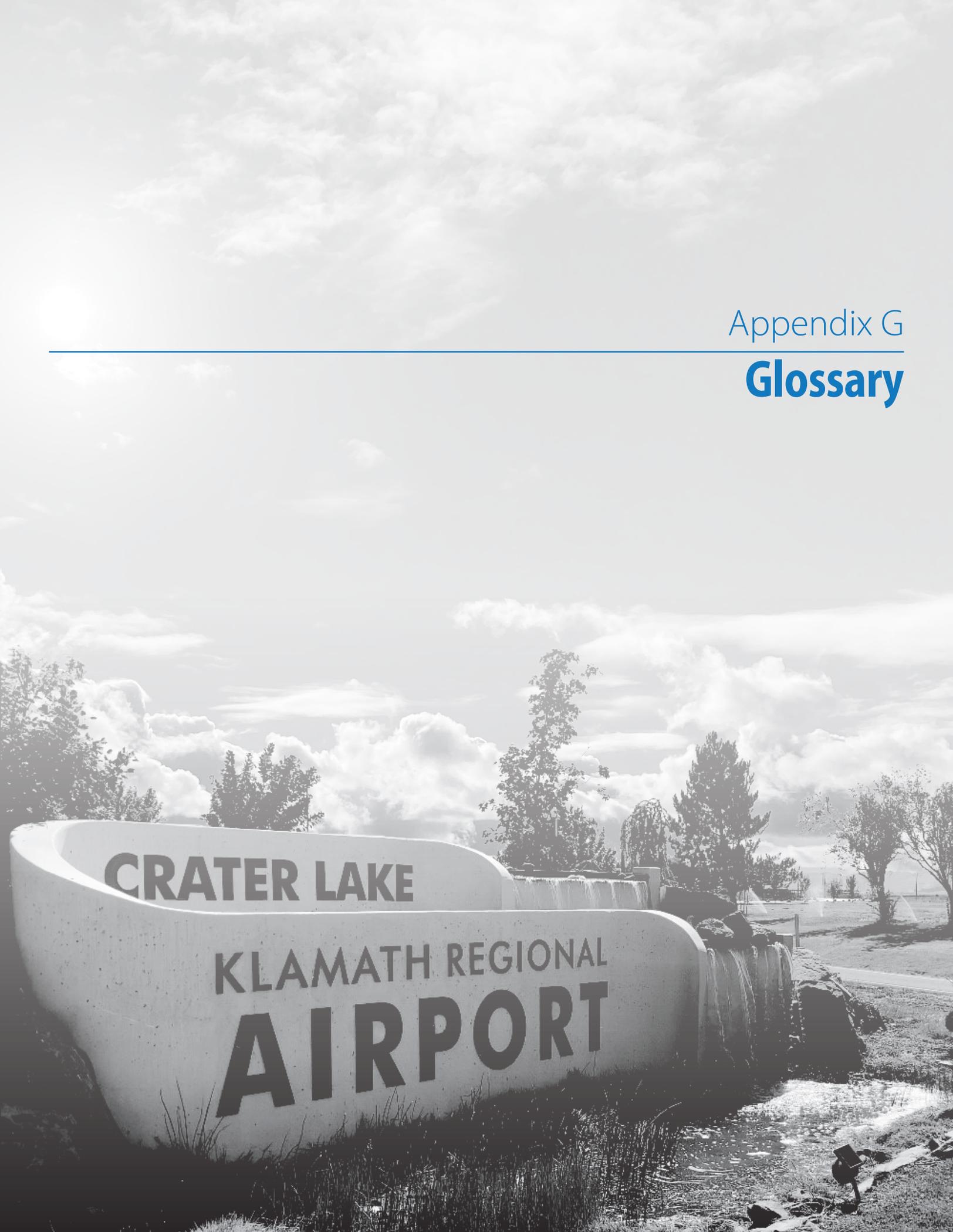
APPENDIX F: CAPITAL IMPROVEMENT PLAN PRO FORMA (CONTINUED)

Account Activity	Historical					Forecasted					
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Non-Operating Revenue (Expenses) and Capital											
Interest Income- Restricted and Non-Restricted	\$ 11,614	\$ 13,281	\$ 18,379	\$ 24,644	\$ 22,661	\$ 22,888	\$ 23,116	\$ 23,348	\$ 23,581	\$ 23,817	\$ 24,055
Interest Income	\$ (28,725)	\$ (20,419)	\$ (11,563)	\$ (5,911)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Grants Receipts	\$ 158,105	\$ 653,631	\$ 2,570,742	\$ 4,732,460	\$ 2,004,059	\$ -	\$ 744,700	\$ 9,873,000	\$ 150,000	\$ 8,027,400	\$ 150,000
Passenger Facility Charges (PFC)	\$ 27	\$ -	\$ 34,246	\$ 5,156	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Capital Contributions	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Special Items (Loss)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Other (Subtotals Below)	\$ 13,341	\$ 11,810	\$ 13,535	\$ 35,815	\$ 19,325	\$ 16,800	\$ 14,800	\$ 14,800	\$ 14,800	\$ 14,800	\$ 14,800
Customer Facility Charge	\$ 13,341	\$ 11,810	\$ 13,535	\$ 9,815	\$ 9,710	\$ 9,800	\$ 9,800	\$ 9,800	\$ 9,800	\$ 9,800	\$ 9,800
Sale of Surplus Equipment	\$ -	\$ -	\$ -	\$ 26,000	\$ 9,615	\$ 7,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000
Total Non-Operating Revenue (Expenses)	\$ 154,362	\$ 658,303	\$ 2,625,339	\$ 4,792,164	\$ 2,046,045	\$ 39,688	\$ 782,616	\$ 9,911,148	\$ 188,381	\$ 8,066,017	\$ 188,855
Net Assets											
Change in Net Assets	\$ (1,064,146)	\$ (780,318)	\$ 1,212,798	\$ 3,805,593	\$ 415,215	\$ (1,752,612)	\$ (1,030,584)	\$ 8,078,848	\$ (1,666,319)	\$ 6,190,617	\$ (1,704,545)
Net Assets (deficit) at beginning of year	\$ 58,485,107	\$ -	\$ 56,590,312	\$ 59,962,271	\$ 63,034,020	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Net Assets (deficit) at end of year	\$ 57,420,961	\$ (780,318)	\$ 57,803,110	\$ 63,767,864	\$ 63,449,235	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Capital Expenditures and Construction in Progress											
Airfield	\$ 158,323	\$ 621,060	\$ 2,651,165	\$ 5,828,799	\$ 1,042,520	\$ -	\$ 794,300	\$ 10,531,200	\$ -	\$ 8,562,600	\$ -
Terminal	\$ 13,828	\$ 6,886	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Parking and Ground Transportation	\$ -	\$ 20,554	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Roadways, Rail and Transit	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Other (Subtotals Below)	\$ 122,313	\$ 22,489	\$ 63,175	\$ 411,983	\$ 39,120	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Equipment	\$ 83,997	\$ 22,489	\$ 25,704	\$ 17,538	\$ 39,120	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Vehicles	\$ 38,316	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Maintenance Hangar	\$ -	\$ -	\$ -	\$ 394,445	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Facilities Other Than Terminal	\$ -	\$ -	\$ 37,471	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Total Capital Expenditures and Construction In Progress	\$ 294,464	\$ 670,989	\$ 2,714,340	\$ 6,240,782	\$ 1,081,640	\$ -	\$ 794,300	\$ 10,531,200	\$ -	\$ 8,562,600	\$ -
Non-FAA Funded Capital Projects											
Fiber Optics	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 30,000	\$ -	\$ -	\$ -	\$ -	\$ -
Vehicle Replacement	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 40,000	\$ -	\$ 45,000	\$ -	\$ -	\$ -
Equipment Replacement	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 58,000	\$ -	\$ -	\$ -	\$ -	\$ -
Security Camera System	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 10,000	\$ -	\$ -	\$ -	\$ -	\$ -
Access Control System	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 50,000	\$ -	\$ -	\$ -	\$ -
Facility Improvements	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 35,000	\$ -	\$ -	\$ 100,000	\$ 50,000
Pavement Maintenance	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 75,000	\$ 75,000	\$ -	\$ 50,000
Total Airport Funds on Non-Capital Projects	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 138,000	\$ 85,000	\$ 120,000	\$ 75,000	\$ 100,000	\$ 100,000

Note: As of Aug 2020, one car rental company remains at LMT, Customer Facility Charge (CFC) are anticipated to remain constant from 2019 values.

Appendix G

Glossary



Appendix G

Glossary

This glossary includes definitions of terms and acronyms used in the Plan.

ACRONYMS:

AAC	Aircraft Approach Code
AAF	Army Air Field
AC	Advisory Circular
ACIP	Airport Capital Improvement Program
ACOM	Army Command
ACRP	Airport Cooperative Research Program
ACTC	Air Traffic Control Tower
ADAIR	Adversary Air Squadron
ADS-B	Automatic Dependent Surveillance-Broadcast
ADG	Airplane Design Group
ADO	Airports District Office
ADPM	Average Delay Peak Month
AFI	Air Force Instruction
AFRC	Air Force Reserve Command
AGL	Above Ground Level
AICUZ	Air Installation Compatible Use Zone
AIP	Airport Improvement Program
AIRS	Aerometric Information Retrieval System
AJUA	Airport Joint Land Use Agreement
ALP	Airport Layout Plan
ALS	Approach Lighting System
ALSF	Approach Lighting System with Sequenced Flashers
AMSL	Above Mean Sea Level
AMU	American Military University
ANG	Air National Guard

APPENDIX G : GLOSSARY

ANGH	Air National Guard Handbook
AOA	Airport Operating Area / Airport Operations Area
AOB	Airport Operation Building
AOC	Airport Operating Certificate
AOPA	Aircraft Owners and Pilots Association
APV	Approach Procedure with Vertical Guidance
AQP	Aquifer Protection Area
ARC	Airport Reference Code
ARFF	Aircraft Rescue and Firefighting Facility
ARNG	Army National Guard
ARTCC	Air Route Traffic Control Center
ASCC	Army Service Component Command
ASDA	Accelerate Stop Distance Available
ASDI	Aircraft Situation Display to Industry
ASHPO	Airport Safety and Hazard Preventions Overlay Zone
ASO	Aviation Service Operator
ASOS	Automated Surface Observing System
ASV	Annual Service Volume
ATC	Air Traffic Control
ATCS	Air Traffic Control Squadron
ATCT	Airport Traffic Control Tower
ATF	Aviation Trust Fund
AVGAS	Aviation Gasoline
AWOS	Automated Weather Observing Station
BCA	Benefit Cost Analysis
BLF	Boarding Load Factor
BLM	Bureau of Land Management
BMP	Best Management Practice
BNSF	Burlington Northern Santa Fe Railroad
BRL	Building Restriction Line
CAGR	Compound Annual Growth Rate
CAP	Civil Air Patrol
CATM	Combat Arms and Training Maintenance Range
CATS	Certification Activity Tracking System
CBD	Central Business District
CFC	Customer Facility Charges
CFR	Code of Federal Regulations
CIP	Capital Improvement Program
CMG	Cockpit to Main Gear
CMMP	Contaminated Media Management Plan
COAR	Critical Oregon Airport Relief
CONUS	Continental United States
CSSN	Capacity/Safety/Security/Noise
CTAF	Common Traffic Advisory Frequency
dB	Decibel
DER	Decision End of Runway

DLA	Defense Logistics Agency
DME	Distance Measuring Equipment
DNL	Day-Night Noise Level
DOD	Department of Defense
DOT	State Department of Transportation, Aviation Agency
DPC	“Joint Squad Ops/MX Hangar /DPC Construction” Ch5
DRU	Direct Reporting Units
DTWG	Dual Tandem-Wheel Gear
DWG	Dual Wheel Gear
EA	Environmental Assessment
EAS	Essential Air Service
EOR	Explosives Ordinance Recovery
EPA	Environmental Protection Agency
ESQD	Explosive Safety Quantity Distance
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulations
FAS	Final Approach Segment
FATO	Final Approach and Takeoff Area
FBO	Fixed Base Operator
FCT	FAA Contract Tower
FPPA	Farmland Protection Policy Act
FS	Flight School
FSS	Flight Service Station
FY	Fiscal Year
GA	General Aviation
GAMA	General Aviation Manufacturing Association
GDP	Gross Domestic Product
GIS	Geographic Information System
GMA	Growth Management Act
GPS	Global Positioning System
GQS	Glidepath Qualification Surface
GRP	Gross Regional Product
GS	Glideslope
HEF	High Expansion Foam
HIRL	High Intensity Runway Lights
HQ USAFE	Headquarters United States Forces in Europe
HQDA	headquarters, Department of the Army
HVAC	Heating, Ventilation, and Air Conditioning
IAP	Instrument Approach Procedure
ICAO	International Civil Aviation Organization
ICEMAP	Installation Complex Encroachment Management Action Plan
IDP	Installation Development Plan
IFR	Instrument Flight Rules
ILS	Instrument Landing System
IMC	Instrument Meteorological Conditions
INM	Integrated Noise Model

APPENDIX G : GLOSSARY

JLUS	Joint Land Use Study
JPC	Joint Planning Conference
KATB	Klamath Air Tanker Base
KCC	Klamath County Community College
KFI	Klamath Falls Interagency
LATS	Long-Term Air Transportation Study
LDA	Landing Distance Available
LED	Light Emitting Diode
LIRL	Low Intensity Runway Lights
LITL	Low Intensity Taxiway Lights
LL	Low Lead
LMT	Crater Lake – Klamath Regional Airport
LOC	Localizer
LOI	Letter Of Intent
LOS	Level of Service or Line of Sight
LPV	Localizer Performance with Vertical Guidance
MAJCOM	Major Command
MALS	Medium Intensity Approach Lighting System
MALSF	Medium Intensity Approach Light System with Sequenced Flashing Lights
MALSR	Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights
MAS	Missed Approach Segment
MCCA	Military Construction Cooperative Agreement
MFR	Rogue Valley International-Medford Airport
MFZ	Mandatory Frangibility Zone
MGW	Main Gear Width
MIA	Military Influence Area
MIAOD	Military Influence Area Overlay District
MIRL	Medium Intensity Runway Lights
MITL	Medium Intensity Taxiway Lights
MLW	Maximum Landing Weight
MON	Minimal Operational Network
MOS	Modification Of Standards
MSL	Mean Sea Level
MTOW	Maximum Takeoff Weight
MXG	Maintenance Group
NAAQS	National Ambient Air Quality Standards
NACD	Native American Consultation Database
NAS	National Airspace System
NASA	National Aeronautics and Space Administration
NATO	North Atlantic Treaty Organization
NAVAIDS	Navigational Aids
NBAA	National Business Aviation Association
NCDC	National Climatic Data Center
NCP	Noise Compatibility Program
NDB	Non-Directional Beacon
NDI	Non-Destructive Inspection

NE	North East
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NM	Nautical Mile
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NPE	Non-Primary Airports Entitlement
NPIAS	National Plan of Integrated Airport Systems
NRCS	National Resources Conservation Service
NRHP	National Register of Historic Places
NWI	National Wetland Inventory
NWP	National Wetland Permit
NWS	National Wetland Service
OCS	Obstacle Clearance Surface
ODA	Oregon Department of Aviation
ODALS	Omnidirectional Approach Lighting System
ODF	Oregon Department of Forestry
OFA	Object Free Area
OFZ	Obstacle Free Zone
OIT	Oregon Institute of Technology
OPBA	Operations Per Based Aircraft
PAPI	Precision Approach Path Indicator
PCA	Permit Compliance System
PCI	Pavement Condition Index
PCN	Pavement Classification Number
PDEW	Passengers Daily Each Way
PDX	Portland International Airport
PFC	Passenger Facility Charge
PI	Point of Intersection
POFZ	Planned Object Free Zone
POL	Petroleum, Oil, and Lubricants
PUD	Planned Use Development
PVC	Poor Visibility and Ceiling
RAPCON	Radar Approach Control
RCL	Runway Centerline Lighting
RDC	Runway Design Code
REIL	Runway End Identifier Lights
RNAV	Area Navigation
RNP	Required Navigation Procedure
ROFA	Runway Object Free Area
RPZ	Runway Protection Zone
RSA	Runway Safety Area
RTR	Remote Transmitter/Receiver
RVR	Runway Visual Range
SASO	Special Aviation Service Organization
SCIP	Statewide Capital Improvement Plan

APPENDIX G : GLOSSARY

SEA	Seattle-Tacoma International Airport
SEL	Sound Exposure Level
SEPA	State Environmental Policy Act
SF	Square Foot
SFO	San Francisco International Airport
SI	Metric Units (SI)
SPCC	Spill Prevention, Control, and Countermeasures
SRE	Snow Removal Equipment
SSALR	Short Simplified Approach Lighting System with Runway Alignment Indicator Lights
SSALS	Simplified Short Approach Lighting System
STOVL	“For F-35B aircraft operating as STOVL, see Chapter 8.” Ch 4
SWG	Single Wheel Gear
SWPPP	Stormwater Pollution Prevention Plan
TACAN	Tactical Air Navigation
TAF	Terminal Area Forecasts
TDG	Taxiway Design Group
TDZ	Touchdown Zone
TERPS	United States Standard for Terminal Instrument Approach Procedures
TFMSC	Traffic Flow Management System Counts
TIA	Turn Initiation Area
TLOF	Touchdown and Liftoff Area
TODA	Takeoff Distance Available
TOFA	Taxiway Object Free Area
TORA	Takeoff Runway Available
TRACON	Terminal Radar Approach Control
TRS	Total Retail Sales
TSA	Transportation Security Administration
TSP	Transportation System Plan
TSS	Threshold Siting Surface
UAS	Unmanned Aircraft Systems
UFC	Unified Facility Criteria
UHF	Ultra High Frequency
UNICOM	Universal Communications
UP	Union Pacific
UPS	United Postal Service
US	United States
USAF	United States Air Force
USBR	United States Bureau of Reclamation
USDA	United States Department of Agriculture
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
VASI	Visual Approach Slope Indicator
VFR	Visual Flight Rules
VGSI	Visual Glide Slope Indicators
VHF	Very High Frequency
VLJ	Very Light Jet

VMC	Visual Meteorological Conditions
VOR	Very High Frequency Omnidirectional Range
VOR/DME	Very High Frequency Omnidirectional Range with Distance Measuring Equipment
VORTAC	Very High Frequency Omnidirectional Range/Tactical Air Navigation
WAAS	Wide Area Augmentation System
WDFW	Washington State Department of Fish and Wildlife
WHA	Wildlife Hazard Assessment
WHPA	Wellhead Protection Area

GLOSSARY OF TERMS:

A:

Additional Runway: A non-primary runway not meeting FAA 95 percent crosswind conditions and not required for capacity.

Air Carrier: A commercial airline with published schedules operating at least five round trips per week.

Aircraft Fleet Mix: The mix or differing aircraft types operated at a particular airport or by an airline.

Aircraft Gear Configuration: Distribution of aircraft main gear type and configuration; single-wheel gear aircraft (SWG) is each landing gear is supported by a single tire; dual-wheel gear aircraft (DWG) is each landing gear consists of a single axle with two tires per axle that equally share the weight of the aircraft and provide for greater weight distribution.

Aircraft Operation: An aircraft landing or takeoff. A 'local' operation is performed by aircraft that operate in the local traffic pattern, including simulated instrument approaches. An 'itinerant' operation is performed by aircraft that operate beyond the airport local traffic pattern or practice area – typically 20 miles beyond the airport.

Aircraft Rescue and Firefighting Facility (ARFF): A facility to house emergency vehicles, extinguishing agents, and personnel responsible for minimizing the effects of an aircraft accident or incident.

Aircraft Sponsor: A public agency authorized to legally own and operate an airport, as prescribed in accordance with Federal Aviation Administration regulation, and other required laws.

Airport Improvement Program (AIP): The FAA funding and grant-in-aid program used to plan and develop airports included in the National Plan of Integrated Airport Systems (NPIAS).

Airport Layout Plan (ALP): A record drawing depicting the scaled graphic representation of airport existing and proposed facilities.

Airport Reference Code (ARC): FAA airport design standard classification based upon the Aircraft Approach Code (AAC) approach speed measured in knots (represented by a capital letter) and Aircraft Design Group (ADG) wingspan and tail height measured in feet (represented by a roman numeral). The ARC sets the dimensional, separation, and setback standards for airport geometry layout.

Air Route Traffic Control Center (ARTCC): FAA operated facility for controlling high altitude en-route aircraft traffic.

Airports GIS (AGIS): FAA GIS system to collect airport and aeronautical data to meet the demands of the Next Generation National Airspace System. GIS is a computer system designed to capture, store, manipulate, analyze, manage, and present all types of spatial or geographical data.

Air Traffic Control – Tower (ATCT): A manned facility for monitoring and controlling traffic on the ground and in the airport airspace vicinity.

Annual Service Volume (ASV): The annual aircraft operational capacity of the airport systems.

Approach Lighting System (ALS): A series of sequencing lights beyond the runway centerline used to visually guide pilots landing in night and low visibility conditions. The ALS is classified by full, intermediate, and basic systems.

Area Navigation (RNAV): Airspace navigation using a satellite-based navigation system that permits aircraft direct courses between fixes or a network of waypoints.

Automatic Dependent Surveillance-Broadcast (ADS-B): A satellite-based technology that broadcasts aircraft identification, position, and speed with once-per-second updates.

Automated Weather Observation System (AWOS/ASOS): a station that provides local automated weather reports for various ambient and sky conditions.

Avgas: Aviation gasoline (referred as 100LL) used in piston-powered aircraft engines.

Avigation Easement: A grant or property interest in land over which a right of unobstructed flight in the airspace is established.

B:

Based Aircraft: Aircraft stored in hangars or on tie-downs as part of a rental or lease agreement; excludes temporary visiting aircraft or aircraft registered at another airport.

Building Restriction Line (BRL): identifies a suitable location for airport buildings and structures from the runway airspace surfaces.

C:

Capital Improvement Plan (CIP): A list of planned capital airport projects and costs, also used by the federal and state agencies to plan and programmed planned funded improvements.

Cockpit to Main Gear Distance (CMG): The distance from the pilot's eye to the main gear turn center.

Compound Annual Growth Rate (CAGR): The annualized compounded percent rate of change over multiple years.

Critical/Design Aircraft: FAA airport planning classification for the most demanding aircraft, or family of aircraft, with similar characteristics regularly using the airport over 500 aircraft operations per year.

Crosswind: A wind which is not parallel to a runway or the path of an aircraft.

Crosswind Runway: FAA eligible runway if the primary runway wind coverage is less than 95 percent.

D:

Declared Distance: The distances declared available for a turbine aircraft takeoff run (TORA), takeoff distance available (TODA), accelerate-stop distance (ASDA), and landing distance (LDA) requirements.

Displaced Threshold: The landing location on the runway, when the landing area begins at a point on the runway other than the designated beginning of the runway.

F:

Federal Aviation Administration (FAA): The federal agency with airport regulatory authority, airspace, aircraft, and pilots operating in the United States, with the mission to provide safe and efficient aerospace systems. The FAA Airport District Office (ADO) is responsible for planning at airports in the FAA Region.

Federal Aviation Administration Hot Spot: A location on an airport movement area with a history of potential risk of collision or runway incursion, and where heightened attention by pilots and drivers is necessary.

Federal Aviation Regulations (FAR): The FAA rules and regulations that govern the operation of aircraft, airways, airmen, and airports.

Fixed Based Operator (FBO): An operating with on-airport facilities providing aircraft and pilot services; such as equipment sales, aircraft maintenance, fuel, and parking storage.

G:

General Aviation (GA): Civil aviation, excluding air carriers, commercial operations, and military aircraft, conducted for recreational, business, on-demand passenger and emergency charter transport, flight instruction, and governmental purposes.

Global Positioning System (GPS): A satellite-based radio positioning, navigation, and time-transfer system.

I:

Instrument Approach Procedure (IAP): A series of predetermined maneuvers developed for the orderly transfer of aircraft under instrument flight conditions, from the beginning of the initial approach to a landing, or to a point from which a landing may be made visually. **The Non-Precision Approach (NPA)** provides course guidance, with or without vertical path guidance, with visibility minimums not lower than ¼-mile

(4000' runway visual range). **The Approach Procedure with Vertical Guidance (APV)** provides vertical and lateral electronic guidance, with minimums down to 250 feet and $\frac{3}{4}$ -mile. **The Precision Approach (PA)** provides positive vertical path guidance with minimums less than 200 feet and below $\frac{3}{4}$ -mile (4000' runway visual range).

Instrument Flight Rules (IFR): Rules specified by the FAA for the flight under weather conditions in which visual reference cannot be made to the ground and the pilot must rely on instruments to fly and navigate.

Instrument Meteorological Conditions (IMC): Weather conditions that require pilots to fly primarily by reference to instruments, and therefore under instrument flight rules (IFR is a cloud ceiling generally less than 1,000 feet and/or visibility less than 3 miles).

Instrument Landing System (ILS): A ground-based system consisting of a localizer and glideslope station antenna which provides runway end precision instrument approach capabilities. The ILS CAT-I minimums provide not lower than 200' and $\frac{1}{2}$ -statute mile (1800' RVR); ILS CAT-II minimum provide not lower than 100' and 1200 feet RVR; ILS CAT-III minimum provide not lower than 100' and 1200 feet RVR.

J:

Jet A: Aircraft engine fuel used in turbine (turboprop and jet) engine powered aircraft.

Joint Civilian/Military (Joint-Use) Airport: An airport owned by the Department of Defense, at which both military and civilian aircraft make shared use of the airfield. [Revised by Final Rule: Safety Enhancements, Certification of Airports (78 FR 3311), 1/16/2013]

K:

Knot: A measure of aircraft airspeed (1 knot = 1.15 mile per hour).

L:

Large Aircraft: An aircraft with a maximum certificated takeoff weight of more than 12,500 pounds.

Load Factor. The percentage of seats occupied on an aircraft by passengers.

M:

Mean Sea Level (MSL): The elevation of an object above the average sea level.

Military Operations Area (MOA): Designated airspace to separate nonparticipating instrument flight rule (IFR) traffic from military flight activities. MOA does not restrict or prohibit general aviation aircraft.

Missed Approach. An instrument approach not completed by a landing, due to visual contact not established at authorized minimums or instructions from air traffic control, or other reasons.

Modification to Standards (MOS): FAA approved nonconformance to airport design standards.

Movement Area: The runways, taxiways, and other areas used for taxiing or hover taxiing, air taxiing, takeoff, and landing of aircraft.

N:

National Environmental Policy Act (NEPA): legislations which requires federal agencies to integrate environmental values into their decision-making processes by considering the environmental impacts of their proposed actions and reasonable alternatives to those actions.

National Plan of Integrated Airport Systems (NPIAS): The FAA identification of nearly 3,400 existing and proposed airports that are significant to national air transportation and thus eligible to receive federal grants-in-aid assistance.

Navigational Aid (NAVAID): Electronic radio and visual lights providing pilots locational and situational awareness, particularly during low visibility conditions.

National Airspace System (NAS NextGen). The airspace network of air navigation facilities, equipment and services. NextGen is the FAA-led airspace transportation modernization program.

Nautical Mile (NM). A unit measure of aeronautical distance (1 NM = 6,076 feet or 1.15 statute miles).

O:

Obstacle: An existing object at a fixed geographical location or which may be expected at a fixed location within a prescribed area with reference to which vertical clearance is or must be provided during flight operation.

Obstacle Free Zone (OFZ): FAA clearing standards to preclude aircraft and other object penetrations, except for frangible NAVAIDs located based on function.

P:

Part 77: Code of Federal Regulation Title 14 Part 77, *Safe, Efficient Use, and Preservation of the Navigable Airspace* (14 CFR Part 77), establishes standards and notification requirements for objects affecting navigable airspace.

Pavement Condition Index (PCI): A numerical index used in transportation civil engineering between 0 and 100 which is used to indicate the general condition of a pavement.

Precision Approach Path Indicator. A visual navigational aid providing guidance information to help pilots acquire and maintain the correct approach (in the vertical plane) to a runway.

Primary Runway: a single runway eligible for FAA development.

R:

Runway: A defined rectangular surface on an airport prepared or suitable for the landing or takeoff of aircraft.

Runway Design Code (RDC): FAA runway classification, based on aircraft and instrument procedures, signifying the design standards to which the runway is to be built.

Runway Object Free Area (OFA): FAA two-dimensional safety area centered longitudinally on the runway and taxiway, prescribing clearing standard of above-ground objects, except those fixed by function or aircraft ground maneuvering purposes.

Runway Incursion: Occurrence involving the incorrect presence of an aircraft, vehicle, or person on the protected area of a surface designated for the landing and takeoff of aircraft.

Runway Safety Area (RSA): FAA two-dimensional safety area centered longitudinally on the runway and taxiway, prescribing criteria for the clearing of objects, grading, drainage, and being capable of supporting airport equipment; in the event of an undershoot, overshoot, or excursion of an aircraft from the runway.

Runway Protection Zone (RPZ): FAA two-dimensional trapezoidal safety area, associated with approach and departure, extending beyond the runway end, to enhance the protection of people and property on the ground by keeping the area clear of incompatible land uses.

Runway Visual Range (RVR): Facilities providing a measurement of horizontal visibility located adjacent to instrument runways.

S:

Secondary Runway: A non-primary runway meeting FAA crosswind conditions or required for capacity and other operational factors.

Shared Use: A U.S. Government-owned airport that is co-located with an airport specified under 14 CFR §139.1(a) and at which portions of the movement areas and safety areas are shared by both parties.

Similar Characteristics: Refers to the practice of grouping critical aircraft by comparable operational performance and/or physical dimensions.

Small Aircraft: An aircraft with a maximum certificated takeoff weight less than 12,500 pounds.

Snow Removal Equipment (SRE): Snow equipment and earth-moving machinery used to maintain the airport.

Specialized Aviation Service Operator (SASO): *A single or specialize aeronautical service provider.*

T:

Taxilane: Designed for low speed and precise aircraft taxiing, usually located outside the movement area, providing access from taxiways to aircraft parking positions and other terminal areas.

Taxiway: A defined path established for the taxiing of aircraft from one part of an airport to another. A designated area that connects runways with aprons, providing the ability to move aircraft on the ground so they will not interfere with takeoffs or landings.

Taxiway Design Group (TDG): Aircraft undercarriage dimensions used to define FAA design standards for taxiway and taxilane systems.

Terminal Area Forecast (TAF): The annual FAA historical record and forecast of passengers, aircraft operations, and based aircraft for airports in the National Plan of Integrated Airport Systems (NPIAS).

Terminal Radar Approach Control: An air traffic control service to aircraft arriving, departing, or transiting controlled airspace.

Traffic Management System Counts (TMSC): Traffic counts by airport or city-pair for various aircraft and user data groupings, reported by day an hour. TMSC data is generated by flight plans operating in the National Airspace System.

Traffic Pattern: The traffic flow for aircraft landing and departing the airport; includes the usual pattern for departure, crosswind, downwind, base leg; and final approach.

U:

Unmanned Aircraft System (UAS/UAV): Remotely operated (pilot-less) aircraft vehicles.

Urban Growth Boundary (UGB): A regional boundary, set by the local jurisdiction by mandating that the area inside the boundary be used for higher density urban development and the area outside be used for lower density development, with the hope of controlling urban sprawl.

V:

Very High Frequency Omnidirectional Range (VOR/VORTAC): A ground-based electronic navigation aid transmitting 360-degree azimuth signal beams oriented from magnetic north.

Visual Flight Rules (VFR): Rules that govern the procedures for conducting flight under visual meteorological conditions. Conditions in which pilots must maintain separation from aircraft and objects visually, without the use of navigational aids.

Visual Meteorological Conditions (VMC): Weather conditions under which pilots have the ability to visually see and avoid stationary objects and other aircraft and fly without the use of instrumentation, under visual flight rules. A visual approach is conducted under instrument flight rules (IFR), which authorizes the pilot to proceed visually and clear of clouds to the airport. The pilot must, at all times, have either the airport or the preceding aircraft in sight.

W:

Wide Area Augmentation System (WAAS): A ground-based boosted signal used by the satellite Global Positioning System (GPS), enabling aircraft to use GPS to fly instrument approach procedures.

MILITARY GLOSSARY (PLANNING STUDIES):

Installation Development Plan (IDP, 2015): The IDP is an OANG study that provides a planning, programming, and development strategy addressing current and future mission deficiencies and opportunities. The IDP guides the base in developing properly-configured facilities and infrastructure aligned to current and 20-year programmed mission requirements.

Joint Land Use Study (JLUS, 2016): The JLUS is a City study to encourage cooperative land use so future OANG growth is compatible, and to create a mutually supportive set of tools and procedures to implement recommended development.

Installation Complex Encroachment Action Plan (ICEMAP): Identifies areas of potential future land use conflicts to assist coordination with the local community and identifying mutually agreeable solutions to prevent incompatible land uses from encroaching on the OANG mission capabilities.



Acronyms

A

AFI	Air Force Instruction
AFPD	Air Force Policy Directive
AGL	above ground level
ANG	Air National Guard
ARFF	Airport Rescue and Firefighting
ASK	Kingsley Field
ATC	Air Traffic Control
ATCS	Air Traffic Control Squadron
ATCT	Air Traffic Control Tower
APZ	Accident Potential Zone
AT	Anti-Terrorism / Force Protection

B

BASH	Bird / Wildlife Aircraft Strike Hazard
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C

CAA	Clean Air Act
CATM	Combat Arms Training and Maintenance Range
CBRNE	Chemical, Biological, Radiological, Nuclear and Explosives
CDO	Community Development Ordinance
CERF-P	Enhanced Response Force Package
CL - KR	Crater Lake – Klamath Regional Airport
COM	Communication / Coordination
CZ	Clear Zone

D

dB	decibel
dBA	A-weighted decibel
dBp	Peak decibels
DEQ	Oregon Department of Environmental Quality
DLCD	Oregon Department of Land Conservation and Development
DNL	Day-Night Average Sound Level
DOD	Department of Defense
DODI	Department of Defense Instruction
DOI	United States Department of Interior
du	dwelling unit

E

ED	Energy Development
EFU	Exclusive Farm Use
e.g.	for example
EPA	Environmental Protection Act
ESQD	Explosive Safety Quantity Distance

F

FAA	Federal Aviation Administration
FAR	Federal Aviation Regulation
FW	Fighter Wing

G, H

GA	General Aviation
GIS	geographic information system

I

IDP Installation Development Plan
 INRMP Integrated Natural Resources Management Plan

J

JLUS Joint Land Use Study
 JUA Joint Use Agreement

K

Kingsley Kingsley Field

L

LAS Land / Air / Sea Spaces
 LCDC Land Conservation and Development Commission
 LU Land Use

M

MIA Military Influence Area
 MIAOD Military Influence Area Overlay District
 MOU Memorandum of Understanding

N

NAAQS National Ambient Air Quality Standards
 NEPA National Environmental Policy Act
 NGOs nongovernmental organizations
 NOI Noise

O

OE Obstruction Evaluation
 OEA Office of Economic Adjustment
 OFZ Obstacle Free Zone
 ONG Oregon National Guard
 ORANG Oregon Air National Guard

P, Q

PM_{2.5} Particulate Matter, fine particles
 PC Policy Committee
 PL Public Law
 PM Particulate Matter

R

REPI Readiness and Environment Protection Integration
 ROFA Runway Object Free Area
 RPZ Runway Protection Zone
 RSA Runway Safety Area

S

SA Safety Zones
 SIPs State Implementation Plans
 SDZ surface danger zone

T

TC Technical Committee

U

USAF United States Air Force
 UGB Urban Growth Boundary
 US United States
 U.S.C United States Code
 USFWS United States Fish and Wildlife Service

Acronyms

V

V	Vibration
VO	Vertical Obstructions

W, X, Y, Z

WQQ	Water Quality / Quantity
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