MULINO STATE AIRPORT | AIRPORT MASTER PLAN

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OREGON DEPARTMENT OF AVIATION

MULINO STATE AIRPORT | AIRPORT MASTER PLAN REPORT

FINAL REPORT, July 2019

PREPARED FOR

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Chapter 1 – Introduction & Project Overview

Chapter 1 – Introduction and Project Overview

Introduction

The Oregon Department of Aviation (ODA) prepared an updated Airport Master Plan for Mulino State Airport (4S9) in cooperation with the Federal Aviation Administration (FAA) to address the airport's needs for the next twenty years. The Airport Master Plan provides specific guidance in making the improvements necessary to maintain a safe and efficient airport that is economically, environmentally, and socially sustainable.

Study Purpose

The purpose of the Airport Master Plan is to define the current, short-term, and long-term needs of the Airport through a comprehensive evaluation of facilities, conditions, and FAA airport planning and design standards. The study also addresses elements of local planning (land use, transportation, environmental, economic development, etc.) and financial feasibility that have the potential of affecting the planning, development, and operation of the airport. FAA Advisory Circular (AC) 150/5070-6B, Airport Master Plans defines the specific requirements and evaluation methods established by FAA for the study and AC 150/5300-13A, Change 1, Airport Design defines the airfield design standards to be used in study.

Project Need

The FAA recommends that airports periodically update their master plans as conditions change in order to address current planning. This project updates the 2008 Airport Master Plan & Airport Layout Plan Update (WHPacific), which provided the current planning guidance for the airport. Several recommendations from the previous airport master plan have been implemented and the remaining recommendations were reexamined based on current conditions. Current FAA standards, trends within the aviation industry, and events within the region were reflected in the updated planning for Mulino State Airport, in addition to addressing changing local conditions. The final Airport Master Plan and Airport Layout Plan (ALP) replaces the previous master plan and reflects the FAA's current planning and design criteria.

Project Funding

Funding for the Airport Master Plan Update was provided through an FAA Airport Improvement Program (AIP) grant (90%) with a local match (10%) provided by ODA. The AIP is a dedicated fund administered by FAA with the specific purpose of maintaining and improving the nation's public use airports. The AIP is funded exclusively through fees paid by users of general aviation and commercial aviation and the funds can only be used for eligible aviation related projects.

Airport History

The existing airport site in Mulino has been in aviation use since 1949, according to FAA records. Mulino Airport operated as a privately-owned airport with basic facilities prior to being acquired for public use in 1988.

The 1981 Oregon Aviation System Plan (Volume I – Inventory) included the following description of Mulino Airport activity and facilities:

- 65 Acres;
- Runway 2/20 2,100 x 300' (Turf);
- Runway 12/30 2,100 x 300' (Turf);
- Runway Lights, Wind Indictor, Unicom;
- 21,900 Annual Operations (estimated, 1979); and
- 33 Based Aircraft (1979).

The 1983 Oregon Aviation System Plan (Volume III – System Requirements) identified Portland-Mulino Airport as a "New" Reliever airport in the Oregon Aviation System. The system plan identified a full range of facility needs including property acquisition, airfield paving and construction, development of new structures, obstruction removal, and other infrastructure.

The 2008 Mulino Airport Master Plan update cited the 1981 Clackamas County Reliever Airport Study as the initial planning impetus leading to the development of a public use airport in Mulino. The 1981 study projected that the Mulino Airport would "develop in twenty years into a busy airport with hundreds of based aircraft, facilities and services for business jets, more than one fixed base operator (FBO), and an air traffic control tower." These expectations of demand/activity led the Port of Portland to acquire the airport and adjacent land in 1988 to develop a reliever airport to other Port of Portland airports. The airport was renamed Portland-Mulino Airport. New airfield facilities (runway, taxiways, taxilanes, apron, lighting, etc.), site improvements, drainage/stormwater, and utilities were constructed over a four year period extending from 1988 to 1992.

Updated airport planning was subsequently completed, including the 1990 Portland-Mulino Noise Growth Management Plan, which reviewed and evaluated potential aircraft noise impacts at Portland-Mulino Airport and local land use controls. The airport master plan was periodically updated and the airport accommodated modest levels of private facility development (hangars, etc.) and new tenants. No major changes to the runway-taxiway system or the primary landside facilities (apron, taxilanes, etc.) have occurred since the original construction.

The airport experienced significantly slower growth over the next twenty years than originally forecast in 1981 and the functional role of Portland-Mulino Airport as a Port of Portland reliever airport was reevaluated. The Port of Portland transferred ownership of the airport to the Oregon Department of Aviation (ODA) in 2007 after the reevaluation was completed, and the airport was renamed Mulino State Airport.

Study Organization

Work in progress on the Airport Master Plan Update was documented in a series of technical memoranda (presented as draft chapters). The chapters were prepared to document progress in the study, facilitate the review of preliminary results, and to obtain input early and throughout the master planning process.

The draft chapters and supporting documents were prepared over a period of approximately 12 months. The Oregon Department of Aviation (ODA), a planning advisory committee (PAC) established to provide input to the project, and the Federal Aviation Administration (FAA) reviewed draft chapters as they were prepared. The master plan chapters were available for public review and comment throughout the project. The draft chapters have been updated as needed to reflect information compiled during the planning process and incorporated into the Airport Master Plan report.

The Mulino State Airport Master Plan includes the following chapters:

- *Chapter 1 – Introduction and Project Overview*
- *Chapter 2 – Inventory of Facilities*
- *Chapter 3 – Aviation Activity Forecasts & Demand Capacity*
- *Chapter 4 – Facility Requirements*
- *Chapter 5 – Environmental Review*
- *Chapter 6 – Airport Development Alternatives*
- *Chapter 7 – Airport Layout Plan*
- *Chapter 8 – Land Use Planning*
- *Chapter 9 – Airport Financial Plan/CIP*
- *Chapter 10 – FAA Compliance Review and Recycling & Solid Waste Management Plan*
- *Appendices – AGIS Survey, Miscellaneous Technical Memos*

Local Citizen Participation

The Oregon Department of Aviation (ODA) is committed to an inclusive, transparent planning process and made project work products available for public review. The public involvement element of the Airport Master Plan Update provided opportunities for all interested individuals, organizations, or groups to participate in the project. ODA was committed to working with the Hamlet of Mulino and Clackamas County on local coordination during the planning process.

A local Planning Advisory Committee (PAC) was formed by ODA to assist the project team in reviewing draft technical working papers and to provide input into the planning process. The composition of the PAC was intended to provide an effective blend of airport users, neighbors, local businesses, local government representation, and other interests. In its advisory role, the PAC periodically met during the project, reviewed and commented on draft work products, discussed key project issues, and provided local knowledge and expertise to the planning process.

The PAC meetings were open to the public; however, since the meetings are organized as work sessions, the time allocated for public comment was limited. An expanded public comment period was provided in the public meetings that coincided with specific PAC meetings. PAC and public input were integral to the planning process to ensure that all interested stakeholders had an opportunity to participate in the project.

Draft work products developed during the project were available for public review and comment. Copies of the draft work products were also available for public review and comment throughout the project. Comment forms were available in both electronic and printed versions of draft work products.

A series of public meetings were held during the project to facilitate public participation. The project team presented information, provided updates on study progress, and identified upcoming decision points in a workshop format to facilitate discussion. The project team used a variety of tools to encourage citizen participation, including surveys, project newsletters, and project updates posted on ODA's webpage.

Summary

The FAA-defined airport master planning process requires a sequential, systematic approach, which leads to the selection of a preferred development option for the airport that is integrated into the Airport Layout Plan (ALP) and Airport Capital Improvement Program (ACIP). To meet this goal, the Airport Master Plan Update:

- Provides an updated assessment of existing facilities and activity;
- Provides an overview of environmental conditions that may affect future airport improvements and operations;
- Forecast airport activity measures (design aircraft, based aircraft, aircraft operations, etc.) for the current 20-year planning period;
- Examined previous planning recommendations (2008 Airport Master Plan) as appropriate, to meet the current and projected airport facility needs, consistent with current FAA airport design standards;
- Determined current and future facility requirements for both demand-driven development and conformance with FAA design standards;
- Provided consistency between airport planning and land use planning to promote maximum compatibility between the airport and surrounding areas;
- Prepared an updated Airport Layout Plan (ALP) drawing set to accurately reflect current conditions, master plan recommended facility improvements, and current FAA design criteria;
- Developed an Airport Capital Improvement Program (ACIP) that prioritizes improvements and estimates project development costs and funding eligibility for the 20-year planning period: and
- Evaluated airport sponsor compliance with FAA Airport Improvement Program (AIP) grant assurances.

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, United States Code, section 47104. The contents do not necessarily reflect the official views or policy of the FAA. Acceptance of this report by the FAA does 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 with appropriate public laws.

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Chapter 2 – Inventory of Existing Conditions

Chapter 2 – Inventory of Existing Conditions

This chapter documents the existing facilities and conditions at Mulino State Airport (Airport Identifier Code: 4S9). The airport is owned and operated by the Oregon Department of Aviation (ODA).

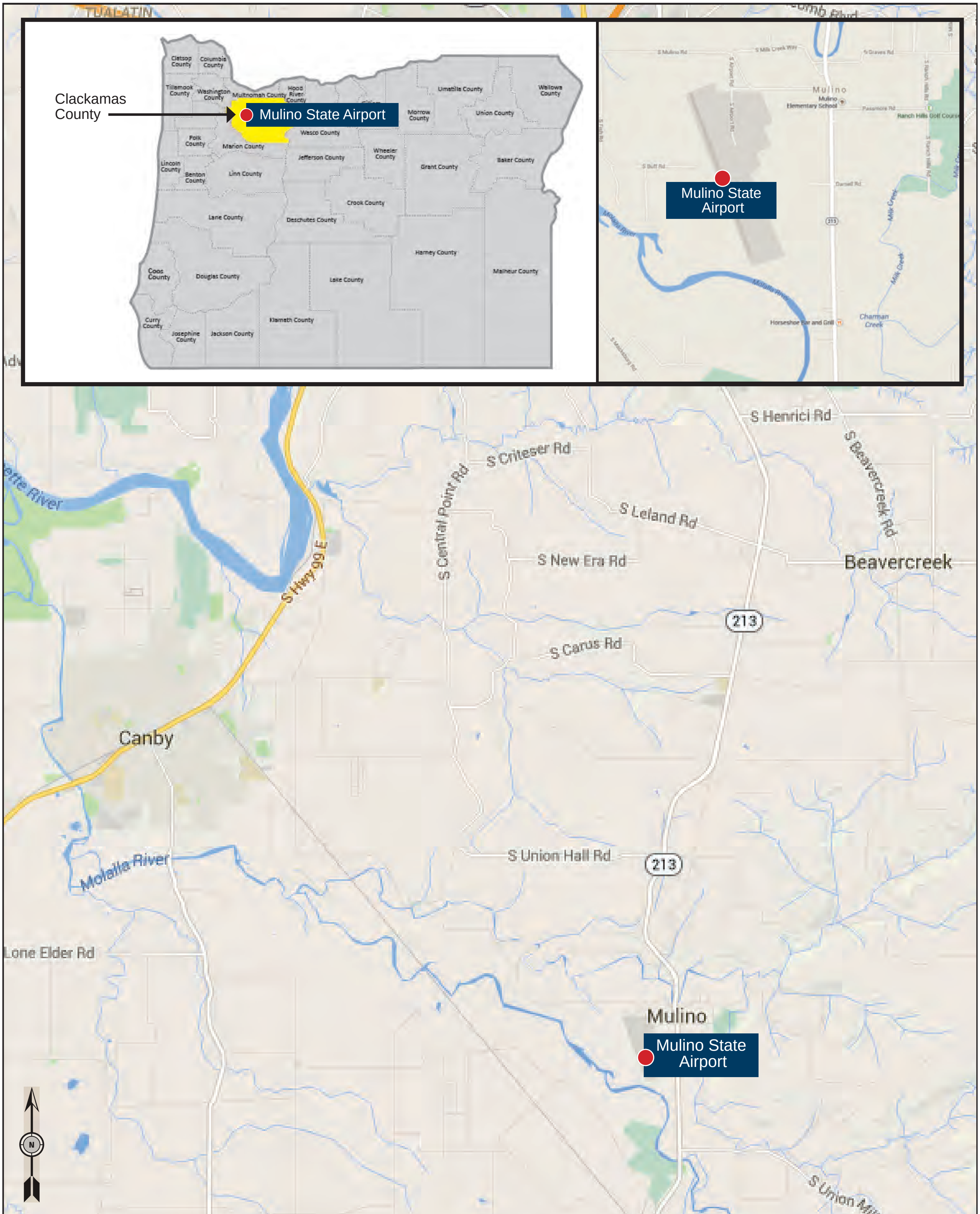
This project updates the 2008 Mulino Airport Master Plan, which served as a primary source for inventory data.[1] More current or comprehensive data have been included in the chapter to illustrate current conditions where available. Data from a variety of sources are used in this evaluation; a summary of the data sources used is provided at the end of the chapter. Existing airfield facilities were examined during on-site inspections to update facility inventory data. The consultants also worked closely with ODA staff to review the current facility and operational data. New aerial photography has been flown for this project as part of the airport's GIS survey.

Airport ownership changed from the Port of Portland to the Oregon Department of Aviation (ODA) and the airport was renamed Mulino State Airport after the last master plan was completed in 2008.

Locale and Geography

Mulino State Airport is located within the Hamlet of Mulino, near the southeastern corner of the Portland metropolitan area in northern Clackamas County. A location and vicinity map for Mulino State Airport is provided in **Figure 2-1**.

[1] 2008 Mulino Airport Master Plan & Airport Layout Plan Update (WHPacific)



MULINO STATE AIRPORT | AIRPORT MASTER PLAN

LOCATION MAP | **FIG. 2-1**

Mulino is located in a predominantly rural setting, approximately 21 miles south of downtown Portland, on the gently rising eastern slopes of the Willamette Valley. Further east is Estacada, the western slopes of the Cascade Range, and Mount Hood National Forest. The Molalla River and the Clackamas River are major drainages from the Cascade Range that connect with the Willamette River, northwest of Mulino. The Molalla River lies at the southern end of the airfield, although a small area of airport property extends south of the river. The airport is surrounded by a mix of rural residential and agricultural land uses.

State Highway 213 is a primary access route through Clackamas County connecting several communities and surrounding areas. Mulino is located 10 miles south of Oregon City and five miles north of Molalla on Highway 213; Mulino State Airport is located one-half mile west of Highway 213 via South Mulino Road. Highway 99E is located approximately 7 miles west of Mulino (at Canby) via South Mulino Road. Interstate 5 (Exit 278, south of Aurora State Airport) is approximately 13 miles west of Mulino and Interstate 205 is located approximately 12 miles north (Exit 10, between Gladstone and Oregon City).

Population

The 2010 Census for Mulino totaled 2,103 residents within the defined "Census Designated Place" (CDP), which coincides with the political boundaries of the Hamlet of Mulino. The Mulino CDP population in 2013 was estimated as 2,175, up 3.4 percent from the 2010 Census.[2] The July 1, 2014 certified population estimate[3] for Clackamas County was 391,525, up 4.1 percent from the 2010 Census (375,992).

Climate

Moderate temperatures and precipitation characterize the northern Willamette Valley region. The nearest historic climate data are available from an observation site[4] located in Molalla, approximately five miles south of Mulino. The average maximum temperature is 80.6 degrees Fahrenheit (July) and the average minimum temperature is 32.9 degrees (January) based on recorded data from 1935 and 1976.

Annual precipitation averages 45.70 inches and annual snowfall averages 6.3 inches. Approximately 44 percent of annual precipitation occurs during the three-month period of November, December and January. Precipitation during the summer months (June, July, and August) averages just 3.8 inches of total annual precipitation.

[2] 2009-2013 American Communities Survey 5-Year Estimates (U.S. Census Bureau)

[3] Portland State University (PSU), Population Research Center

[4] Western Regional Climate Center (Molalla, Oregon Station No. 355677)

Historical Aviation Activity

Mulino State Airport accommodates a wide variety of aeronautical activity, including small single- and multi-engine piston aircraft, small turbine aircraft, and helicopters. The airport also accommodates skydiving and has accommodated glider operations in the past.

There are currently 58 based aircraft at the airport, as reflected in the **FAA's National Based Aircraft Database** (**www.basedaircraft.com**)**.** The database lists 57 single engine aircraft and 1 helicopter. Airport management has confirmed the count of 58 "currently validated" aircraft is accurate and should be used in the master plan. The current based aircraft count reflects an increase of 18 aircraft (+40%) since 2006 (the base year for previous 2008 master plan forecasts). The 2008 Airport Master Plan estimated 40 based aircraft and 32,274 annual aircraft operations at Mulino Airport in 2006.

The historic **FAA Airport Master Record (Form 5010-1)** and the **FAA Terminal Area Forecast** lists 59-based aircraft and 21,300 annual aircraft operations. This data was updated in May 2017 in order to reflect the most current available data.

All historic aircraft operations levels are based on estimates. A detailed analysis of aviation activity data will be presented in the updated Aviation Activity Forecasts (Chapter 3). Current airport activity is summarized in **Table 2-1**.

TABLE 2-1: MULINO STATE AIRPORT (4S9) BASED AIRCRAFT AND OPERATIONS

ACTIVITY TYPE	ACTIVITY LEVEL
Based Aircraft	
Single-Engine Piston	56
Multi-Engine Piston	0
Turboprop/Turbojet	0
Glider	2
Rotorcraft	1
Total Based Aircraft (AFD EFF 5/25/17)	59
Annual Aircraft Operations (Recent Estimates) ➢ FAA 5010 Airport Record Form (updated months ending 8/25/15)	21,300

Airfield Facilities

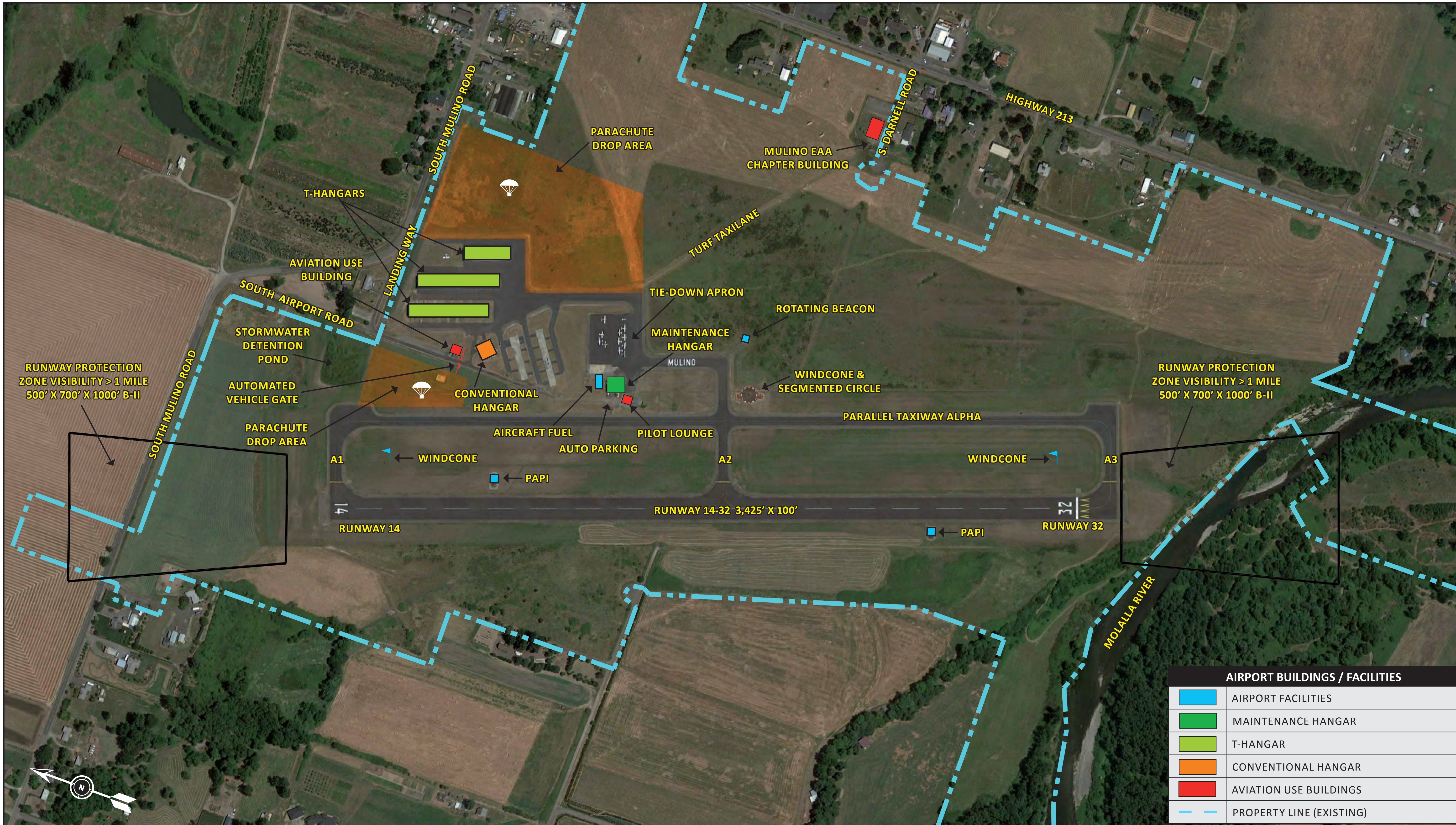
Airfield facilities comprise two categories: airside and landside. Airside facilities include the runways, taxiways, airfield lighting, and navigational aids that provide for the safe and efficient movement of aircraft. Landside facilities include aircraft storage (hangars, apron), fixed base operator (FBO) facilities and services (aircraft maintenance, fueling, passenger services, etc.), and aircraft support facilities. **Table 2-2** summarizes current airport data and **Figure 2-2** depicts existing airfield facilities.

Mulino State Airport consists of 275 acres (as indicated on the current FAA-approved airport layout plan) located west of State Highway 213. The published airfield elevation is 260 feet above mean sea level (MSL).

The airport has one runway (14/32), oriented in a northwest/southeast direction (140-320 degree magnetic heading). Runway 32 is the designated "calm wind" runway. The runway is lighted and equipped to support day and night operations in visual meteorological conditions. The runway is served by a taxiway system that provides access to all developed areas of the airfield. All airfield pavements are constructed of asphalt. All landside facilities and other structures are located on the east side of the runway.

TABLE 2-2: AIRPORT DATA

AIRPORT NAME/DESIGNATION	MULINO STATE AIRPORT (4S9)
Airport Owner	Oregon Department of Aviation (ODA)
Date Established	1949 (per local historical records); 1988, Port of Portland purchased and redeveloped the airport.
Federal Airport Category	National Plan of Integrated Airport Systems (NPIAS): General Aviation, FAA Airport Reference Code: B-II (as depicted on 2008 ALP)
State Airport Category	Category IV – Local General Aviation Airport (Oregon Aviation Plan)
Airport Acreage	275 Acres (per 2008 Airport Layout Plan)
Airport Reference Point (ARP) Coordinates	N 45° 12' 58.7865" W 122° 35' 24.3025"
Airport Elevation	260 feet MSL
Airport Traffic Pattern Configuration/Altitude	Left Traffic (Runway 32), Right Traffic (Runway 14); 1,260 feet MSL / 1,000 feet AGL
Calm Wind Runway	Runway 32
Airport Radio Communication	Common Traffic Advisory Frequency (CTAF) 123.050 MHz



EXISTING CONDITIONS | **FIG. 2-2**

Mulino State Airport is a non-towered airfield and pilots use the airport Unicom/Common Traffic Advisory Frequency (CTAF) for communications on the ground and in the vicinity of the airport. The airport traffic pattern altitude is 1,000 feet above ground level (1,260 feet MSL). The airport traffic patterns are located on the west side of the runway to reduce direct overflights of the community. Runway 32 has standard left hand traffic and Runway 14 has right hand traffic.

A review of on-airport development since the Airport Layout Plan drawing was approved in April 2008, notes construction of two new T-hangars (26 units) and removal of two older T-hangars (15 units). A storage barn located between the airport access road and the parallel taxiway has also been removed. Two parachute drop zones have been established on the airport, east of the runway.

Runway 14/32

Runway 14/32 is 3,425 feet long and 100 feet wide. The previous master plan indicates that the Runway 32 threshold was relocated 175 feet north in 2003 to meet FAA safety standards, reducing the useable length for takeoff and landing from 3,600 feet to 3,425 feet. The runway environment is cleared and graded to meet FAA airplane design group II (ADG II) design standards.

The runway has an asphalt surface with visual markings, edge lighting, and visual approach aids at both ends. The visual markings are consistent with the runway's current visual approach capabilities. The runway markings (white paint) include runway designation numbers, centerline stripe, and threshold bar at the Runway 32 end, indicating the end of usable runway. Yellow taxiway lead-in lines are painted on the runway at the mid-runway exit taxiway (Taxiway A2). The pavement located beyond the end of Runway 32 (175-foot relocated threshold) is marked as taxiway with a yellow centerline stripe and four yellow arrowheads pointing to the runway threshold bar. All runway markings are consistent with FAA standards for configuration, color, and approach type. The markings were observed to be in fair to good condition during a recent (2015) site visit.

The runway has an effective gradient of 0.34 percent, with the high point located at its south end (Runway 32 threshold). The runway pavement was rated "satisfactory" in a 2012 inspection.[5] The pavement condition observed during the 2015 inventory site visits is consistent with the 2012 rating and the age of the pavement.

The runway is served by a full-length parallel taxiway (Taxiway Alpha) on its east side with three 90-degree exit taxiways.

Table 2-3 summarizes existing runway facilities.

[5] Pavement Evaluation/Maintenance Management Program 2012 – Mulino State Airport (October 2012)

TABLE 2-3: RUNWAY 14/32 DATA

Dimensions	3,425 x 100 feet Relocated Threshold (Rwy 32): 175 x 100 feet (section converted to taxiway)
Bearing	N 19°00' W (True)
Effective Gradient	0.34%
Surface/Condition	Asphalt/Satisfactory
Markings	Visual: Runway Landing Designation Numbers, Threshold End Bar (Rwy 32), and Centerline Stripe (white)
Lighting	Runway Edge, Threshold, Visual Guidance Indicators
Signage	Runway Hold Position Signs (internally illuminated)
Wind Coverage	On-site data is not available. Estimated crosswind coverage based on data from nearby airports (as noted on 2008 ALP): ➢ 96.3% at 10.5 knots (12 mph) ➢ 98.4% at 13 knots (15 mph)

Airfield Pavement Strength

The runway, taxiways, taxilanes, and apron pavements are designed to accommodate a variety of general aviation aircraft. The majority of airfield pavements were constructed with a 2-inch asphalt concrete (AC) surface course over an 8-inch crushed aggregate base. No pavement strength rating is listed on the FAA Airport Record Form (5010 -1) or in the FAA Airport/Facility Directory (A/FD). However, the common pavement sections are consistent with designs intended to accommodate small aircraft (12,500 pounds and less) with single-wheel landing gear configurations.

Runway Wind Coverage

It is generally preferable for aircraft to land and takeoff directly into the wind, although varying wind conditions often require crosswind operations at airports. When wind conditions exceed the capabilities of a specific aircraft, use of a crosswind runway (when available) may occur. At airports with single runways, occasional periods of strong crosswinds often limit operations until conditions improve.

The FAA-recommended planning standard states that primary runways should be capable of accommodating at least 95 percent of wind conditions within the prescribed crosswind component. This component is based on a direct crosswind (90 degrees to the direction of flight) of 10.5 knots (12 miles per hour) for small aircraft and 13 knots (15 miles per hour) for larger general aviation aircraft. Aircraft are able to tolerate increasingly higher wind speeds as the crosswind angle is reduced and moves closer to the direction of flight.

The 2008 Mulino Airport Master Plan noted that on-site wind data was not available to determine the Runway 14/32 wind coverage. The 2008 Airport Layout Plan drawing includes an all-weather wind rose indicating 96.3 percent crosswind coverage on Runway 14/32 at 10.5 knots (12 miles per hour) and 98.4 percent coverage at 13 knots (15 miles per hour). The wind rose does not identify the location for the data.

The 2008 Airport Master Plan facility requirements analysis indicated that local pilots reported prevailing winds out of the south-southwest, particularly during the fall and spring months, which effectively creates a 45-degree crosswind. The 2008 Airport Master Plan suggested that a wind study could be conducted to determine crosswind coverage for Runway 14/32 and also noted that the 100-foot width of the runway provides additional operating margins for small aircraft in crosswind conditions.

Taxiways and Taxilanes

The airport has an extensive taxiway system, including a full-length parallel taxiway on the east side of Runway 14/32 that provides access to the full runway and adjacent landside facilities. A system of taxiways and taxilanes provides access to aircraft parking aprons and hangar development areas on the east side of the airport. **Table 2-4** summarizes existing taxiway and taxilane facilities. **Figure 2-2**, presented earlier in the chapter, depicts the major taxiways on the airfield. The striping and markings on the major taxiways are in fair or good condition based on a 2015 site visit. Pavement condition varies by section, consistent with pavement age, historic maintenance, and aircraft usage. Taxiway markings are generally in fair condition (yellow paint), although most of the taxiways/taxilanes located in the east landside area have worn centerline stripes or no striping.

Taxiways

TAXIWAY A (PARALLEL TAXIWAY)

Taxiway A is a full-length parallel taxiway. Taxiway A is 40 feet wide, has a runway centerline separation of 400 feet, and has three exit taxiway connections to the runway. The taxiway has a centerline stripe and connecting centerline stripes for each exit taxiway and the apron access taxiway. Taxiway A has edge lighting and lighted guidance signs.

Taxiway A has two aircraft holding areas located near both runway ends on the outer edge (east side) of the taxiway. The holding areas are approximately 130 feet long and 50 feet deep. The outer edge of the holding area pavement is approximately 70 feet from the parallel taxiway centerline. The FAA ADG II standard for the parallel taxiway object free area (TOFA) is 65.5 feet, measured from the taxiway centerline. The TOFA is intended to provide an obstruction free path for taxiing aircraft (wingtip clearance), so it should be free of parked or holding aircraft, structures, or other fixed obstructions. Aircraft positioned in the holding areas, and a portion of the pilot lounge building appears to be located within the ADG II parallel taxiway OFA.

TAXIWAY A1, A2, AND A3 (RUNWAY EXITS)

Runway 14/32 has three 90-degree exit taxiways (Taxiways A1, A2, and A3) connecting the runway and parallel taxiway at each end and near mid-runway. Taxiways A1 and A3 (the end exit taxiways) are 50 feet wide and taxiway A2 (the mid-runway exit taxiway) is 40 feet wide. The taxiways are equipped with edge lighting, lighted guidance signs and yellow centerline stripes. Taxiway A2 is also marked with yellow lead-in lines that extend from the runway in both directions and connect to the taxiway centerline.

The number, location and configuration of the exit taxiways is standard for a runway of this length and provides efficient aircraft movement. However, use of the mid-runway exit for landing aircraft often requires aggressive braking, particularly for Runway 32. The taxiway lead-in striping for Taxiway A2 is located approximately 1,525 feet from the Runway 32 threshold and 1,725 feet from the Runway 14 threshold. Aircraft that are unable to slow sufficiently to use the mid-runway exit, either continue their landing rollout to the end exit taxiway, or execute a 360-degree turn on the runway and back-taxiway to Taxiway A2.

Taxiways A1, A2, and A3 have painted aircraft hold lines (two solid yellow lines with two dashed lines) and mandatory runway instruction signs located 125 feet from the runway centerline. The facility requirements section of the 2008 airport master plan notes that the aircraft hold lines are intended to protect the runway safety area (RSA). Based on current FAA design standards, aircraft hold position lines and signs are located to keep holding aircraft outside the runway obstacle free zone (OFZ). For Runway 14/32, the OFZ is 400 wide, extending 200 feet from runway centerline.

ACCESS TAXIWAY

The airport's east landside facilities are connected to the runway-taxiway system by a single access taxiway that extends from the southwest corner of the main tiedown apron to the intersection of Taxiway A and A2. The access taxiway is approximately 590 feet long and 40 feet wide. The section of the taxiway in line with Taxiway A2 has a yellow centerline stripe that is partially worn/faded. The section of the taxiway leading directly to the tiedown apron has no centerline stripe and is marked "MULINO" with 30-foot letters. The access taxiway is equipped with stake-mounted retroreflective (blue) edge markers.

TURF TAXIWAY

The airport has a designated turf taxiway (approximately 50' x 1,250') that extends from the paved access taxiway located near the southeast corner of the main tiedown apron to the Experimental Aircraft Association (EAA) building on the southeast corner of the airport. A second turf taxiway (approximately 50' x 1,500') that provided access to a café (currently closed) adjacent to the northeast corner of the airport is currently unused.

Taxilanes

Mulino State Airport has several taxilanes serving landside facilities. Most of the taxilanes have centerline stripes that are very worn/faded or have not been repainted after pavement sealcoating.

HANGAR ACCESS TAXILANE

The airport has an access taxilane that connects a series of hangar taxilanes to the main tiedown apron and access taxiway. The taxilane is approximately 680 feet long and 35 feet wide.

T-HANGAR TAXILANES

The east landside area has a system of taxilanes that provide access to three existing T-hangars, one conventional hangar, and two concrete pads from former T-hangars (new hangars are planned for the concrete pads). The hangar taxilane widths vary from 22.5 feet to 40 feet, although several abut large paved areas adjacent to the hangars.

APRON TAXILANES

The western and southern edges of the main apron accommodate taxilanes that connect to the adjacent access taxiway (south) and hangar access taxilane (north). The south access taxiway transitions into an apron taxilane that provides access to the aircraft fueling area and connects with the tiedown taxilanes. The apron is configured with two east-west tiedown rows served by three adjacent access taxilanes.

TABLE 2-4: TAXIWAY AND TAXILANE DATA (MULINO STATE AIRPORT)

TAXIWAY	DESCRIPTION	DIMENSIONS/CONFIGURATION
Taxiway A	East Parallel Taxiway	3,600 x 40' with three exit taxiways; Aircraft hold areas located on both runway ends. Asphalt w/ centerline stripe (yellow); Medium Intensity Taxiway Lights (MITL)
Taxiways A1, A2, A3	90-degree Exit Taxiways	Dimensions: 330' x 50' (A1, A3); (40' for A2) Asphalt w/ centerline stripe; taxiway lead-in lines (Taxiway A2 only) on runway; aircraft hold lines at each runway connection (125' from runway centerline); MITL
Access Taxiway	Access Taxiway between Taxiway A and Main Tiedown Apron	Dimensions: 590' x 40' Asphalt w/partial centerline stripe (yellow); "MULINO" (white) markings; Edge Reflectors
Hangar Access Taxilane	Connects Main Tiedown Apron and T-Hangar Taxilanes	Dimensions: 683' x 35' Asphalt; unmarked; unlighted
T-Hangar Taxilanes	7 Taxilanes serving six hangars/sites	Dimensions vary (widths 22.5 to 40 feet) Asphalt; unmarked; unlighted
Turf Taxilanes	Taxilane to EAA Building	Dimensions: 1,250' x 50' (approximate) Turf surface; unmarked; unlighted

Aircraft Aprons

MAIN TIEDOWN APRON

The primary aircraft apron is located on the east side of the runway/parallel taxiway and accommodates aircraft tiedowns and fueling. A pilot lounge building and an aircraft maintenance hangar are also located along the primary aircraft apron. The apron totals approximately 60,660 square feet of paved area with approximately 16 small aircraft parking positions in two double-sided rows (tail-in parking). Aircraft are secured to anchored steel cables located at the front and back of each row, rather than individual tiedown anchors. The apron is configured with taxilanes adjacent to the tiedown rows that provide access to the aircraft fueling area. Vehicle access to the main tiedown apron area is provided via Airport Road, with parking located near the pilot lounge and maintenance hangar.

A small area of pavement located near the south end of the three T-hangars is designated as apron in the current pavement maintenance plan. Airport users indicate that the area has been used for helicopter parking in the past, although the markings (painted circle) are no longer actively maintained.

Airfield Lighting and Signage

The airfield lighting at Mulino State Airport accommodates day-night operations in visual meteorological conditions. Airfield lighting includes runway edge lighting, threshold lighting, Precision Approach Path Indicators (PAPI), a lighted windsock, lighted runway hold position signs, and an airport beacon. Taxiways A, A1, A2, and A3 are equipped with edge lighting. Existing lighting systems are described in **Table 2-5**.

TABLE 2-5: TYPES OF AIRPORT LIGHTING USED AT MULINO STATE AIRPORT

CATEGORY	TYPE
Airport Lighting	Airport Rotating Beacon (white/green dual lens)
Runway Lighting	Medium Intensity Runway Lighting (MIRL) (white lenses) Threshold Lighting (red/green lenses)
Visual Guidance Indicators	Precision Approach Path Indicators (PAPI) Runway 14 and 32: • 2-Box PAPI (red/white lenses) • 3.0 degree glide path
Taxiway Lighting	Taxiways A, A1, A2, and A3 • Medium Intensity Taxiway Lights (blue lenses)
Airfield Signage	Runway Hold Position Signs
Other Lighting	Obstruction lights, lighted wind cone, flood lighting on hangars, and fuel area.

AIRPORT LIGHTING

The airport has a rotating beacon mounted on a tower support on the east side of the runway, near the segmented circle. Rotating beacons are used to identify the location of an airport to pilots at night or during reduced visibility. The beacon provides sequenced white and green flashing lights (representing a lighted land airport) that rotate 360 degrees to allow pilots to identify the airport from all directions from several miles.

One internally illuminated wind cone is located in the segmented circle, midfield on the east side of the runway. There are two other unlighted wind cones, one at each runway end, between the parallel taxiway and runway.

RUNWAY LIGHTING

Runway 14/32 has medium intensity runway edge lighting (MIRL). The MIRL system includes white edge lights (with blue lights located near the exit taxiways) and runway threshold lights. The threshold lights consist of two sets of three fixtures near each corner of the runway ends. The fixtures have split lenses (green/red) indicating the beginning and end of the useable runway.

VISUAL GUIDANCE INDICATORS

Runways 14 and 32 are equipped with 2-box Precision Approach Path Indicators (PAPI). The PAPI projects light along a fixed glide path to a runway end, with red and white colored lights indicating the aircraft's vertical position (above, below, or on glide path) relative to the defined glide path.

AIRFIELD SIGNAGE

The runway-taxiway system has internally illuminated mandatory instruction signs (Runway Holding Position Sign with red background and white letters/numbers). The signs are located to coincide with the painted aircraft hold lines on each taxiway that connects to the runway.

TAXIWAY LIGHTING

The parallel taxiway and exit taxiways are equipped with medium intensity taxiway lighting (MITL) with blue lenses.

OTHER LIGHTING

Overhead lighting is available in the main tiedown apron area, the aircraft fueling area, and various hangar areas, and adjacent to Airport Drive. Several hangars and buildings have exterior wall-mounted lights.

LIGHTING CONTROL/OPERATION

The runway edge lights, taxiway edge lights, and wind cone are pilot controlled using the common traffic advisory frequency (CTAF) 123.050 MHz. The Runway 14/32 PAPI operates 24 hours a day. The airport beacon operates on a photocell, from dusk until dawn or during periods of low visibility. All airfield lighting reportedly functions normally.

Airfield Pavement Condition

The primary airfield pavements at Mulino State Airport were constructed between 1990 and 1993 with asphalt concrete (AC) over a crushed aggregate base. Newer pavement sections include the Portland cement concrete (PCC) fueling apron (2005) and three hangar taxilanes (2003) located adjacent to two older T-hangars (the buildings have been removed).

The Pavement Evaluation/Maintenance Management Program was developed and applied to all Oregon general aviation airports as part of the Oregon Aviation System Plan. The evaluation takes into account historical pavement condition index (PCI) ratings, pavement features, and current conditions. Through the use of the MicroPAVER computer software, existing conditions data can be entered, and projections of future pavement condition and specific needs can be estimated. **Table 2-6** summarizes PCI ratings at Mulino State Airport based on inspections conducted in 2015, with comparisons to previous ratings from 2004, 2008, and 2012.

It should be noted that although the numerical scale (0-100) used to rate pavements in Micro Paver has not changed, the qualitative ratings (good, fair, etc.) have changed. For example, a PCI of 100, which is typical of new pavement, now corresponds to a "satisfactory" rating instead of "excellent." This is only important to note when comparing the qualitative pavement ratings contained in the 2008 airport master plan (Chapter 2, Exhibit 2C) to the ratings from the most recent pavement inspection. A summary of the current and previous PCI rating descriptors is provided at the bottom of **Table 2-6**.

The rate of pavement deterioration documented between the 2004 and 2015 PCI inspections is consistent with local conditions and aircraft use. ODA conducts periodic vegetation control, crackfilling, sealcoating, and marking/repainting of airfield pavements. A visual inspection of the airfield pavements conducted for the master plan did not identify any areas of pavement deterioration that significantly differed from recent PCI inspections.

TABLE 2-6: SUMMARY OF AIRFIELD PAVEMENT CONDITION RATINGS

PAVEMENT SECTION	2015 PCI	2012 PCI	2008 PCI	2004 PCI
Runway 14/32	86	83	84	96
Taxiway A (North Section)	82	79	76	89
Taxiway A (South Section)	79	69	93	99
Taxiway A1 (north exit)	81/92	94/91	91/100	100
Taxiway A2 (middle exit)	83/87	94/100	88/100	100
Access Taxiway (between Taxiway A and Main Tiedown Apron)	90/95	86/93	90/100	100
Taxiway A3 (south exit)	81/93/91	95/88/95	86/100/93	99
Hangar Access Taxilane (between Main Tiedown Apron and T-Hangars)	82	84	86	95
T-Hangar Taxilanes (existing T-Hangars)	77-83	79-89	87-93	97-100
Hangar Taxilanes (former hangars)	75-77	88-90	97-96	NR
Main Tiedown Apron	88	90	81	94
Runway 14 Holding Apron	98	99	100	100
Runway 32 Holding Apron	100	100	100	100

The Pavement Condition Index (PCI) scale ranges from 0 to 100, with seven general condition categories ranging from "failed" to "good." For additional details, see *Oregon Aviation System Plan Pavement Evaluation/Maintenance Management Program* (2015) for Mulino State Airport.

2015 PCI Rating Categories
85-100 = **Good** (previously "Excellent")
70-85 = **Satisfactory** (previously "Very Good")
55-70 = **Fair** (previously "Good")
40-55 = **Poor** (previously "Fair")
25-40 = **Very Poor** (previously "Poor")
10-25 = **Serious** (previously "Very Poor")
0-10 = **Failed** (previously "Failed")

Landside Facilities

HANGARS AND AIRPORT BUILDINGS

Mulino State Airport accommodates a variety of aviation-related buildings including hangars, a pilot lounge/airport management office, and other structures. **Table 2-7** summarizes existing airport buildings. **Figure 2-2**, presented earlier in this chapter, depicts the existing airport facilities.

TABLE 2-7: BUILDINGS AT MULINO STATE AIRPORT

	BUILDING	USE	OWNERSHIP
1.	Pilot Lounge/Airport Management Office/FBO	Facilities including common area, restroom, kitchen, and office	ODA
2.	Conventional Hangar (50'x60')	Aircraft maintenance	ODA
3.	Conventional Hangar (60'x60')	Aircraft storage	ODA
4.	Office (adjacent to Airport Road)	Oregon Pilots Association (OPA) events	Private
5.	T-hangar (17 unit)	Aircraft storage	Private
6.	T-hangar (17 unit)	Aircraft storage	ODA
7.	T-hangar (9 unit)	Aircraft storage	ODA
8.	EAA Mulino Chapter Building (adjacent to Darnell Road)	Experimental Aircraft Association (EAA) events	Private

Vehicle Access and Parking

Vehicle access to the airport is provided from State Highway 213 via South Mulino Road, Landing Way, and Airport Road (the primary access to the airfield). Airport Road is asphalt surfaced (approximately 1,200 feet long and 15 feet wide) with an automated (key pad combination) sliding vehicle gate. Airport Road provides access to the east landside area including the main tiedown apron, aircraft hangars, aviation fuel facilities, and the pilot lounge.

Additional surface access is provided from a second connection to South Mulino Road located near the northeast corner of the T-hangar development. The access is equivalent to a driveway (approximately 10 feet wide) and has a lockable vehicle swing gate. It appears to be used primarily to access the hangars and the on-airport skydiving operation. Vehicle access to the EAA building located on east side of the airport is provided via South Darnell Road, which connects to State Highway 213.

An area of public parking (approximately 15 parking positions) is located adjacent to Airport Road, on the north side of the airport access gate. A smaller vehicle parking area (approximately 6 parking positions) is located adjacent to the pilot lounge building and aircraft maintenance hangar. Airport tenants and users park in grass areas adjacent to hangars.

Airspace and Navigational Aids

Mulino State Airport is a non-towered airport that operates under visual flight rules (VFR) conditions. There are no instrument procedures available for the airport and no ground-based navigational aids are located on or near the airport.

AIRSPACE CLASSIFICATIONS

Airspace within the United States is classified by the FAA as “controlled” or “uncontrolled” with altitudes extending from the surface upward to 60,000 feet above mean sea level (MSL). Controlled airspace classifications include Class A, B, C, D, and E. Class G airspace is uncontrolled. Airports with instrument approaches have at least one category of controlled airspace.

Aircraft operating within controlled airspace are subject to varying levels of positive air traffic control that are unique to each airspace classification. Requirements to operate within controlled airspace vary, with the most stringent requirements associated with very large commercial airports in high traffic areas. Uncontrolled airspace is typically found in remote areas or is limited to a 700 or 1,200-foot above ground level (AGL) layer above the surface and below controlled airspace. **Figure 2-3** illustrates and describes the characteristics of the FAA defined airspace classifications.

LOCAL AREA AIRSPACE STRUCTURE

Figure 2-4 depicts nearby airports, notable obstructions, special airspace designations and instrument flight rules (IFR) routes in the vicinity of Mulino State Airport, as identified on the Seattle Sectional Charts and the IFR Enroute Low Altitude Chart (L-1/L-2).

The airport is located in an area of Class G airspace that extends upward from the ground surface to the floor of the Class E airspace over the airport. The local Class E airspace consists of a large segment of airspace surrounding the Portland metro area that begins at 700 feet above ground level (AGL). The boundary between the 700-foot and 1,200-foot AGL Class E airspace segments is located approximately three nautical miles south of the airport.

Radio communication is not required for visual flight rules (VFR) operations in Class G and E airspace, although pilots are encouraged to use the common traffic advisory frequency (CTAF) when operating at the airport. Aircraft are required to obtain an air traffic control (ATC) clearance prior to operating in Class E airspace during instrument flight rules (IFR).

Areas of Class E airspace associated with enroute instrument airways have a floor established at 700 feet AGL. The nearest low altitude enroute instrument airway is Victor 448 (V448), which passes (north-south) within 1 nautical mile west of Mulino State Airport. The minimum enroute altitude (MEA) for this section of V448 is 5,000 feet MSL. Victor 500 (V500) passes (east-west) within 3 nautical miles north of the airport. The airway has two MEAs depending on the direction of flight (10,000 and 7,200 feet MSL) and a minimum obstruction clearance altitude (MOCA) of 6,700 feet MSL.

An area of Class C airspace associated with Portland International Airport is located north of Mulino State Airport. The southern edge of this Class C airspace is located approximately 12 nautical miles north of Mulino with a floor of 1,700 feet and a ceiling of 4,000 feet. Operations within Class C airspace require radio contact with air traffic control.

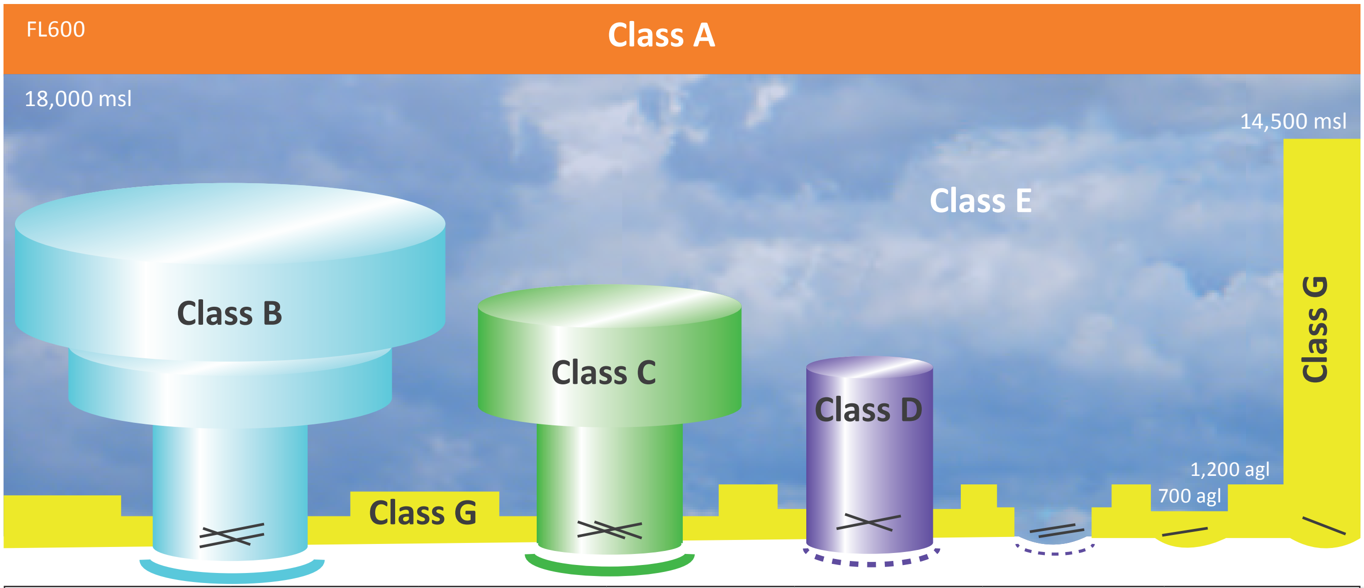
Aurora State Airport, located approximately 8 miles west-northwest of Mulino State Airport, is in the process of establishing an airport traffic control tower. Construction of the tower was completed in summer 2015 and it is currently operating in an advisory mode until final FAA certification is obtained. Once the tower becomes fully operational, an area of Class D airspace will be established around the airport, from the surface upward to 2,500 feet above ground level (AGL). The eastern edge of the Aurora Class D airspace will extend to within about three nautical miles (west) of Mulino. The Class D airspace will be in effect during the normal tower operating hours and revert back to Class E airspace when the tower is not in operation. Other nearby airports with Class D airspace include Portland-Troutdale, Portland-Hillsboro, and McNary Field (Salem).

The local airport traffic pattern altitude is 1,000 feet above ground level (AGL) (1,260' MSL) with right traffic on Runway 14 and left traffic on Runway 32. The traffic patterns are located on the west side of the runway, as depicted in **Figure 2-5**. Local airport operations and flight activity are not directly affected by the enroute airspace due to the minimum enroute altitudes that are well above the local airport traffic pattern altitude.

SPECIAL USE AIRSPACE AND NEARBY OBSTACLES

There are no areas of special use airspace (SUA) in the immediate vicinity of the airport. The nearest Military Operations Area (MOA) is the Dolphin North MOA (NE corner: 65 miles southwest). MOAs are designated to segregate VFR and IFR traffic from military operations. When a MOA is active, IFR traffic may be cleared through the area when air traffic control can ensure IFR separation; otherwise, traffic will be rerouted. Although VFR operations are not restricted in an MOA, pilots are advised to exercise extreme caution while flying within, near, or below an active MOA. Prior to entering an active MOA, pilots are encouraged to contact the controlling agency for traffic advisories due to these areas frequently changing status.

Pilots are requested to maintain a minimum altitude of at least 2,000 feet above ground level (AGL) over municipal parks, wilderness areas, wildlife refuges and other sensitive areas. The nearest area of this type is the Tualatin River National Wildlife Refuge, located approximately 17 miles northwest of Mulino State Airport.

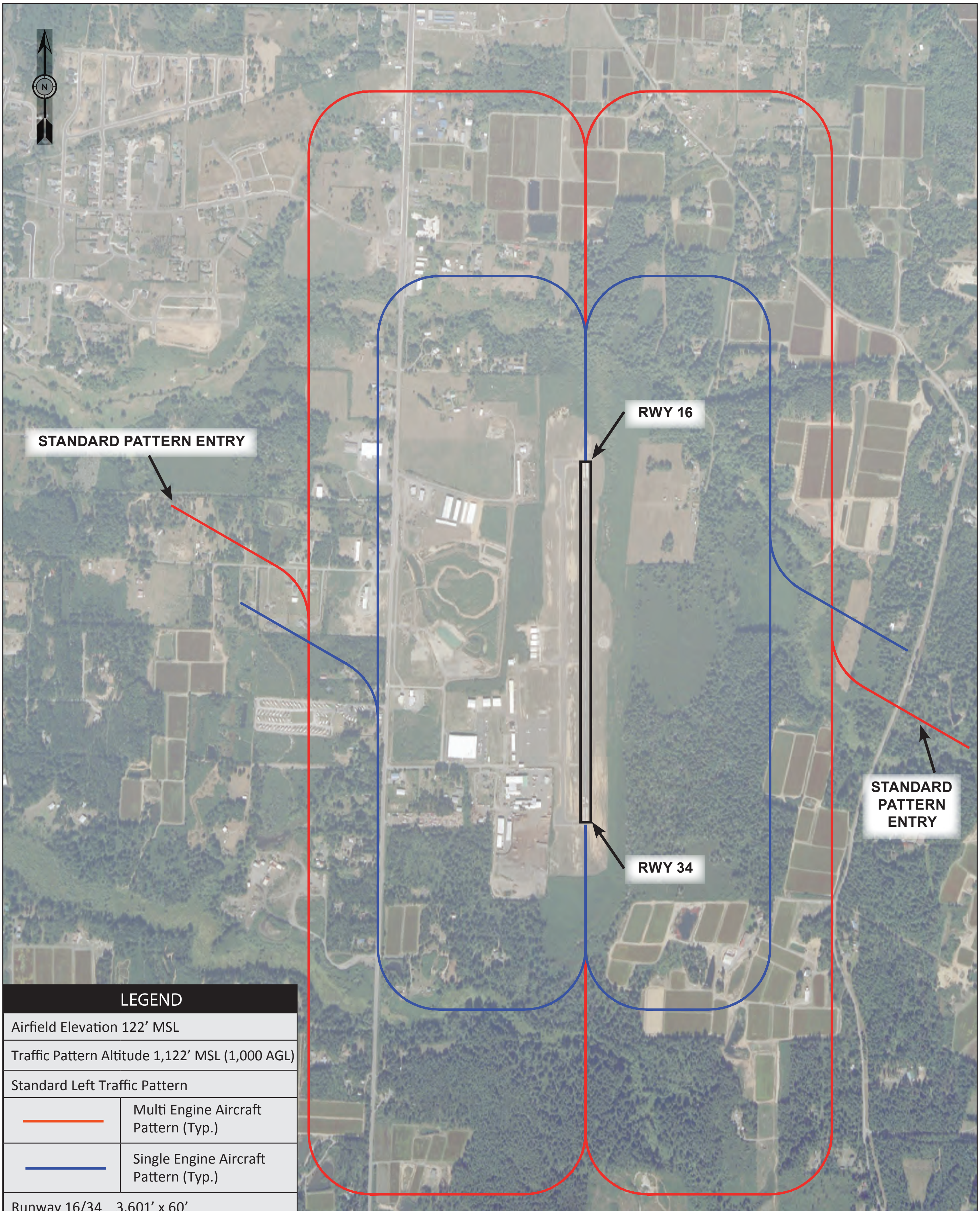


COMMUNICATION REQUIREMENTS AND WEATHER MINIMUMS						
	Class A	**Class B**	**Class C**	**Class D**	**Class E**	**Class G**
Airspace Class De i	Generally airspace above 18,000 feet MSL up to and including FL 600.	Generally mul - layered airspace from the surface up to 10,000 feet MSL surrounding the na on's busiest airports	Generally airspace from the surface to 4,000 feet AGL surrounding towered airports with service by radar approach control	Generally airspace from the surface to 2,500 feet AGL surrounding towered airports	Generally controlled airspace that is not Class A, Class B, Class C, or Class D	Generally uncontrolled airspace that is not Class A, Class B, Class C, Class D, or Class E
Minimum Pilot Quali a ons	Instrument Ra ng	Student*	Student*	Student*	Student*	Student*
Entry Requirements	IFR: ATC Clearance VFR: Opera ons Prohibited	ATC Clearance	IFR: ATC Clearance VFR: Two-Way Communica on w/ ATC	IFR: ATC Clearance VFR: Two-Way Communica on w/ ATC	IFR: ATC Clearance VFR: None	None
VFR Visibility Below 10,000 msl**	N/A	3 Statute Miles	3 Statute Miles	3 Statute Miles	3 Statute Miles	Day: 1 Statute Mile Night: 3 Statute Miles
VFR Cloud Clearance Below 10,000 msl	N/A	Clear of Clouds	500 Below 1,000 Above 2,000 Horizontal	500 Below 1,000 Above 2,000 Horizontal	500 Below 1,000 Above 2,000 Horizontal	500 Below 1,000 Above 2,000 Horizontal***
VFR Visibility 10,000 msl and Above**	N/A	3 Statute Miles	3 Statute Miles	3 Statute Miles	5 Statute Miles	5 Statute Miles
VFR Cloud Clearance 10,000 msl and Above	N/A	Clear of Clouds	500 Below 1,000 Above 2,000 Horizontal	500 Below 1,000 Above 2,000 Horizontal	1,000 Below 1,000 Above 1 Statute Mile Horizontal	1,000 Below 1,000 Above 1 Statute Mile Horizontal

*Prior to opera ng within Class B, C or D airspace (or Class E airspace with an opera ng control tower), student, sport, and recrea onal pilots must meet the applicable FAR Part 61 training and endorsement requirements. Solo student, sport, and recrea onal pilot opera ons are prohibited at those airports listed in FAR Part 91, appendix D, sec on 4.
**Student pilot opera ons require at least 3 statue miles visibility during the day and 5 statute miles visibility at night.
***Class G VFR cloud clearance at 1,200 agl and below (day); clear of clouds.

LEGEND

	Private airports with hard-surface runways / other runways		Public-use airports with hard-surfaced runways 1,500ft. to 8,069ft.
	Glider Operations		Public-use airports with hard-surfaced runways greater than 8,069ft.
	Skydive Operations		Class E Airspace with floor 700' above surface
	Compass Rose (VOR/DME or VORTAC)		Class C Airspace (surface)
	VOR or RNAV Airways		Class D Airspace (surface)



LEGEND	
Airfield Elevation 122' MSL	
Traffic Pattern Altitude 1,122' MSL (1,000 AGL)	
Standard Left Traffic Pattern	
(red line)	Multi Engine Aircraft Pattern (Typ.)
(blue line)	Single Engine Aircraft Pattern (Typ.)
Runway 16/34 3,601' x 60'	

Numerous electrical transmission lines are depicted on the aeronautical chart west of Mulino State Airport. One tower is depicted on the aeronautical chart approximately 7 miles SW of the airport with an elevation of 219 feet AGL. Heights for the electrical transmission lines are not provided; although, tower heights exceeding 200 feet are common.

A designated parachute jumping area is charted approximately 5 miles south of the airport near the private Skydive Oregon airport. Mulino State Airport also accommodates skydiving operations and updated information has been submitted by ODA to FAA for publishing in aeronautical charts and the airport/facility directory (A/FD).

A glider operations designation is charted approximately 2 miles northeast of Mulino State Airport and the airport periodically accommodates locally-based and transient glider activity.

NAVIGATIONAL AIDS/WEATHER DATA

There are no electronic navigational aids located on the airport. Ground-based navigational aids (NAVAIDS) in the area include the Newberg VOR/DME[6] (18.4 nautical miles northwest), the LAKER non directional beacon (NDB) (located 20.2 nautical miles north), and the instrument landing system (ILS) localizer at Aurora State Airport (7.8 nautical miles west-northwest). These NAVAIDS provide additional navigation functions for enroute aircraft in addition to supporting terminal instrument approaches.

Mulino State Airport does not have on-site weather observation capabilities, such as an automated weather observation system (AWOS) or automated surface observing system (ASOS). The nearest on-site airport weather observation is located at Aurora State Airport. **Table 2-8** summarizes existing navigational aids and related items.

[6] Very high frequency Omnidirectional Radio range (VOR) with distance measuring equipment (DME)

TABLE 2-8: NAVIGATIONAL AIDS AND RELATED ITEMS

TYPE	FACILITIES
Electronic Navigational Aids	None on Field Nearest: Newberg (UBG) VOR/DME (117.4 MHz) (18.4 nm NW) Aurora State Airport (UAO) Localizer/DME (111.15 MHz) (7.8 nm WNW)
Weather Observation	None on Field Nearest: ASOS (Aurora State – 7.8 nm WNW) (118.525 MHz) ASOS (Portland – Troutdale – 21.5 nm NNE) (135.625 MHz)
Communication	Unicom/Common Traffic Advisory Frequency (CTAF)(123.050 MHz)

AERONAUTICAL SERVICES PROVIDERS

Mulino State Airport has one fixed base operator (FBO) "Infinite Air," who manages the ODA-owned aviation fuel system and rental hangars, and plans to offer fixed-wing flight instruction in the near future. The FBO leases space in the airport pilot lounge from ODA and is currently in the process of renovating the building to accommodate their operational needs.

The airport has one specialized aviation service operator (SASO) "Mix Aircraft Solution," who provides aircraft maintenance service and leases the maintenance hangar located adjacent to the pilot lounge and main tiedown apron from ODA.

Pacific Northwest Skydivers is located on the airport and provides recreational parachuting and parachute training.

AIRCRAFT FUEL

100-octane low lead (100LL) aviation gasoline (AVGAS) is available at the airport. ODA owns and maintains one 12,000-gallon double wall aboveground fuel storage tank with a credit card reader that allows 24-hour self-fueling. The fueling facilities are located adjacent to the Main Tiedown Apron. The airport's FBO, Infinite Air is responsible for managing the fuel system as part of its agreement with ODA.

PUBLIC RESTROOMS

Public restrooms are located in the pilot lounge building, and portable toilets are located adjacent to the aviation fuel area and in the hangar area.

FENCING

A 3-foot perimeter field fence surrounds the airport. One automated (combination key pad) vehicle gate is located on Airport Road. A lockable vehicle swing gate is located near the northeast corner of the north hangar development area with direct access to South Mulino Road.

Public Safety

Mulino is located within the service area for Molalla Rural Fire Protection District #73 (MRFPD #73). MRFPD #73 has a coverage area of approximately 101 square miles for fire services and 350 square miles for ambulance services, using both full time and volunteer firefighters and emergency medical technicians. MRFPD #73 Station 81 is located in Mulino, approximately 1.6 miles south of the airport on Highway 213.

The Clackamas County Sheriff's Department provides police service for the community and surrounding area.

Utilities

The developed areas of Mulino State Airport have water, electrical, and telephone/internet service. **Figure 2-6** depicts the locations of the major utilities serving Mulino State Airport.

WATER

Mulino Water District provides water service for the airport. The Mulino Water District service boundary is immediately west of and runs parallel to Runway 14/32. As a result, all water service is from the east.

- A water line enters the airport boundary from the north via Airport Road and exits the airport to the east via South Darnell Road.
- The water service lines range from 4-8 inches in diameter.
- East of the runway: one hydrant near the westernmost T-hangar, one hydrant in the infield area near the entrance to the airport, one hydrant near the main tiedown apron and fuel tank, and one hydrant near the airport beacon.

SANITARY SEWER

Mulino is not served by a sanitary sewer network due to the community's small size and rural setting. Individual septic systems that percolate into the soil serve the community and the airport.

STORMWATER

The airfield uses a system of catch basins that have one outfall to a stormwater detention pond located on the northeast corner of the airport. The majority of surface drainage is collected from the runway, taxiways, and apron and routed north to the stormwater detention pond. The areas along the runway, taxiways, and apron appear to be sloped and provide efficient airport drainage.

POWER

Portland General Electric provides electrical service to the airport. Overhead power lines run along the east side of Airport Road from the airport entrance to the pilot lounge with overhead connections to lights. The overhead electrical lines on South Mulino Road in the vicinity of the Runway 14 approach are not equipped with high visibility marker balls for pilot identification. All electrical service lines on the airport are underground, including the connection to the wind cone and beacon.

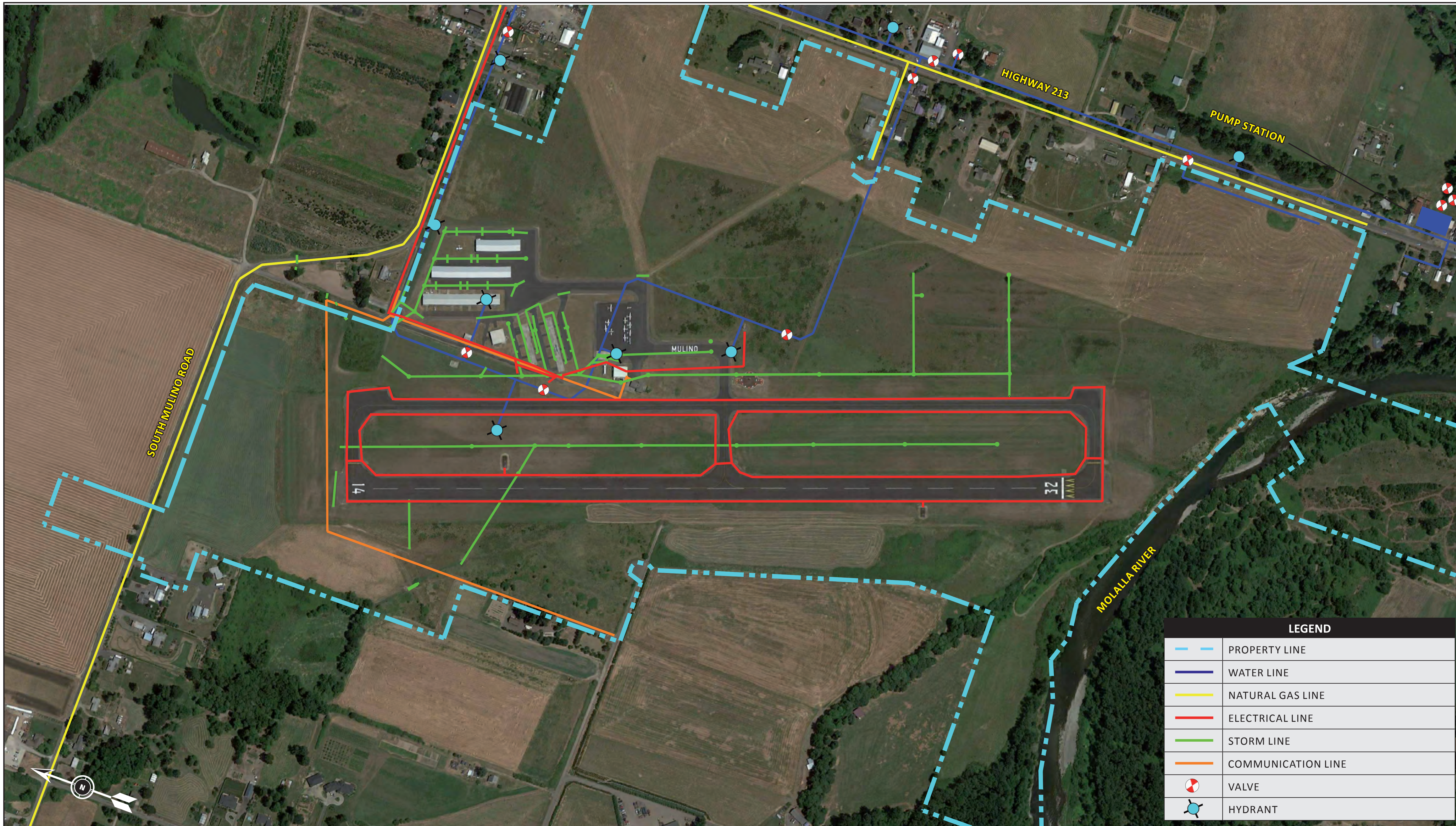
GAS

Northwest Natural Gas provides natural gas service to areas around the airport, but no direct service lines to the airport are known. Current service lines include the following:

- 2" diameter line in the right-of-way of South Mulino Road
- 4" diameter line in the right-of-way of State Highway 213
- 2" diameter line in the right-of-way of South Darnell Road

TELEPHONE/INTERNET

Communication and internet services are provided through Molalla Communication Cooperative.



MULINO STATE AIRPORT | AIRPORT MASTER PLAN

OREGON Department of AVIATION

AIRPORT UTILTIES | **FIG. 2-6**

CENTURY WEST ENGINEERING

Land Use Planning and Zoning

Mulino State Airport is located in unincorporated Clackamas County and is subject to land use controls established by the County. The airport is also located within the boundary of the Hamlet of Mulino, although there are no additional land use regulations associated with the hamlet designation beyond those defined by Clackamas County. Land use controls and zoning for the airport and the immediate vicinity of the airport are administered by Clackamas County. Current land use and zoning for the airport and its surrounding area is depicted in **Figure 2-7**.

Existing land use and zoning is briefly described below. A detailed description of existing land use and zoning, any potential concerns or issues, and any related recommendations will be provided in the Airport Land Use Compatibility chapter later in the master plan.

COMPREHENSIVE PLAN

The **Clackamas County Comprehensive Plan** provides policy and land use planning guidance for the urban and rural areas of the county. The community of Mulino and Mulino State Airport are located outside the urban growth boundary defined for the Portland Metro area in unincorporated Clackamas County. The comprehensive plan land use designation for this area is "Rural."[7] The comprehensive plan provides the following definition for the **Rural** land use designation:

"Rural lands are exception lands, as defined in Oregon Administrative Rules 660-004-0005(1), that are outside urban growth boundaries and Unincorporated Communities and are suitable for sparse settlement, such as small farms, woodlots, or acreage home sites. They lack public facilities or have limited facilities and are not suitable, necessary, or intended for urban, agricultural, or forest use."

Clackamas County Comprehensive Plan, Chapter 5: Transportation System Plan defines policies and land use planning guidance specific to public use airports. Policy 5.X.6 - Apply a Public-Use Airport and Safety overlay zoning district to public-use airports, consistent with ORS 836.600 through 836.630, and as shown on Map 5-10.", provides the basis for adopting airport-specific development regulations for Mulino State Airport through the application of the special use district.

ZONING

Clackamas County Zoning and Development Ordinance - Section 713 Public Use Airport and Safety Overlay Zones applies to Mulino State Airport and defines permitted uses (outright and subject to review), airspace and noise impact boundaries, land use compatibility requirements, restrictions on water impoundments, and nonconforming uses. The airport accommodates a variety of aviation related uses and all existing development directly supports aviation-related activities.

[7] Clackamas County Comprehensive Plan - Non Urban Land Use Map

As defined in the county code, the physical boundary of the airport overlay zone is "coterminous" with the airport boundary, although the boundaries of the safety overlay zones "radiate from points at the ends of the airport's primary surface…" which often extend beyond an airport boundary.

The underlying zoning for Mulino State Airport consists of three zones:

- Exclusive Farm Use (EFU)
- Rural Residential Farm Forest on 5 acres (RRFF-5)
- Rural Area Residential on 2 acres (RA-2)

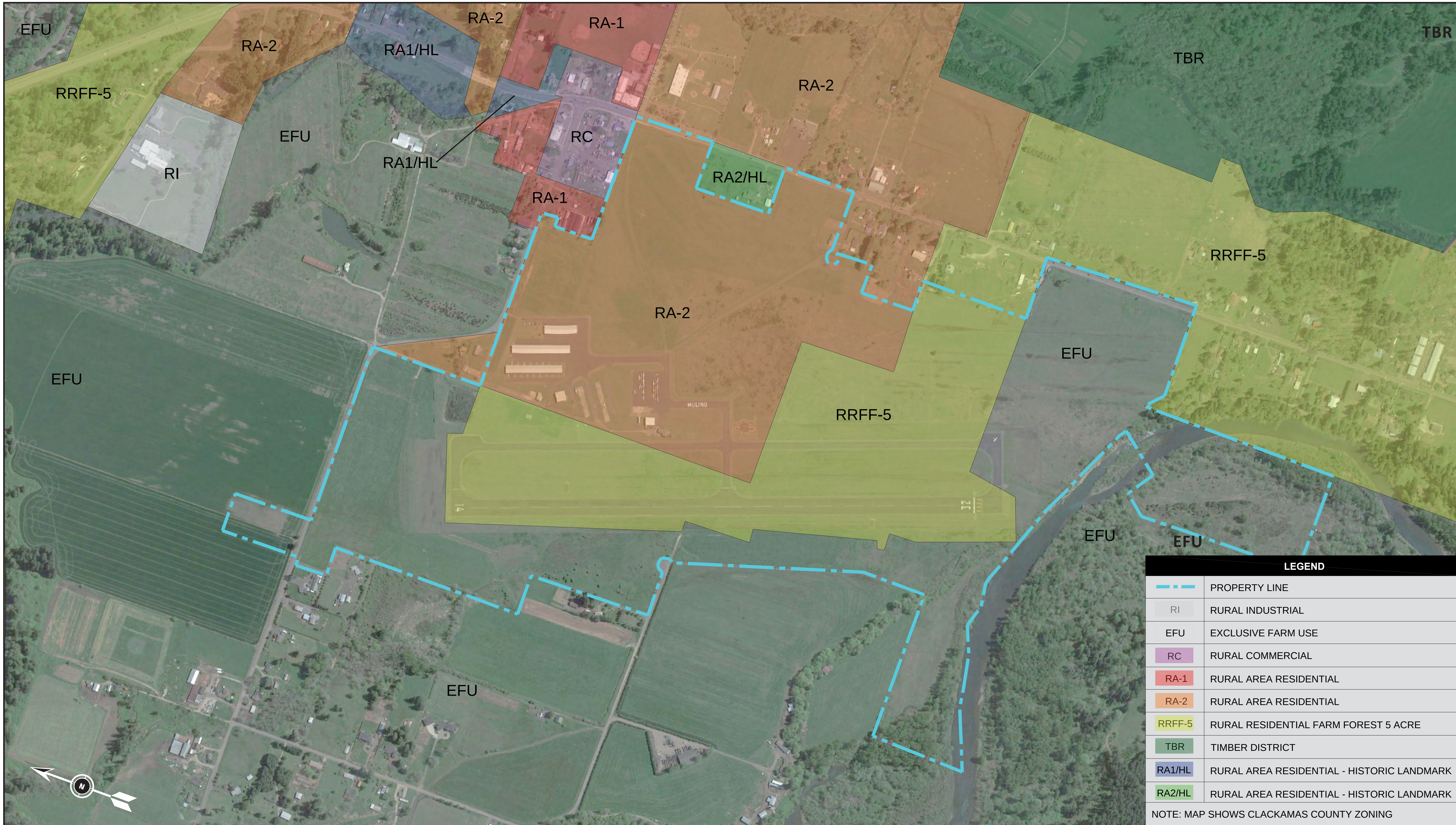
The runway and a majority of the taxiway system is located within the RRFF-5 zone. The EFU zoned land is located primarily south, west, and north of the runway. The east landside areas of the airport (hangars, aircraft fueling, pilot lounge, tie-down apron) are located within the RA-2 zone. As noted above, the provisions of the public use airport overlay zone (Section 713) apply to all portions of the airport, regardless of surface zoning.

OVERLAY ZONING

The Clackamas County Zoning and Development Ordinance Public Use Airport and Safety Overlay Zone (section 713.06) defines a range of items that are to be delineated and applied within the zoning code. These include airport imaginary surfaces defined in Federal Aviation Regulation (FAR) Part 77, those surfaces defined in the airport design advisory circular (runway protection zones, runway dimensions, elevations, etc.), and the noise impact boundary. Section 713.06 states *"All lands, waters, and airspace, or portions thereof, that are located within these boundaries or surfaces shall be subject to the requirements of this zone."*

AIRPORT VICINITY ZONING

The airport vicinity encompasses a variety of zoning. Land bordering the airport is zoned Rural Area Residential on 1 acre (RA-1), Rural Commercial (RC), EFU, RRFF-5, and RA-2. Beyond the immediate area are large areas of low density (2 to 5 acres per dwelling unit) rural residential zoning, EFU zoning and forest resource or other natural resource zoning.



MULINO STATE AIRPORT | AIRPORT MASTER PLAN

ZONING MAP | **FIG. 2-7**

CENTURY WEST ENGINEERING

Data Sources:

- Oregon Department of Aviation airport records
- Mulino Airport – Airport Master Plan (WH Pacific, 2008)
- Mulino State Airport – 2012 Pavement Management Report (Pavement Consultants Inc.)
- FAA Airport Master Record Form (5010-1)
- **Airport/Facility Directory (AFD) – Northwest U.S.** (U.S. DOT, Federal Aviation Administration, Municipal Aeronautical Charting Office)
- **Seattle Sectional Aeronautical Chart; IFR Enroute Low Altitude (L-1/L-2) Chart** (U.S. DOT, Federal Aviation Administration, Municipal Aeronautical Charting Office)
- The Hamlet of Mulino Community Plan, Infrastructure of the Hamlet (2007)
- Local land use planning documents, zoning ordinances and mapping

A glossary of aviation terminology and a list of acronyms have also been provided to describe technical items and aviation jargon commonly in use.

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Chapter 3 – Aviation Activity Forecasts

Chapter 3 – Aviation Activity Forecasts

The overall goal of aviation activity forecasting is to prepare forecasts that accurately reflect current conditions, relevant historical trends, and provide reasonable projections of future activity, which can be translated into specific airport facility needs anticipated during the next twenty years and beyond.

Introduction

This chapter provides updated forecasts of aviation activity for Mulino State Airport (4S9) for the twenty-year master plan horizon (2015-2035). The forecasts presented in this chapter are consistent with Mulino State Airport's current and historic role as a community general aviation airport.

Unless specifically noted, the forecasts of activity are unconstrained and assume that ODA will be able to make the facility improvements necessary to accommodate anticipated demand. Through the evaluation of airport development alternatives later in the master plan, ODA will determine if any unconstrained demand will not or cannot be reasonably met.

The FAA-defined airport master plan forecasting process for general aviation airports is designed to address elements critical to airport planning by focusing on two key activity segments: based aircraft and aircraft operations (takeoffs and landings). Detailed breakdowns of these two segments are also provided including aircraft fleet mix, activity peaking, distribution of local and itinerant operations. The determination of the critical aircraft, also referred to as the design aircraft is also addressed.

The activity forecasts also provide consistency in evaluating future demand-based facility requirements such as runway and taxiway capacity, aircraft parking and hangar capacity, and other planning evaluations.

Aviation activity can be influenced on the local, regional, and national levels, making it virtually impossible to predict year-to-year fluctuations of activity over twenty years with any certainty. In addition, major unexpected events have the potential to render any forecast obsolete. Therefore, it is important to remember that aviation activity forecasts only serve as guidelines. Planning must be flexible enough to respond to a range of unforeseen developments - either positive or negative. The use of development reserves for demand-driven facility needs such as hangar space or aircraft parking provides airport management with the ability to respond to unanticipated demand and preserve long-term aviation use areas on the airport. If the pace of forecast activity is not realized, the implementation of recommended improvements would typically be delayed to reflect actual, rather than forecast demand.

Forecast Process

The Federal Aviation Administration (FAA) provides guidance on forecasting aviation activity in airport master planning projects. **FAA Advisory Circular (AC) 150/5070-6B, Airport Master Plans**, outlines seven standard steps involved in the forecast process:

1) **Identify Aviation Activity Measures**: The level and type of aviation activities likely to impact facility needs. For general aviation, this typically includes based aircraft and operations.
2) **Review Previous Airport Forecasts**: May include the FAA Terminal Area Forecast (TAF), state or regional system plans, and previous master plans.
3) **Gather Data**: Determine what data are required to prepare the forecasts, identify data sources, and collect historical and forecast data.
4) **Select Forecast Methods**: There are several appropriate methodologies and techniques available, including regression analysis, trend analysis, market share or ratio analysis, exponential smoothing, econometric modeling, comparison with other airports, survey techniques, cohort analysis, choice and distribution models, range projections, and professional judgment.
5) **Apply Forecast Methods and Evaluate Results**: Prepare the actual forecasts and evaluate for reasonableness.
6) **Summarize and Document Results**: Provide supporting text and tables as necessary.
7) **Compare Forecast Results with FAA's TAF**: Follow guidance in FAA Order 5090.3C, Field Formulation of the National Plan of Integrated Airport Systems. In part, the Order indicates that forecasts should not vary significantly (more than 10 percent) from the TAF. When there is a greater than 10 percent variance, supporting documentation should be supplied to the FAA. The aviation demand forecasts are then submitted to the FAA for their approval.

Master Plan forecasts for operations and based aircraft for general aviation airports are considered to be consistent with the TAF if they meet the following criteria: Where the 5- or 10-year forecasts exceed 100,000 total annual operations or 100 based aircraft:

a. Forecasts differ by less than 10 percent in the 5-year forecast and 15 percent in the 10-year period, or
b. Forecasts do not affect the timing or scale of an airport project, or
c. Forecasts do not affect the role of the airport as defined in the current version of FAA Order 5090.3C.

When the 5- or 10-year forecast is for less than 100,000 total annual operations or 100 based aircraft, the forecast does not need to be reviewed at FAA Headquarters, but the data should be provided to the FAA for the annual update of the TAF.

National General Aviation Activity Trends

The first decade and a half of the 21st Century was a tumultuous period for General Aviation (GA). The industry was battered by poor economic conditions and steadily rising fuel prices that slowed growth and negatively impacted areas such as aircraft manufacturing, on-demand air travel, aircraft ownership, and aircraft utilization levels. Ongoing concerns over the potential replacement and future availability of 100LL aviation gasoline (AVGAS) have also created uncertainty within general aviation. Other factors such as the aging—both in terms of the general aviation aircraft fleet and pilot population temper future expectations of growth on a national level. Providing an affordable path to access general aviation through aircraft ownership or rental presents a major challenge within the industry. On a national level, most measures of GA activity declined sharply through the "great recession" and have only recently started to show modest signs of improvement in recent years. Aircraft manufacturing has shown positive gains in recent years after an extended period of weak sales.

The FAA's long-range forecasts[1] are tempered to reflect current and recent historical conditions. The FAA projects that the U.S. active GA aircraft fleet will experience modest annual growth (0.4 percent) long term, increasing from 198,860 aircraft in 2014 to 214,260 in 2035 (+15,400), which represents an average net increase of 733 aircraft per year (see **Figure 3-1**).

Although the FAA maintains a moderately favorable long-term outlook, many of the activity segments associated with piston engine aircraft and AVGAS consumption are not projected to return to "pre-recession" levels within the 20-year horizon. While some segments of general aviation are expected to grow at moderately high rates, most measures of the general aviation industry suggest modest, sustained annual growth in the range of 1 to 2 percent is expected over the next twenty years. The FAA's annual growth assumptions for individual general aviation activity segments are summarized in **Table 3-1**. **Table**

[1] FAA Aerospace Forecast Fiscal Years 2015-2035

3-2 briefly summarizes the positive and negative factors expected to affect general aviation over the next twenty years.

FIGURE 3-1: US ACTIVE GENERAL AVIATION AIRCRAFT FORECAST

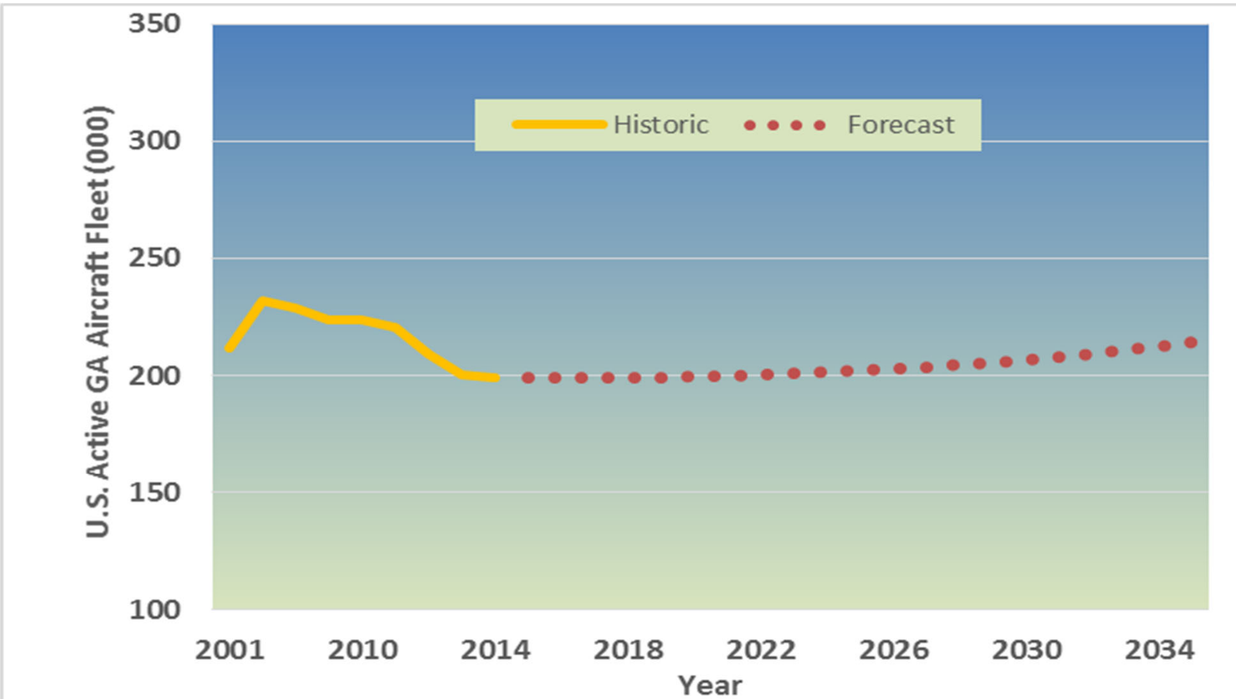


TABLE 3-1: FAA LONG-RANGE FORECAST ASSUMPTIONS (U.S. GENERAL AVIATION)

ACTIVITY COMPONENT	FORECAST ANNUAL AVERAGE GROWTH RATE (2014-2035)
Components with Annual Growth Forecast < 0%	
Single Engine Piston Aircraft in U.S. Fleet	-0.6%
Multi-Engine Piston Aircraft in U.S. Fleet	-0.4%
Hours Flown - GA Fleet (Piston AC)	-0.5%
Student Pilots (Indicator of flight training activity)	-0.3%
AVGAS (Gallons consumed - GA only)	-0.1%
Private Pilots	-0.3%
Components with Annual Growth Forecast < 1%	
Commercial Pilots / Airline Transport Pilots	0.4% / 0.5%
Instrument Rated Pilots	0.2%
Active Pilots (All Ratings, excluding Airline Transport)	0.1%
GA Operations at Towered Airports (all AC types)	0.4%
Active GA Fleet (# of Aircraft)	0.4%
Components with Annual Growth Forecast 1%-2%	
Experimental Aircraft in U.S. Fleet	1.4%
Turboprop Aircraft in U.S. Fleet	1.5%
Components with Annual Growth Forecast >2%	
Sport Pilots	5.2%
Piston Helicopters in U.S. Fleet	2.1%
Turbine Helicopters in U.S. Fleet	2.8%
Light Sport Aircraft in U.S. Fleet	4.3%
Turbojet Aircraft in U.S. Fleet	2.8%
Hours Flown - GA Fleet (Turbine AC)	2.9%
Hours Flown – Experimental AC	2.4%
Hours Flown – Light Sport AC	5.1%
Jet Fuel (Gallons consumed – GA only)	2.5%
Source: FAA Long Range Aerospace Forecasts (FY 2015-2035)	

TABLE 3-2: OVERALL TRENDS IN LONG-RANGE GENERAL AVIATION FORECASTS

POSITIVE FACTORS	NEGATIVE FACTORS
⇧ Size of active general aviation fleet ⇧ Use of turbine and diesel engines for small aircraft ⇧ Use of auto gas for light sport aircraft (LSA) and experimental aircraft ⇧ Light sport aircraft and experimental aircraft production ⇧ Small turbine fixed wing aircraft production, including single-engine turboprops and small jets ⇧ Piston and turbine helicopter production ⇧ Jet fuel consumption (+70%) over the next 20 years ⇧ Hours flown: helicopter, business jet, turboprop, light sport, experimental ⇧ Active pilots: commercial, instrument, airline transport, sport ⇧ Growth in active sport pilots to nearly offset decline in active private pilots ⇧ Reduced flight training and medical requirements for sport pilots ⇧ Limited airline service creates demand for other modes of personal and business transportation	⇩ AVGAS consumption to decline slightly over the next 20 years ⇩ Active piston fleet to shrink by 10 percent by 2035 ⇩ New single engine and multi-engine piston production will not keep pace with fleet attrition ⇩ New LSA and experimental production will not fully offset decline in active piston aircraft fleet ⇩ Declining hours flown: piston single-engine and multi-engine ⇩ Declining active pilots: student, private ⇩ High cost of flying, aircraft ownership, new aircraft acquisition

Airport Service Area

The airport service area refers to the geographic area surrounding an airport that generates most of the aviation activity. The population, economic characteristics, and capabilities of competing airports within an airport's service area are important factors in defining locally generated demand for aviation facilities and services, which influence an airport's ability to attract transient aircraft activity.

Competing airports located beyond a 30-minute travel time typically have less impact on general aviation airports due to the redundancy provided by closer facilities. Service areas often overlap, creating competition between airports for facilities and services such as hangar space, fuel, and aircraft maintenance services. These items are sensitive to cost, convenience, and the quality of facilities or services for both locally based and transient users.

A 30-minute surface travel time is used to approximate the boundaries of a service area for a typical general aviation airport. **Figure 3-2** illustrates the approximate boundary of an estimated 30-minute drive from Mulino, which encompasses portions of Clackamas, Multnomah, Washington, Marion, and Yamhill Counties. Historically, Mulino State Airport has accommodated general aviation users from within this geographic area, although Clackamas County represents the largest and most proximate portion of the service area.

Table 3-3 lists the public use airports within a 30 nautical mile radius of Mulino State Airport. Some of the public use airports listed provide competitive facilities and services with master plans that identify future facility expansion. Although these airports are located within 30 miles of Mulino, several are located beyond the 30-minute surface travel time noted above, which suggests less impact on Mulino State Airport activity.

Aurora State Airport (UAO), located approximately 12 miles (driving) and 7.8 nautical miles (air) northwest of Mulino State Airport, is the public airport nearest to Mulino and is the primary competitor for general aviation activity within the local airport service area. Aurora is one of Oregon's busiest general aviation airports with significant business jet and flight training activity, a large based aircraft fleet, and a full range of services and facilities, including a new airport traffic control tower. The current Aurora State Airport Master Plan projects 464 based aircraft and 124,386 annual operations (takeoffs and landings) by 2030. [2]

Mulino State Airport accommodates predominantly small single- and multi-engine airplanes and helicopters with limited activity generated by larger aircraft. The existing runway (3,425 x 100 feet) is adequate to accommodate small single- and multi-engine piston aircraft, turboprops, small business jets, and helicopters.

[2] Aurora State Airport Master Plan (W&H Pacific, 2010)

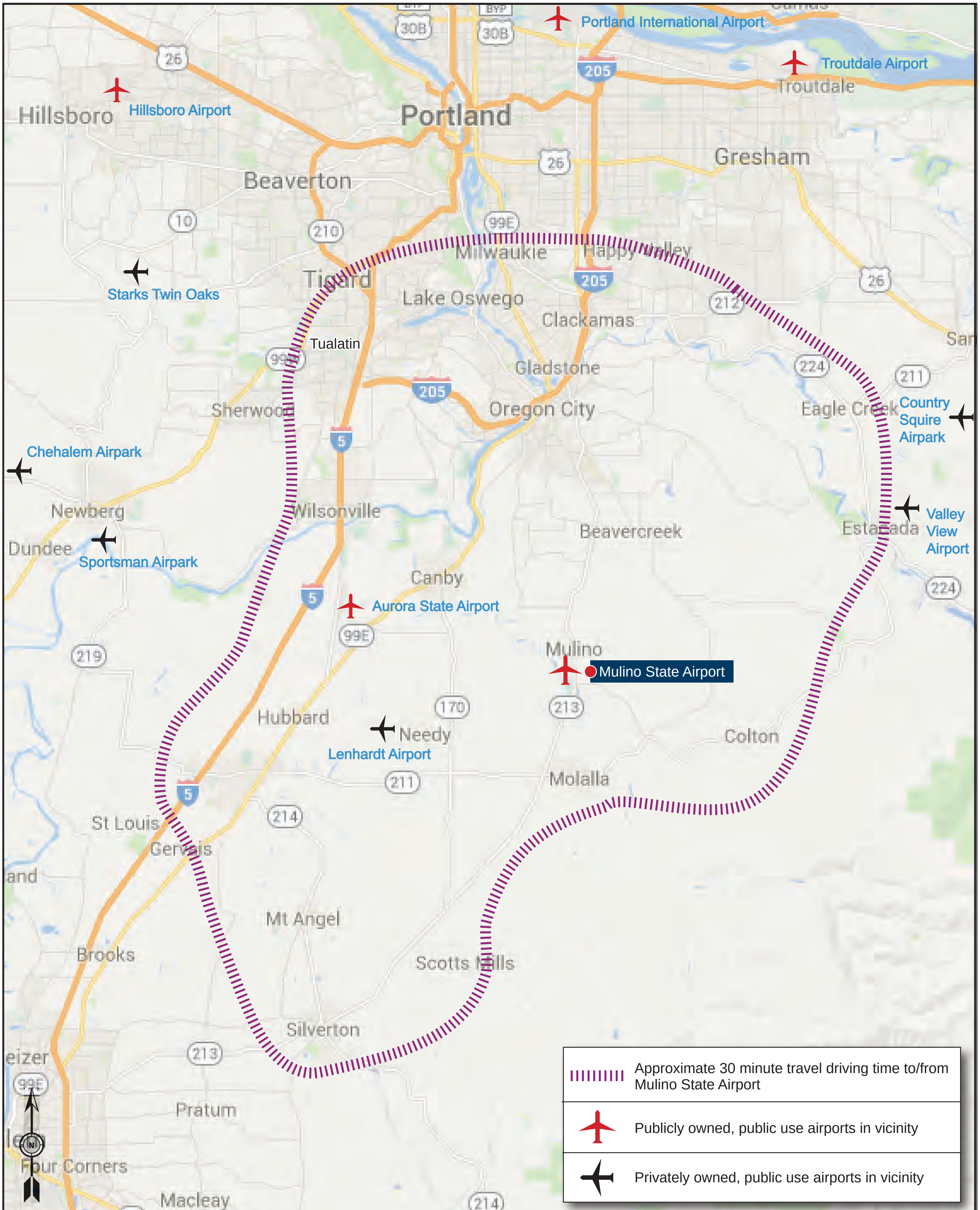

Portland International Airport
Troutdale Airport
Troutdale
Hillsboro
Hillsboro Airport
Portland
Gresham
Beaverton
Starks Twin Oaks
Tigard
Milwaukie
Happy Valley
Lake Oswego
Clackamas
Tualatin
Gladstone
Sherwood
Oregon City
Eagle Creek
Country Squire Airpark
Chehalem Airpark
Newberg
Wilsonville
Dundee
Sportsman Airpark
Beavercreek
Estacada
Valley View Airport
Canby
Aurora State Airport
Mulino
Mulino State Airport
Hubbard
Needy
Lenhardt Airport
Colton
Molalla
St Louis
Gervais
Mt Angel
Brooks
Scotts Mills
Silverton
Pratum
Four Corners
Macleay
Approximate 30 minute travel driving time to/from Mulino State Airport
Publicly owned, public use airports in vicinity
Privately owned, public use airports in vicinity

TABLE 3-3: PUBLIC USE AIRPORTS IN VICINITY OF MULINO STATE AIRPORT *(WITHIN 30 NAUT. MILES)*

AIRPORT	LOCATION	RUNWAY DIMENSION (FEET)	SURFACE	LIGHTED RUNWAY?	FUEL AVAILABLE?
Lenhardt Airpark (Hubbard)	7 NM West	2,956 x 45	Asphalt	LIRL	100LL
Aurora State Airport	8 NM West	5,004 x 100	Asphalt	MIRL	100LL/Jet-A
Valley View Airport (Estacada)	13 NM Northeast	3,780 x 32	Asphalt	Non-standard	None
Country Squire Airpark	16 NM Northeast	3,095 x 32	Asphalt	None	None
Sportsman Airpark (Newberg)	16 NM Northwest	2,755 x 50	Asphalt	LIRL	100LL/Jet-A
Stark's Twin Oaks Airpark (Hillsboro)	20 NM Northwest	2,465 x 48	Asphalt	LIRL	100LL
Chehalem Airpark (Newberg)	21 NM Northwest	2,285 x 40	Asphalt	Non-standard	100LL/Jet-A
Troutdale Airport	21.5 NM Northeast	5,399 x 150	Asphalt	MIRL	100LL/Jet-A
Portland International Airport	22 NM North	11,000 x 150 (primary rwy)	Concrete	HIRL	100LL/Jet-A
McMinnville Municipal Airport	23 NM Southwest	5,420 x 150 (primary rwy)	Asphalt	HIRL	100LL/Jet-A
Hillsboro Airport	25 NM Northwest	6,600 x 150 (primary rwy)	Asphalt	HIRL	100LL/Jet-A
Pearson Field (Vancouver, WA)	24 NM Northwest	3,275 x 60	Asphalt	MIRL	100LL
Grove Field (Camas, WA)	26 NM Northeast	2,710 x 40	Asphalt	Non-standard	100LL
Salem Municipal Airport	26 NM Southwest	5,811 x 150 (primary rwy)	Asphalt	HIRL	100LL/Jet-A

Mulino State Airport is ideally suited to accommodate the range of general aviation activity typically found at small community airports based on the number and type of competing airports within the local airport service area. Mulino State Airport offers relatively uncongested airspace, quality facilities, and available capacity in the growing Portland Metro area. It is ideally located to accommodate both locally-generated and transient activity such as flight training. The recent addition of an airport traffic control tower at nearby Aurora State Airport with the addition of controlled airspace highlights the operational differences between the two airports in terms of air traffic volume and airspace complexity. Looking forward, the ability to maintain current capabilities and make targeted improvements, will allow Mulino State Airport to effectively compete for general aviation users without losing its appeal.

Socioeconomic Trends and Forecasts

POPULATION

In broad terms, the population within an airport's service area affects the type and scale of aviation facilities and services that can be supported. Although a large number of airport-specific factors can affect activities at an airport, changes in population often reflect other broader economic conditions that may affect airport activity.

As noted earlier, the airport service area for Mulino State Airport extends beyond Clackamas County into adjacent Multnomah, Washington, Marion, and Yamhill Counties. For this reason, a review of the five-county region provides a broad indication of regional trends that may influence general aviation demand.

Historical Population

Certified estimates of population for Oregon counties and incorporated cities are developed annually by the Portland State University (PSU) Population Research Center. The annual PSU estimates, coupled with the U.S. Census, conducted every ten years, provide an indication of local area population trends over an extended period.[3]

The July 1, 2014 PSU certified population estimates for the five local counties totaled approximately 2.1 million, up approximately 4.2 percent from the 2010 Census. The population of the five-county area has grown at a slightly higher rate than the State of Oregon since 1990. Historical population data and average growth rates are summarized in **Table 3-4**.

[3] Portland State University Population Research Center, July 1, 2014 estimate; 1990, 2000, 2010 estimates

TABLE 3-4: FIVE-COUNTY HISTORICAL POPULATION

COUNTY	1990	2000	2010	2014	AAR % 1990-2014
Clackamas	**280,862**	**339,299**	**376,780**	**391,525**	**1.4%**
Multnomah	586,617	662,290	736,785	765,775	1.1%
Washington	315,469	447,298	531,070	560,465	2.4%
Marion	229,938	285,572	315,900	326,150	1.5%
Yamhill	65,999	85,325	99,405	102,525	1.9%
5-County Total	**1,478,885**	**1,819,784**	**2,059,940**	**2,146,440**	**1.6%**
State of Oregon	*2,860,375*	*3,431,100*	*3,839,300*	*3,962,710*	*1.4%*
Source: U.S. Census data; Office of Economic Analysis, Department of Administrative Services, State of Oregon 2015; Portland State University (PSU) Certified Population Estimates					

POPULATION FORECASTS

Oregon Office of Economic Analysis (OEA)

Long-term population forecasts prepared by the Oregon Office of Economic Analysis (OEA) are periodically generated to support local and statewide planning. The most recent OEA long-term forecasts were released in March of 2013, and project modest sustained growth for the five counties through 2035. The five counties' population is expected to grow at 1.2% between 2015 and 2035, which is slightly higher than the State of Oregon's forecasted growth rate of 1.1%. The OEA forecasts are summarized in **Table 3-5**.

It is reasonable to assume that recent historical trends will continue and the forecast population growth within the airport service area will be a positive factor affecting future activity at Mulino State Airport.

TABLE 3-5: FIVE-COUNTY & OREGON POPULATION FORECASTS

COUNTY	2015	2020	2025	2030	2035	AAR % 2015-2035
Clackamas	**393,217**	**422,576**	**454,311**	**485,054**	**512,731**	**1.3%**
Multnomah	768,632	807,198	845,356	879,987	909,947	.85%
Washington	570,672	622,368	677,017	731,125	782,316	1.6%
Marion	331,643	355,189	381,089	406,612	430,652	1.3%
Yamhill	104,525	113,611	123,897	133,907	143,117	1.6%
5-County Total	**2,168,689**	**2,320,942**	**2,481,670**	**2,636,685**	**2,778,763**	**1.2%**
State of Oregon	*4,001,600*	*4,252,100*	*4,516,200*	*4,768,000*	*4,995,200*	*1.1%*
Source: U.S. Census data; Office of Economic Analysis, Department of Administrative Services, State of Oregon 2015						

AREA ECONOMY

Historically, downturns in general aviation activity often occur during periods of weak economic conditions and growth typically coincides with favorable economic conditions. It is evident that the recent economic recession and the slow recovery that followed, has constrained general aviation activity locally, statewide, and throughout the national airport system. However, as indicated in the FAA's national long-term aviation forecasts, the overall strength of the U.S. economy is expected to sustain economic growth over the long-term, which should translate into modest to moderate growth in aviation activity.

A review of Woods and Poole employment data[4] for the five county Mulino State Airport service area indicates that Retail Trade and Health Care and Social Assistance are among the top employers in all five counties. Clackamas County has a unique mixture of employment that also includes Manufacturing; Professional and Technical Services; and Real Estate and Rental and Leasing among its top five employer segments. The August 2015 unemployment rate in Clackamas County was 5.5 percent, compared to Oregon's rate of 6.1 percent. Unemployment rates in the local five-county service area range from a low of 5.0 percent (Washington) to a high of 6.6 percent (Marion). With the exception of Marion County, all five counties have unemployment rates of 5.6 percent or lower, indicating slightly better economic conditions than Oregon as a whole.

Table 3-6 summarizes historical and forecast income and employment data for the five service area counties, the State of Oregon, and the United States. The data indicate that the average employment growth rate for all five counties is projected to outpace the State of Oregon and the United States over the next twenty years, although growth in household income is expected to be slower.

[4] State and County Projections to 2040, Woods & Poole Economics (2014)

TABLE 3-6: MEAN HOUSEHOLD INCOME & EMPLOYMENT DATA

	HISTORICAL		FORECAST				
Area	**2000**	**2013**	**2020**	**2025**	**2030**	**2035**	**AAR % 2000-2035**
Household Income (in current dollars)							
U.S.	$27,000	$43,597	$54,251	$68,829	$88,534	$114,566	4.3%
State of Oregon	$25,560	$39,286	$48,694	$61,617	$79,065	$102,073	4.2%
Clackamas County	$37,247	$47,958	$59,068	$74,299	$94,748	$121,545	3.5%
Multnomah County	$33,126	$43,651	$54,319	$68,918	$88,655	$114,733	3.7%
Washington County	$88,548	$116,341	$141,633	$179,382	$232,085	$302,937	3.7%
Marion County	$25,052	$35,234	$43,533	$54,919	$70,262	$90,450	3.8%
Yamhill County	$68,711	$97,232	$115,818	$143,866	$182,505	$233,555	3.7%
Employment (# of Jobs)							
State of Oregon	2,094,837	2,282,970	2,476,198	2,649,004	2,833,284	3,029,896	1.1%
Clackamas County	189,836	225,515	248,877	269,855	292,277	316,214	1.5%
Multnomah County	548,930	589,383	626,693	658,534	691,042	724,199	0.8%
Washington County	277,255	309,647	351,132	389,875	432,820	480,409	1.6%
Marion County	160,217	173,688	187,774	200,288	213,534	227,528	1.0%
Yamhill County	39,299	46,223	50,391	54,080	57,967	62,068	1.4%
Source: Woods & Poole (2014)							

POPULATION AND REGISTERED AIRCRAFT

Table 3-7 shows the ratio of registered aircraft to total population in each of the five counties and the service area as a whole. As noted in the previous airport master plan, Clackamas County has a higher ratio of registered aircraft per capita than the overall service area and the State of Oregon. This is generally attributed to low density residential development patterns, residential airparks, higher-than-average income, and the proximity of outdoor recreation opportunities outside Clackamas County.

TABLE 3-7: COMPARISON OF POPULATION AND AIRCRAFT REGISTRATION

COUNTY	POPULATION (2014)	REGISTERED AIRCRAFT	REGISTERED AIRCRAFT PER 1,000 POPULATION
Clackamas	391,525	699	1.79
Multnomah	765,775	867	1.13
Washington	560,465	630	1.24
Marion	326,150	486	1.49
Yamhill	102,525	297	2.90
Five-County Total	**2,146,440**	**2,979**	**1.39**
State of Oregon	*3,962,710*	*7,562*	*1.91*
Source: *PSU Certified Population Estimates (July 1, 2014)* *FAA Aircraft Registry Database (September 2015)*			

Overview of Recent Local Events

The number of based aircraft at Mulino State Airport increased from 40 to 57[5] (+17) between 2006 and 2015, which slightly exceeded forecast demand defined in the 2008 Airport Master Plan.

A review of current conditions and the 2008 Airport Layout Plan identifies several recent facility changes:

- Two multi-unit T-hangars (26 units) and one conventional hangar used for aircraft maintenance were constructed;
- Two existing multi-unit T-hangars were removed (the concrete building pads and asphalt taxilanes remain in place and are planned to be re-used for new hangar development);
- Designated parachute drop zones were established on the airport.

In addition to the facility improvements, the availability of aviation services has increased and currently includes Infinite Air (FBO), Mix Aircraft Solutions (aircraft maintenance), and Pacific Northwest Skydivers (recreational parachuting and parachute training).

Infinite Air has leased the pads from the former T-hangars and plans to begin construction of 5 new hangar units within the next 12 months with construction of another 4 units dependent upon demand.

[5] 2015 Airport management estimate and Basedaircraft.com printout

Historical and Current Aviation Activity

Aircraft operational data (takeoffs and landings, touch and go landings, etc.) for the airport are limited to estimates. As a non-towered airport, no official record of activity is maintained. However, a review of estimates contained in state aviation system plans, previous airport master plans, periodic activity counts, and FAA TAF data, provides a general indication of activity at the airport over time. Based aircraft counts are updated annually either as part of a master plan update or by airport management updating the Basedaircraft.com database.

HISTORICAL DATA - FAA TERMINAL AREA FORECAST (TAF)

The FAA TAF is maintained for airports that are included in the National Plan of Integrated Airport System (NPIAS). The TAF is periodically updated and adjusted, as more specific airport activity data is available. When reviewing FAA TAF data, it is important to note that when there is no change from year to year it often indicates a lack of updated reporting, rather than no change in activity. Similarly, a large change in data in a single year may follow updated reporting that captures changes that actually occurred over several years. Small changes in year-to-year activity that extend through the forecast typically reflect assumed growth rates that are not frequently updated. For these reasons, the TAF should be used as general guide for comparison with other forecasts and periodic activity estimates.

A review of recent historical TAF data for the airport reflects an adjustment in 2010, when annual operations were reduced from 39,663 to 21,300. This adjustment coincided with the completion of the last airport master plan, which indicated that the accuracy of the TAF operations data for 2006 was "questionable" and likely overstated. The master plan indicated that the estimated activity (21,300 operations) listed on the 2004 FAA Airport Master Record Form (5010 Form) provided a more accurate indication of activity, and that was used as the baseline for the updated master plan forecasts. **Table 3-8** summarizes recent historical TAF based aircraft and aircraft operations estimates for the airport.

TABLE 3-8: FAA TAF HISTORICAL OPERATIONS AND BASED AIRCRAFT DATA – MULINO STATE AIRPORT

YEAR	AIRCRAFT OPERATIONS[1]	BASED AIRCRAFT[1]	RATIO: GA OPERATIONS PER BASED AIRCRAFT
2002	34,856	53	658
2003	35,462	53	669
2004	36,062	42	859
2005	36,668	42	873
2006	37,209	42	886
2007	38,160	42	909
2008	38,722	56	691
2009	39,663	46	862
2010	21,300	44	484
2011	21,300	44	484
2012	21,300	45	473
2013	21,300	45	473

[1] 2014 FAA Terminal Area Forecast (TAF) historical activity based on estimates with periodic updates from various planning updates

Airport Traffic Counts

Aircraft operations (takeoffs and landings) counts at non-towered airports were conducted on a semi-regular basis by the Oregon Department of Aviation (ODA), through its "RENS" automated activity counting program beginning in the 1980s. Audio recorders were placed next to runways to capture distinct engine sounds for takeoffs that could be identified by aircraft type. The RENS program methodology used four seasonal samples over a 12-month period to support a statistical analysis that yielded annual activity estimates. The program was phased out in 2003, but provided five annual operations estimates for the airport between 1994 and 2002. The activity levels fluctuated over the period of the counts, with a low of 15,733 operations (1997-1998) and a high of 32,138 operations (1995-1996). The last count was conducted in 2002-2003, and resulted in an estimate of 22,675 operations. If combined with the FAA TAF listing of 53 based aircraft in 2003, it would result in a ratio of 428 operations per based aircraft.

CURRENT ESTIMATE OF ACTIVITY

Based Aircraft

Airport management lists 58 aircraft based at Mulino State Airport in the current FAA National Based Aircraft Database. The listed aircraft include 57 fixed wing single-engine piston aircraft (including 8 with experimental certificates) and 1 helicopter, representing a net increase of 18 aircraft over the 2006 estimate used in the last master plan.

Aircraft Operations

The FAA provides planning guidance for estimating activity at general aviation airports without control towers. This guidance includes the use of activity ratios to project aircraft operations relative to the number of aircraft based at the airport. In the absence of actual aircraft operations counts, the ratios of activity are generally adequate for airport planning purposes. The FAA developed "typical" operations ratios for general aviation airports based on their observations at airports throughout the United States. The recommended ratios are 250 operations per based aircraft for small airports with low activity; 350 operations per based aircraft for airports with moderate local and itinerant activity; and 450 operations per based aircraft for high activity airports in urban areas. The ratios are intended to reflect operations from both locally based and transient aircraft. However, the presence of unique activities such as a large flight school or other commercial operations can increase traffic volumes based on significantly higher aircraft utilization levels (annual flight hours per aircraft, etc.). Conversely, the absence of aviation fuel or a fixed base operator (FBO) can contribute to lower activity levels.

The 2008 Airport Master Plan noted that the base year (2006) activity was believed to be approximately 21,300 operations and 40 based aircraft, which resulted in a ratio of 533 operations per based aircraft. The FAA TAF data for 2013 (21,300 operations and 45 based aircraft) reflects a ratio of 473 operations per based aircraft. These ratios appear to be on the high side for a small general aviation airport with no commercial activities and limited (transient) flight training activity based on the FAA guidance noted above.

It appears that a ratio of approximately **420 operations per based aircraft** would be more consistent with current operations at Mulino State Airport based on current conditions, the airport's historical utilization levels, recent fuel sales volumes, relevant national trends, and the FAA's current guidance on estimating aircraft activity at non-towered airports. This level of aircraft utilization would also provide a reasonable basis for developing forecasts of future activity. Applying the ratio of **420 operations** to **59 based aircraft** for 2015 results in a total of **24,360 annual operations**. The ratio is intended to capture both local and transient aircraft activity. A detailed distribution of current traffic is provided in the forecast of aircraft operations later in the chapter.

AIRPORT SERVICE AREA - MASTER PLAN FORECASTS

Master plan forecasts for the other public use airports located in the vicinity of Mulino State Airport were reviewed to gauge overall growth expectations within the region. A summary of master plan forecasts prepared for Aurora State Airport, Troutdale Airport, Hillsboro Airport, and Portland International Airport is presented in **Table 3-9**. Overall, growth in general aviation activity at these airports is expected to average less than 2 percent annually. It should be noted that these forecasts reflect a wide baseline period (2003 to 2013), which includes both pre- and post-recession trends and more recent strategic planning for Troutdale that projects a decline in based aircraft and only a small increase in aircraft operations through 2033. However, the overall long-term expectation for growth in general aviation activity in the area is consistent with the region's history and forecast population growth.

TABLE 3-9: NEARBY AIRPORTS – GENERAL AVIATION ACTIVITY FORECASTS

CURRENT AIRPORT MASTER PLAN FORECASTS (FAA APPROVED)	BASE YEAR BASED AIRCRAFT	LONG-TERM (≈20-YEAR) FORECAST BASED AIRCRAFT	BASE YEAR GA OPERATIONS	LONG-TERM (≈20-YEAR) FORECAST GA OPERATIONS
Aurora State Airport[1]	324 (Year 2009)	464 (Year 2030)	89,495 (Year 2009)	124,386 (Year 2030)
Troutdale Airport[2]	151 (Year 2013)	142 (Year 2033)	107,938 (Year 2013)	116,700 (Year 2033)
Hillsboro Airport[3]	363 (Year 2003)	462 (Year 2025)	223,589 (Year 2002)	304,400 (Year 2025)
Portland International Airport – General Aviation[4]	N/A	N/A	27,623 (Year 2007)	30,900 (Year 2027)
Totals	***838***	***1,068***	***448,645***	***576,386***
Overall Change		*+230 (27.4%)*		*+127,741 (28.5%)*
Average Annual Growth Rate (%)		*1.22% (+/-)*		*1.26% (+/-)*
2007 OREGON AVIATION PLAN FORECASTS	**BASE YEAR (2005) BASED AIRCRAFT**	**LONG-TERM (2025) FORECAST BASED AIRCRAFT**	**BASE YEAR (2005) GA OPERATIONS**	**LONG-TERM (2025) FORECAST GA OPERATIONS**
Aurora State Airport	387	498	83,824	124,978
Troutdale Airport	196	252	66,225	99,380
Hillsboro Airport	362	466	219,065	293,259
Portland International Airport – General Aviation	N/A	N/A	N/A	N/A
Totals	***945***	***1,216***	***369,114***	***517,617***
Overall Change		*+271 (28.7%)*		*+148,503 (40.2%)*
Average Annual Growth Rate (%)		*1.27%*		*1.70%*

[1] Aurora State Airport Master Plan Update, 2010 (Tables 3H, 3J, 3K, 3L), WHPacific
[2] Port of Portland-Troutdale Airport Master Plan Update, 2015 (Table 3-1), Mead and Hunt
[3] Port of Portland-Hillsboro Airport Master Plan Update, 2003 (Tables 3M, 3R, 3Z), Coffman Associates, WHPacific
[4] Portland International Airport Master Plan Update, March 2010 (Table 3-2) , Jacobs Consultancy

AIRPORT SERVICE AREA – PILOT SURVEY

An online survey was created for pilots operating at Mulino State Airport and at airports throughout the Portland area as part of the data collection effort for the airport master plan update. The survey link was provided to several pilot organizations for distribution to their membership, a display advertisement was published in the September-October 2015 issue of the Oregon Pilot Association newsletter "Propwash," and surveys were mailed to tenants at Aurora State Airport. A total of 33 survey responses were received through September 18, 2015. A summary of the survey is provided in **Appendix A** and key findings are summarized below:

- 9 percent of survey respondents base their aircraft at Mulino; 91 percent base at other airports in the area (6 percent of respondents were based at Aurora);
- 11 percent of respondents indicated that the addition of an airport traffic control tower at Aurora would affect their operations at the Aurora airport;
- 19 percent of respondents indicated they would consider relocating their aircraft to Mulino State Airport from another airport in the area;
- About 30 percent of those considering relocating their aircraft to Mulino State Airport would use apron parking and 70 percent would hangar their aircraft (14 percent indicated an interest in building a hangar).

The non-scientific survey illustrates that the potential exists to attract and accommodate aircraft that are currently located at other nearby airports. This indication of demand suggests that Mulino's market share may increase during the planning period. However, the ability to increase market share is heavily dependent on the availability of facilities and services in demand by potential tenants.

Aviation Activity Forecasting

Three existing Mulino State Airport aviation forecasts are available for comparison with current activity, recent historical trends, and the updated forecasts being prepared for this master plan. The existing Mulino State Airport forecasts have not been modified to reflect recent events. Minor adjustments (interpolation, extrapolation) have been made to present each projection with common forecast year intervals. Although some projections may be obsolete relative to current activity (in actual numbers), the long-term growth rates reflected in the existing forecasts are typically within the range found at many general aviation airports and provide a useful basis of comparison.

Several updated forecasts for Mulino State Airport have been prepared based on a review of recent socioeconomic data, existing aviation activity forecasts, and current conditions.

Based Aircraft Forecasts

Existing and updated based aircraft forecasts are summarized below and in **Table 3-10,** and depicted in **Figure 3-3.**

EXISTING FORECASTS

2008 Airport Master Plan (2.97% Average Annual Growth)

The 2008 Mulino Airport Master Plan[6] forecast projected an increase from 40 to 74 based aircraft between 2006 and 2027, which reflects an average annual growth rate of **2.97 percent**. This master plan forecast is approaching its mid-point, which provides an opportunity to assess the accuracy of the projection. The current based aircraft total (58) is slightly higher than the interpolated master plan based aircraft forecast (55) for 2015. The net increase of 18 aircraft over the nine-year period (2006-2014) equates to an average annual growth rate of **4.22 percent**, which is above the master plan forecast rate.

FAA Terminal Area Forecast (TAF) (1.76% Average Annual Growth)

The FAA's 2015 TAF forecast update projects based aircraft at Mulino State Airport to increase from 45 to 72 (+27) between 2013 and 2040, which represents an average annual growth of **1.76 percent**. The 2013 TAF forecast provides a valid growth rate for comparison, although the TAF's 2013 based aircraft total (45) is well below the validated based aircraft count (58) contained in the FAA National Based Aircraft Inventory database. As result, the current projection is no longer valid.

On a regional level, the 2013-2040 Terminal Area Forecast projects the number of based aircraft (general aviation) in the Northwest-Mountain Region to increase at an annual average rate of 0.96 percent through 2040, which is less than the specific TAF forecast rate for Mulino State Airport.

2007 Oregon Aviation Plan (1.97% Average Annual Growth)

The 2007 Oregon Aviation Plan (OAP) contains based aircraft forecasts for Oregon's public use airports for the 2005-2025 timeframe. For Mulino State Airport, the OAP used the 2005 FAA TAF based aircraft and annual operations estimates as the basis for its forecast. Based aircraft were projected to increase from 42 to 62 (+20) between 2005 and 2025, which represents an average annual growth of **1.97 percent**. The 2015 OAP forecast (52) is approximately 10 percent below the current based aircraft count (58). As with the TAF projection noted above, the growth rate in the OAP forecast is reasonable, although the projection for 2015 is not consistent with current activity.

UPDATED FORECASTS

The following projections were prepared for the 2015-2035 airport master plan.

[6] 2008 Mulino Airport Master Plan & Airport Layout Plan Update, W&H Pacific (2008)

Linear Trend Model (4.2% Average Annual Growth)

This projection calculates the historical rate of growth in based aircraft between 2006 and 2015 and applies that growth rate going forward throughout the planning period. The net growth of 18 based aircraft over this nine-year period equates to annual average growth of 4.24 percent. This projection assumes that the historical trend at Mulino State Airport will continue at the same rate over the next twenty years. The basis for this assumption is that the underlying conditions contributing to the recent historical growth will persist during the planning period. This projection results in an increase from 58 to 133 based aircraft by 2035, which represents an average annual growth rate of **4.24 percent**.

Population – Based Aircraft Ratio (1.09% Average Annual Growth)

Available data indicate that growth in the based aircraft fleet at Mulino State Airport has fluctuated above and below Clackamas County's population growth over the last 20 to 30 years. Since 1990, the ratio of Mulino based aircraft to Clackamas County population has fluctuated between 0.11 and 0.16 aircraft per 1,000 Clackamas County residents. The 58 based aircraft at Mulino State Airport in 2014-15 results in a ratio of 0.148 based aircraft per 1,000 Clackamas County residents, compared to a ratio of 0.11 in 2006. This projection maintains a based aircraft to population ratio of 0.140 aircraft per 1,000 Clackamas County residents through the twenty-year planning period. This projection results in an increase from 58 to 72 based aircraft by 2035, representing an average annual growth rate of **1.09 percent** and assumes the airport's based aircraft fleet will grow at the same rate as Clackamas County population over the next twenty years.

FAA Terminal Area Forecast (TAF) – Adjusted (1.7% Average Annual Growth)

This projection applies the average annual growth rate in the 2015 TAF update to the current based aircraft count (58) from the National Based Aircraft Inventory Program database. The projection results in an increase from 58 to 82 based aircraft by 2035, which represents an average annual growth rate of **1.75 percent**. This projection maintains the FAA's currently defined TAF forecast growth rate for Mulino State Airport, and applies it to the current based aircraft count.

Increasing Market Share Model (4.76% Average Annual Growth)

The increasing market share projection uses the same methodology used in the 2008 Airport Master Plan, with slightly modified assumptions regarding activity within the service area. The underlying assumption outlined in the 2008 master plan was that the historical pattern of privately owned airports closing in the region would continue in the future. The forecast assumed that the majority of displaced aircraft would relocate to Mulino, thereby increasing market share. The market share for nearby Aurora State Airport would remain the same and the market share for privately owned airports would decrease.

A review of current based aircraft data for the 24 local area airports evaluated in the 2008 master plan was performed to identify significant changes such as airport closures or shifts in market share that have occurred since 2008. The current (2015) based aircraft totals for the group of airports is 693,[7] with Mulino State Airport accounting for 8 percent, Aurora State Airport accounted for 46 percent, and the 22 private airports accounted for 46 percent. In 2006, Mulino State Airport accounted for a market share of approximately 6 percent. The FAA TAF forecast based aircraft growth rate (1.46%) for Aurora State Airport was used as the basis to project future demand for the group of airports. The total of based aircraft within the group of airports is projected to increase from 693 to 921 between 2015 and 2035.

The projection assumes that Mulino State Airport's share of based aircraft will increase from 8 to 16 percent, as the market share for privately owned airports decreases from 46 percent to 38 percent. Aurora State Airport's market share will remain stable at 46 percent. The updated market share projection differs from the previous master plan market share projection in that the based aircraft totals at the privately owned airports increase slightly (+9.7%) over twenty years, rather than decline (-18.2%). This projection assumes that the potential closure of privately owned airports will be less prominent than assumed in the 2008 master plan. Some relocation of based aircraft from privately owned airports to Mulino State Airport is anticipated, based on the demand for facilities and services, rather than due to a series of airport closures. The projection results in an increase from 58 to 147 based aircraft at Mulino State Airport by 2035, which represents an average annual growth rate of **4.76 percent**.

<u>National Piston/Experimental/LSA Growth Rate (-0.18% Average Annual Growth)</u>

This projection reflects the composition of air traffic activity at Mulino State Airport that is heavily weighted toward conventional piston-engine aircraft, experimental aircraft, and Light Sport Aircraft (LSA). The projection applies the composite long term growth rate for active aircraft within these segments in the current FAA <u>2015-2035 Long Term Aerospace Forecasts</u>, to Mulino State Airport. On a national level, the FAA projects a 0.5 percent average annual decline in the active piston engine aircraft fleet through 2035. This decline is tempered by projected growth in experimental and LSAs, which are projected to increase at an annual rate of 1.4 and 4.3 percent respectively. However, since piston engine aircraft currently account for 85 percent of this group, the overall trend is down slightly. By 2035, experimental and light sport aircraft are projected to account for 23 percent of this group, reducing conventional piston engine aircraft to 77 percent. The projection results in a decrease from 58 to 56 based aircraft at Mulino State Airport by 2035, which represents an average annual growth rate of **-0.18 percent**.

[7] As listed on current FAA Airport Record Forms (5010)

SUMMARY (BASED AIRCRAFT)

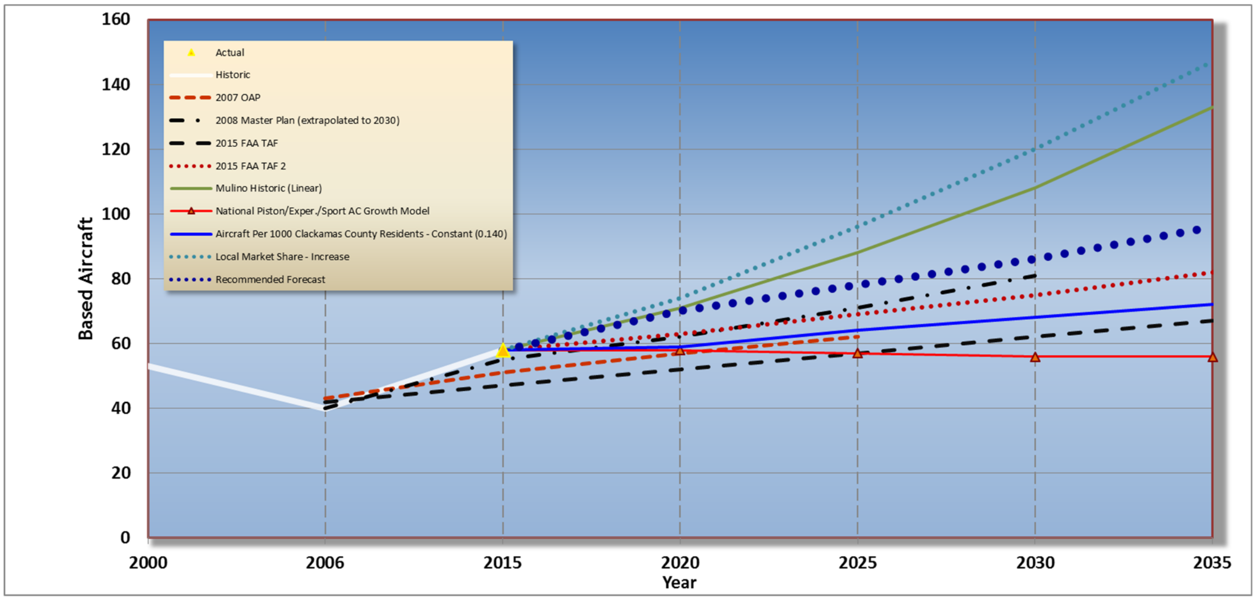
The evaluation of several existing and updated forecasts for based aircraft provides a range of annual growth rates from -0.18 to 4.76 percent. The forecasts provide a reasonable range of demand projections that reflect broad expectations of future trends within general aviation and the local market potential specific to Mulino State Airport. The statistical mean annual growth rate for the group of projections is 2.22 percent. However, based on local market conditions and current planned hangar construction, a higher annual average growth rate of **2.55 percent** is recommended for use in forecasting based aircraft. The underlying strength of the local area and the airport's ability to attract and accommodate new aircraft are key factors in outperforming broader markets. The projection results in an increase from 58 to 96 based aircraft (+38) by 2035. **Table 3-10** summarizes the based aircraft forecasts and **Figure 3-3** depicts the based aircraft forecasts.

TABLE 3-10: MULINO STATE AIRPORT - BASED AIRCRAFT FORECASTS

	Avg. Annual Growth Rate	2014/ 2015	2020	2025	2030	2035
Existing Forecasts						
2008 Mulino Airport Master Plan Forecast	2.97%	55[1]	62[1]	71[1]	81[2]	90[2]
2007 Oregon Aviation Plan Forecast	1.97%	52[1]	57	62	--	--
2015 FAA Terminal Area Forecast	1.76%	47	52	57	62	67
Updated Forecasts						
National Piston-Experimental-LSA Growth Rate Model	-0.18%	58	58	57	56	56
Linear Trend Model (Mulino)	4.24%	58	71	88	108	133
Clackamas County Population to BAC Ratio Model	1.09%	58	59	63	68	72
Local Service Area – Increased Market Share Model	4.76%	58	74	96	120	147
FAA Terminal Area Forecast [2]	1.76%	58[3]	64	70	76	84
Recommended Forecast	**2.55%**	**58**	**70**	**78**	**86**	**96**

[1] Interpolated.
[2] Extrapolated.
[3] TAF Rate applied to updated 2015 BAC count

FIGURE 3-3: MULINO STATE AIRPORT - BASED AIRCRAFT FORECASTS



BASED AIRCRAFT FLEET MIX

The airport's current mix of based aircraft is expected to become more diverse during the current planning period, although small single engine piston aircraft, including experimental and LSA, will continue to represent the majority of based aircraft. Based on local market conditions and broader trends within general aviation aircraft manufacturing, it is reasonable to assume that the based aircraft fleet mix will add multi-engine piston aircraft, turboprops, and helicopters during the twenty year planning period.

Among the more interesting current trends in aircraft manufacturing is the growth in single-engine turboprops, which represented 73 percent of worldwide turboprop deliveries in 2014.[8] Single engine turboprops such as the Cessna Caravan, Pilatus PC-12, Quest Kodiak 100, Socata TBM700, and Piper Meridian represent a growing segment of small aircraft included in Airplane Design Group I and II, which are consistent with the design capabilities of Mulino State Airport.

The projected changes in the based aircraft fleet mix at the airport are consistent with broader trends identified by FAA regarding the composition of the general aviation fleet as a whole and reflect the airport's unique ability to attract a variety of aircraft types for business and personal transportation. The forecast based aircraft fleet mix is summarized in **Table 3-11**. **Figures 3-4 and 3-5** depict the current (2015) and long-term (2035) distribution of based aircraft by type.

[8] GAMA Worldwide General Aviation Aircraft Delivery Report (2014)

TABLE 3-11: MULINO STATE AIRPORT FORECAST BASED AIRCRAFT FLEET MIX

ACTIVITY	2015	2020	2025	2030	2035
Single Engine Piston	49 (85%)	56 (80%)	60 (77%)	63 (73%)	66 (69%)
Multi-Engine Piston	0 (0%)	1 (1%)	2 (<3%)	2 (2%)	4 (4%)
Turboprop	0 (0%)	0 (0%)	1 (1%)	2 (2%)	3 (3%)
Business Jet/VLJ	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Light Sport Aircraft/Ultralights	8 (14%)	11 (16%)	13 (17%)	15 (17%)	17 (18%)
Helicopter	1 (<2%)	2 (3%)	2 (<3%)	4 (5%)	6 (6%)
Total Based Aircraft (100%)	**58**	**70**	**78**	**86**	**96**
Note: Percentages may not sum due to independent rounding					

FIGURE 3-4: MULINO STATE AIRPORT - BASED AIRCRAFT FLEET MIX (AUGUST 2015)

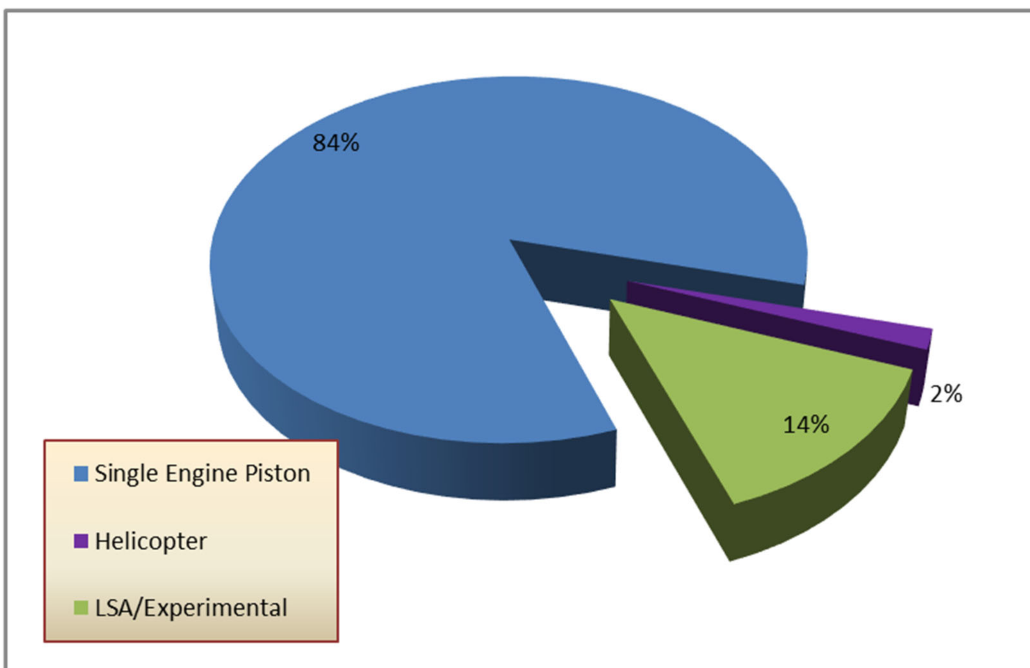
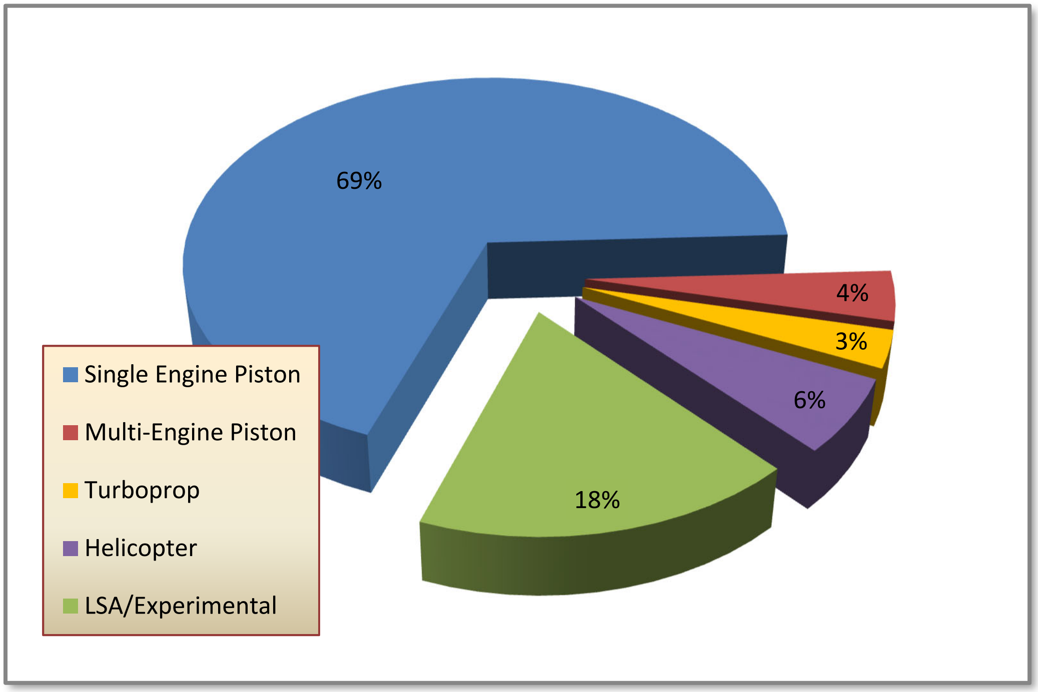


FIGURE 3-5: MULINO STATE AIRPORT – FORECAST BASED AIRCRAFT FLEET MIX (2035)



Aircraft Operations Forecasts

General aviation operations consist of takeoffs and landings conducted by general aviation aircraft and are classified as local or itinerant. General aviation airports may accommodate limited commercial activity (cargo/express, air taxi) and military activity based on their airfield capabilities.

Local operations are conducted in the vicinity of an airport and include flights that begin and end at the airport. These include local area flight training, touch and go landings, flightseeing, skydiving, and other flights that do not involve a landing at another airport. Itinerant operations include flights between airports, including cross-country flights. Itinerant operations reflect specific travel between multiple points, often associated with business and personal travel.

Existing and updated aircraft operations forecasts are summarized below and in **Table 3-12,** and depicted in **Figure 3-6.**

EXISTING OPERATIONS FORECASTS

2008 Airport Master Plan (2006-2027)

The 2008 Mulino Airport Master Plan projected annual aircraft operations to increase from 37,274 to 42,032 between 2006 and 2027, which represents an average annual growth rate of **0.6 percent**. It was noted however, that base year operations data used in the forecast was likely overstated and a more realistic estimate of activity was 21,300 operations. The increase from 21,300 to 42,032 annual operations over the period translates into an annual average growth rate of **3.3 percent**. The current estimate of 24,360 annual operations is 16 percent below the master plan operations forecast for 2012 (28,968) and 26 percent below the forecast for 2017 (32,944). Although trending above current activity estimates, when extrapolated, the previous master plan operations forecast provides a valid upper range projection for comparison with other forecasts.

FAA Terminal Area Forecast (TAF)

The FAA's 2015 TAF forecast update projects aircraft operations at the airport to increase from 21,300 to 34,825 (+64%) between 2013 and 2040, which represents average annual growth of **1.84 percent**. The TAF operations forecast for 2015 (22,225) is approximately 9 percent lower than the current master plan estimate of 24,360 operations noted earlier. The TAF forecasts reflect a slow increase in the ratio of operations to based aircraft (473 to 483) through 2040, coupled with a 60 percent increase in based aircraft by 2040. The TAF provides a valid projection for comparison with other forecasts.

On a regional level, the 2013-2040 Terminal Area Forecast projects itinerant operations (commercial, GA, military) in the Northwest-Mountain Region to increase at an average annual rate of **1.1 percent** through 2040, which is less than the TAF forecast rate applied specifically to Mulino State Airport.

2007 Oregon Aviation Plan

The 2007 Oregon Aviation Plan (OAP) forecasts annual aircraft operations at Mulino State Airport to increase from 36,668 to 55,288 between 2005 and 2025, which represents average annual growth of **2.08 percent**. The OAP forecast for 2015 (46,344) is 90 percent above the current master plan estimate of 24,360 operations noted earlier. The OAP used the 2005 FAA TAF operations total for Mulino as its forecast base. The TAF was adjusted downward by 46 percent between 2009 and 2010, suggesting that the basis for this forecast has changed and the projections are no longer valid.

UPDATED OPERATIONS FORECASTS

Updated aircraft operations projections have been developed for comparison with existing forecasts in order to identify a selected master plan forecast. Consistent with the methodology used in the 2008 Airport Master Plan forecasts, the updated aircraft operations forecasts use ratios of operations to based aircraft to reflect activity generated by locally based and transient aircraft. The projections were developed using an FAA-recommended methodology for estimating airport operations at non-towered general aviation airports. The model was developed by FAA using regression-modeling data from all small towered and non-towered general aviation airports and incorporated several independent variables including airport characteristics, population, and geographic location.

The updated operations forecasts use the 2015 operations estimate (24,360) as the base for new projections. The current estimate reflects a ratio of 420 operations per based aircraft (58 x 420 = 24,360).

Constant and Increasing Operations Ratio

Two scenarios have been developed for aircraft operations based on the conditions for the local airport service area described earlier in the chapter. The scenarios reflect slightly different operational profiles.

The first forecast (**constant ratio projection)** maintains the 420 operations per based aircraft ratio through the twenty-year planning period used to estimate current activity. The projection assumes aircraft utilization will remain at current levels and growth in aircraft operations will be driven primarily by a net increase in based aircraft. The projection results in an increase from 24,360 to 40,320 annual operations by 2035, which represents an average annual growth rate of **2.55 percent**.

The second forecast (**Increasing ratio projection)** assumes a gradual increase from 420 to 450 operations per based aircraft through the planning period. The increase in aircraft utilization would be driven by capturing a larger share of general aviation activity, including locally based and transient activity. Commercial activities such as flight training, aircraft maintenance, and skydiving contribute to higher aircraft utilization levels. The projection results in an increase from 24,360 to 43,200 annual operations by 2035, which represents an average annual growth rate of 2**.91 percent**.

SUMMARY (AIRCRAFT OPERATIONS)

The recommended aircraft operations forecast for Mulino State Airport is the increasing operations per based aircraft (OPBA) ratio. The updated operations forecasts are lower than the 2008 Airport Master Plan forecasts, due in large part to the impact of economic conditions and the current long-term growth expectations nationally, which have been tempered significantly compared to “pre-recession” forecasts. However, the recommended forecast is higher than the current FAA TAF forecast for the airport.

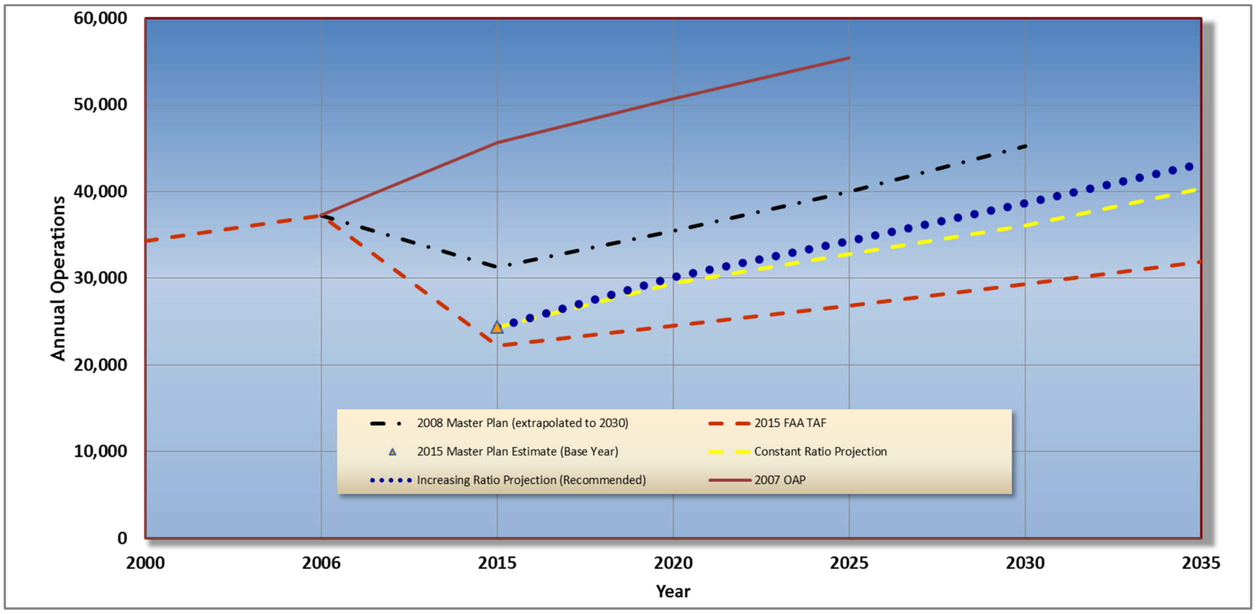
Based on more recent activity trends, the "typical" activity range defined by FAA for general aviation airports ranges from 250 to 450 operations per based aircraft. This range appears to provide a reasonable indication of activity that may be expected at the airport during the current twenty-year period.

TABLE 3-12: MULINO STATE AIRPORT - AIRCRAFT OPERATIONS FORECASTS

	AVG. ANNUAL GROWTH RATE	2014/ 2015	2020	2025	2030	2035
Existing Forecasts						
2008 Mulino Airport Master Plan Forecast	2.48%	37,274[1]	35,442[1]	40,034[1]	45,219[2]	--
2007 Oregon Aviation Plan Forecast	2.08%	45,640	50,727	55,388	--	--
2015 FAA Terminal Area Forecast	1.84%	22,225	24,538	26,850	29,284	31,932
Updated Forecasts						
2015 Constant OPBA Ratio Projection	2.55%	24,360	29,400	32,760	36,120	40,320
2015 Increasing OPBA Ratio Projection (Recommended)	**2.91%**	**24,360**	**30,100**	**34,320**	**38,700**	**43,200**

[1] Interpolated.
[2] Extrapolated.
[3] TAF Rate applied to updated 2015 BAC count

FIGURE 3-6: MULINO STATE AIRPORT - OPERATIONS FORECAST



Operational Split and Aircraft Fleet Mix

LOCAL AND ITINERANT AIRCRAFT OPERATIONS

The FAA TAF forecast (base year 2013) and the current FAA Airport Master Record Form (5010) reflect a 61 percent local and 39 percent itinerant aircraft operations distribution. The 2008 airport master plan forecast used a 60/40 split between itinerant and local operations. For forecasting purposes, a 60/40 split between itinerant and local operations appears to be consistent with the type of activity associated with the airport and is recommended. The operational split is reflected in the forecast summary table at the end of the chapter (**Table 3-16**).

AIRCRAFT OPERATIONS FLEET MIX

The forecast aircraft operations fleet mix at Mulino State Airport is expected to remain primarily driven by single-engine piston fixed wing aircraft, including experimental and LSA, with growth in multi-engine piston, single- and multi-engine turboprop, and helicopter activity. It is reasonable to assume that the airport will accommodate a limited amount of small jet activity based on its current runway capabilities and the development of several new small jets capable of operating on runways as short as 3,000 feet.

It is estimated that single-engine aircraft currently account for approximately 89 percent of airport operations, followed by helicopters (11 percent), and multi-engine aircraft (1 percent). Although single engine piston aircraft will continue to generate the majority of aircraft operations at the airport through the planning period, their portion of overall traffic is expected to gradually decrease slightly as other aircraft types become more common. The forecast aircraft operations fleet mix is summarized in **Table 3-13**.

TABLE 3-13: MULINO STATE AIRPORT - FORECAST AIRCRAFT OPERATIONS FLEET MIX

AIRCRAFT TYPE	2015	%	2020	%	2025	%	2030	%	2035	%
Single Engine Piston	21,600	89	25,870	88	28,300	86	31,056	86	34,080	85
Multi Engine Piston	240	1	350	1	400	1	480	1	560	1
Turboprop	70	<1	240	1	460	<2	560	<2	800	2
Jet	0	0	0	0	0	0	40	<1	40	<1
Helicopter	2,450	10	2,940	10	3,600	11	3,970	11	4,840	12
Total Operations (100%)	**24,360**	**100**	**29,400**	**100**	**32,760**	**100**	**36106**	**100**	**40,320**	**100**
Note: Percentages may not sum due to independent rounding										

Design Aircraft

The selection of design standards for airfield facilities is based on the characteristics of the aircraft that are expected to use the airport. The design aircraft is defined as the most demanding aircraft type operating at the airport with a minimum of 500 annual itinerant operations, as mandated by the FAA Substantial Use Threshold:

"Substantial Use Threshold: 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. Under unusual circumstances, adjustments may be made to the 500 total annual itinerant operations threshold after considering the circumstances of a particular airport. Two examples are airports with demonstrated seasonal traffic variations, or airports situated in isolated or remote areas that have special needs."

The FAA groups aircraft into five categories (A-E) based on their approach speeds. Aircraft Approach Categories A and B include small propeller aircraft, many small or medium business jet aircraft, and some larger aircraft with approach speeds of less than 121 knots (nautical miles per hour). Categories C, D, and E consist of the remaining business jets and larger jet and propeller aircraft generally associated with commercial and military use, with approach speeds of 121 knots or more. The FAA also establishes six airplane design groups (I-VI), based on the wingspan and tail height of the aircraft. The categories range from Airplane Design Group (ADG) I, for aircraft with wingspans of less than 49 feet, to ADG VI for the largest commercial and military aircraft.

The combination of airplane design group and aircraft approach speed for the design aircraft creates the Airport Reference Code (ARC), which is used to define applicable airfield design standards. The FAA classifies aircraft with a maximum gross takeoff weight greater than 12,500 pounds as “large aircraft”; aircraft 12,500 pounds and less are classified as “small aircraft.”

A list of typical general aviation and business aviation aircraft and their respective design categories is presented in **Table 3-14. Figure 3-7** illustrates representative aircraft in various design groups.

CURRENT AND FUTURE DESIGN AIRCRAFT

The current design aircraft is the Beechcraft Baron, a multi-engine piston aircraft included in Aircraft Approach Category B and Airplane Design Group I (ADG I). The combination of approach speed and airplane design group results in Airport Reference Code (ARC) B-I.

The future design aircraft is a Beechcraft King Air 250 for the airport. This aircraft is representative of a multi-engine turboprop included in Aircraft Approach Category B and Airplane Design Group II (ADG II). The combination of approach speed and airplane design group results in Airport Reference Code (ARC) B-II. The 2008 Airport Master Plan notes that the King Air 250 has a maximum takeoff weight of 12,500 pounds.

TABLE 3-14: GENERAL AVIATION AIRCRAFT & DESIGN CATEGORIES

AIRCRAFT	AIRCRAFT APPROACH CATEGORY	AIRPLANE DESIGN GROUP	MAXIMUM GROSS TAKEOFF WEIGHT (LBS)
Cessna 182 (Skylane)	A	I	3,100
Cirrus Design SR22	A	I	3,400
Cessna Corvallis TT	A	I	3,600
Cessna 206 (Stationair)	A	I	3,614
Beechcraft Bonanza A36	A	I	3,650
Socata/Aerospatiale TBM 700	A	I	6,579
Beechcraft Baron 58	B	I	5,500
Cessna 340	B	I	5,990
Cessna Citation Mustang	B	I	8,645
Embraer Phenom 100	B	I	10,472
Cessna Citation CJ1+	B	I	10,700
Beech King Air C90	B	I	11,800
Beechcraft 400A/Premier I	B	I	16,100
Piper Malibu (PA-46)	A	II	4,340
Cessna Caravan 675	A	II	8,000
Pilatus PC-12	A	II	10,450
Cessna Citation CJ2+	B	II	12,500
Cessna Citation II	B	II	13,300
Beech King Air 350	B	II	15,000
Cessna Citation Bravo	B	II	15,000
Cessna Citation CJ4	B	II	16,950
Embraer Phenom 300	B	II	17,968
Cessna Citation XLS+	B	II	20,200
Dassault Falcon 20	B	II	28,660
Dassault Falcon 900	B	II	45,503
Bombardier Learjet 55	C	I	21,500
Gulfstream 200	C	II	34,450
Cessna Citation X	C	II	36,100
Bombardier Challenger 300	C	II	37,500
Gulfstream III	C	II	69,700
Learjet 35A/36A	D	I	18,300
Gulfstream G450	D	II	73,900
Source: AC 150/5300-13, as amended; aircraft manufacturer data.			

A-I

12,500 lbs. or less (small)

Beech Baron 55
Beech Bonanza
Cessna 182
Piper Archer
Piper Seneca

B-I

12,500 lbs. or less (small)

Beech Baron 58
Beech King Air 100
Cessna 402
Cessna 421
Piper Navajo
Piper Cheyenne
Cessna Citation I

A-II, B-II

12,500 lbs. or less (small)

Super King Air 200
Pilatus PC-12
DHC Twin Otter
Cessna Caravan
King Air C90

B-II

Greater than 12,500 lbs.

Super King Air 300, 350
Beech 1900
Cessna Citation Excel
Falcon 20, 50
Falcon 200, 900
Citation II, Bravo XLS+
Citation CJ3

A-III, B-III

Greater than 12,500 lbs.

DHC Dash 7
DHC Dash 8
Q-300, Q-400
DC-3
Convair 580
Fairchild F-27
ATR 72
ATP

C-I, D-I

Lear 25, 35, 55, 60
Israeli Westwind
HS 125-700

C-II, D-II

Gulfstream II, III, IV
Canadair 600
Canadair Regional Jet
Lockheed JetStar
Citation X
Citation Sovereign
Hawker 800 XP

C-III, D-III

Boeing Business Jet
Gulfstream 650
B 737-300 Series
MD-80, DC-9
Fokker 70, 100
A319, A320
Gulfstream V
Global Express

C-IV, D-IV

B-757
B-767
DC - 8-70
DC - 10
MD - 11
L 1011

D-V

B - 747 Series
B - 777

Operational Peaks

It is estimated that peak month activity at Mulino State Airport occurs during the summer (typically July or August) and accounts for approximately 12 percent of annual aircraft operations. This level of peaking is consistent with the mix of airport traffic and is expected to remain relatively unchanged during the planning period. Peak day operations are defined by the average day in the peak month (design day) and the busy day in the typical week during the peak month (busy day); the peak hour within the design day represents the design hour. The busy day is estimated to be 25 percent higher than the average day in the peak month (design day x 1.25). The design hour operations are estimated to equal 15 percent of design day operations. Operational peaks for each of the forecast scenarios are summarized in **Table 3-15**.

TABLE 3-15: PEAK GENERAL AVIATION OPERATIONS FORECAST

ACTIVITY	2014	2020	2025	2030	2035
Annual Operations	24,360	30,100	34,320	38,700	43,200
Peak Month Operations (12%)	2,923	3,612	4,118	4,644	5,184
Design Day (average day in peak month)	97	120	137	155	173
Busy Day	122	151	172	194	216
Design Hour Operations (assumed 15% of design day)	15	18	21	23	26

Air Taxi and Military Operations

Air taxi activity includes operations regulated by the FAA under FAR Part 135, including on-demand passenger service (charter and fractional), small parcel transport (cargo), and air ambulance activity.

The 2008 airport master plan estimated that air taxi activity generated approximately 100 annual operations in 2006, and projected the activity to increase to just below 200 operations by 2027. A similar projection is included in the updated forecasts.

Military operations are limited and include Oregon Army National Guard night helicopter training, search and rescue training, and emergency response operations. A static projection of 100 annual military operations is included in the updated forecast.

Instrument Flight Activity

Mulino State Airport is not currently equipped to accommodate instrument flight activity. However, based on the recommendations in the previous master plan, the addition of non-precision instrument approach capabilities during the 20-year planning period should be assumed. Assuming the development of a new instrument approach is accomplished by 2020, instrument operations are estimated to account for 1 to 2 percent of annual airport operations from 2020 to 2035.

Forecast Summary

The summary of based aircraft and annual aircraft operations forecasts is provided in **Table 3-16** and **Table 3-17** summarizes by ARC. The forecast reflects relatively modest growth expectations consistent with the airport's recent historical activity, local market conditions, and the ability to attract additional aviation activity.

As with any long-term demand forecast, it is recommended that long-term development reserves be protected to accommodate demand that may exceed current projections. For planning purposes, a reserve capable of accommodating a doubling of the twenty-year forecast demand should be adequate to accommodate unforeseen facility needs during the planning period. However, should demand significantly deviate from the airport's recent historical trend, updated forecasts should be prepared to ensure that adequate facility planning is maintained.

TABLE 3-16: FORECAST SUMMARY

ACTIVITY	2015	2020	2025	2030	2035
Annual Operations					
Itinerant					
General Aviation	14,600	17,840	20,350	22,960	25,640
Air Taxi	100	120	140	160	180
Military	100	100	100	100	100
Total Itinerant	**14,620**	**18,060**	**20,590**	**23,220**	**25,920**
Total Local	9,740	12,040	13,730	15,480	17,280
Total Operations	**24,360**	**30,100**	**34,320**	**38,700**	**43,200**
Instrument Operations *(increasing from 1% to 2% of total itinerant operations beginning in 2020)*	0	181	309	464	518
Based Aircraft					
Single Engine Piston	50	56	60	63	66
Multi-Engine Piston	0	1	2	2	4
Turboprop	0	0	1	2	3
Business Jet	0	0	0	0	0
Light Sport Aircraft/Experimental/Other	8	11	13	15	17
Helicopter	1	2	2	4	6
Total Based Aircraft	**58**	**70**	**78**	**86**	**96**

TABLE 3-17: FORECAST SUMMARY (BY ARC)

ACTIVITY	2015	2020	2025	2030	2035
Annual Operations (Turbine Aircraft)					
Constant Ratio Forecast					
Airport Reference Code (A&B)					
A-I Turboprop	40	60	100	200	220
B-I Turboprop	60	80	100	160	180
B-I Business Jet	20	60	70	80	90
A-II Turboprop	80	100	160	290	320
B-II Business Jet	20	60	60	60	60
B-II Turboprop	120	120	150	180	180
C/D I & II Business Jet	0	0	0	0	0
Total Turbine Operations	**340**	**480**	**640**	**970**	**1,050**
Turbine ADG I Operations	120	200	270	440	490
Turbine ADG II Operations	220	280	370	530	560

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Chapter 4 – Airport Facility Requirements

Chapter 4 – Airport Facility Requirements

The evaluation of airport facility requirements applies the results of the inventory and forecasts contained in Chapters Two and Three, and established planning criteria, to existing airport facilities to determine the future facility needs for Mulino State Airport through the current twenty-year planning period.

Introduction

The evaluation of airport facility requirements can be divided into two broad categories: airside and landside. **Airside** facilities include runways, taxiways, navigational aids, and lighting systems. **Landside** facilities include hangars, fixed base operator (FBO) facilities, aircraft parking apron, aircraft fueling, surface access and automobile parking, utilities, and other related items. All airfield items are evaluated based on established FAA standards.

The facility requirements evaluation is used to identify the adequacy or inadequacy of existing airport facilities and identify what new facilities may be needed during the planning period based on forecast demand.

As noted in the updated aviation activity forecasts (Chapter Three), the future design aircraft for Mulino State Airport is identified as a multi-engine turboprop included in Airplane Design Group II (ADG II). This expectation reflects the size and composition of the current turboprop fleet in the United States. Additional information about the design aircraft is provided later in the chapter.

Options and preliminary costs for providing these facility needs will be evaluated in the Airport Development Alternatives (Chapter Six), to determine the most cost effective and efficient means for meeting projected facility needs.

Organization of Materials

This chapter evaluates facility requirements with regard to: (1) conformance of existing facilities with FAA airport design and airspace planning standards; and (2) new demand-based facility needs that reflect the updated aviation activity forecasts. The non-conforming items fall into the following design standard categories:

- **Runway Object Free Area (OFA)** – A berm located on west side of runway (elevated above grade limits) and range fence located approximately 170 feet west of runway centerline are located in portions of the OFA.
- **Runway Obstacle Free Zone (OFZ)** – The aircraft hold lines (e.g., holding aircraft) on Taxiway A1, A2, and A3 are located 125 feet from runway centerline within the OFZ, which does not meet the OFZ clearing standard.
- **Runway Protection Zone (RPZ)** – A section of Mulino Road is located in the Runway 14 RPZ. The FAA includes roadways among several defined "incompatible land uses" for RPZs.
- **Runway Primary Surface (FAR Part 77)** – The pilot lounge/FBO building and airport access road are partially located within the primary surface.
- **Taxiway Object Free Area (TOFA)** – The pilot lounge/FBO building is partially located within the OFA for the parallel taxiway. The aircraft hold areas at both ends of the runway are located within the OFA for the parallel taxiway.
- **Taxilane Object Free Area (TOFA)** – The OFAs for the apron taxilanes and some hangar taxilanes do not meet the clearing standard (dimension from taxilane centerline to a fixed or moveable object, such as parked aircraft, parked vehicles, or hangars).
- **Taxiway Design** – The configuration of the main access taxiway connection to the parallel taxiway (and runway) is not consistent with current FAA design guidance on reducing runway incursions.

Figure 4-1 and **Figure 4-2** illustrate the location of non-conforming items identified at Mulino State Airport during the project inventory, site visits and through review of the applicable design standards described in this chapter.

All non-conforming items will have recommended actions to address the condition. In some cases, a modification to standards may be appropriate based on available mitigation options and FAA policy. The updated Airport Layout Plan will incorporate current and future conformance with FAA airport design standards and airspace planning criteria.

The evaluation of demand-driven items will reflect in gross numbers, new facility needs such as runway length requirements, hangar spaces, and aircraft parking positions based on forecast demand and the needs of the design aircraft. Items such as lighting and navigational aids are evaluated based on the type of airport activity, airport classification, and capabilities.

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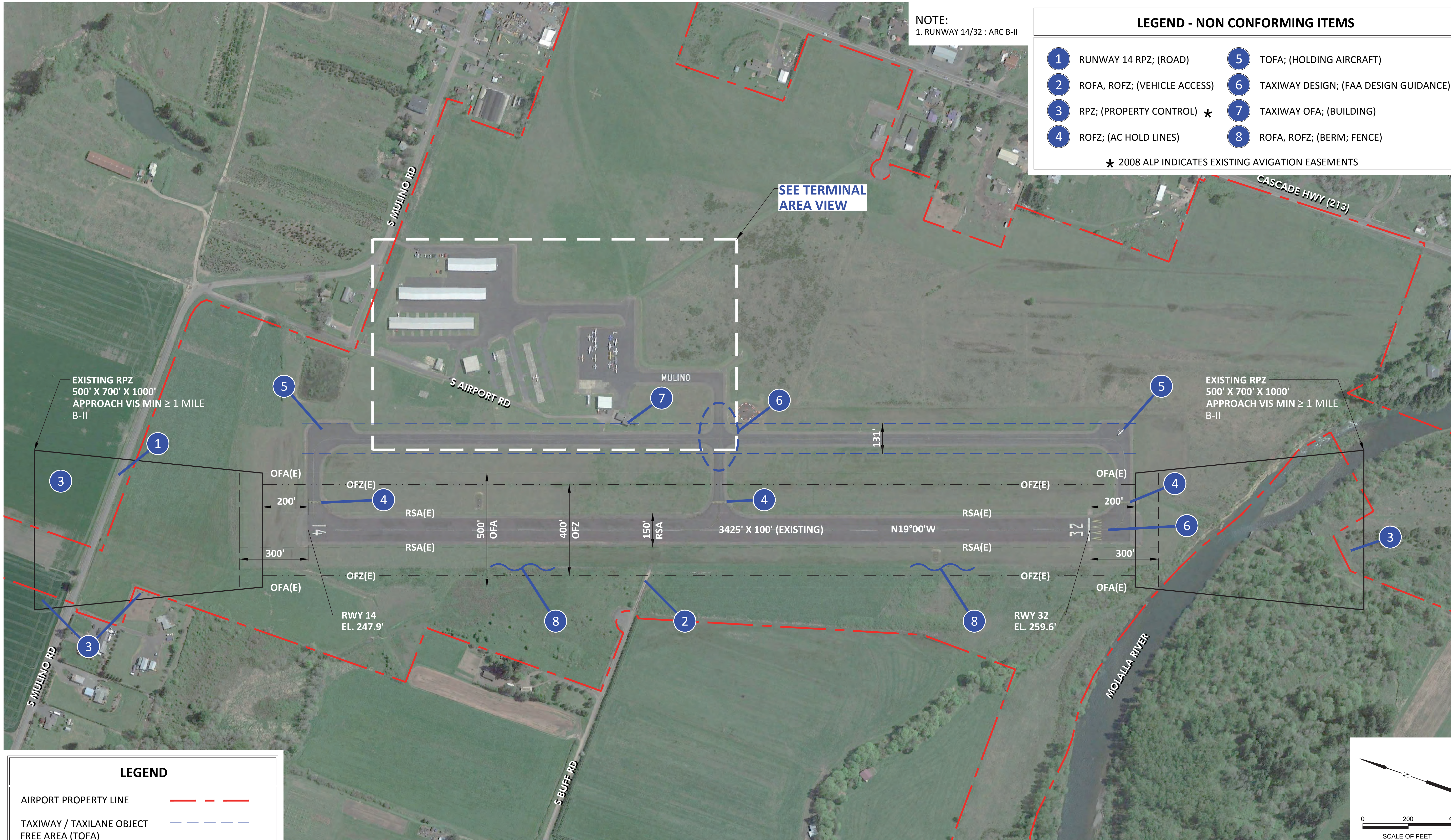
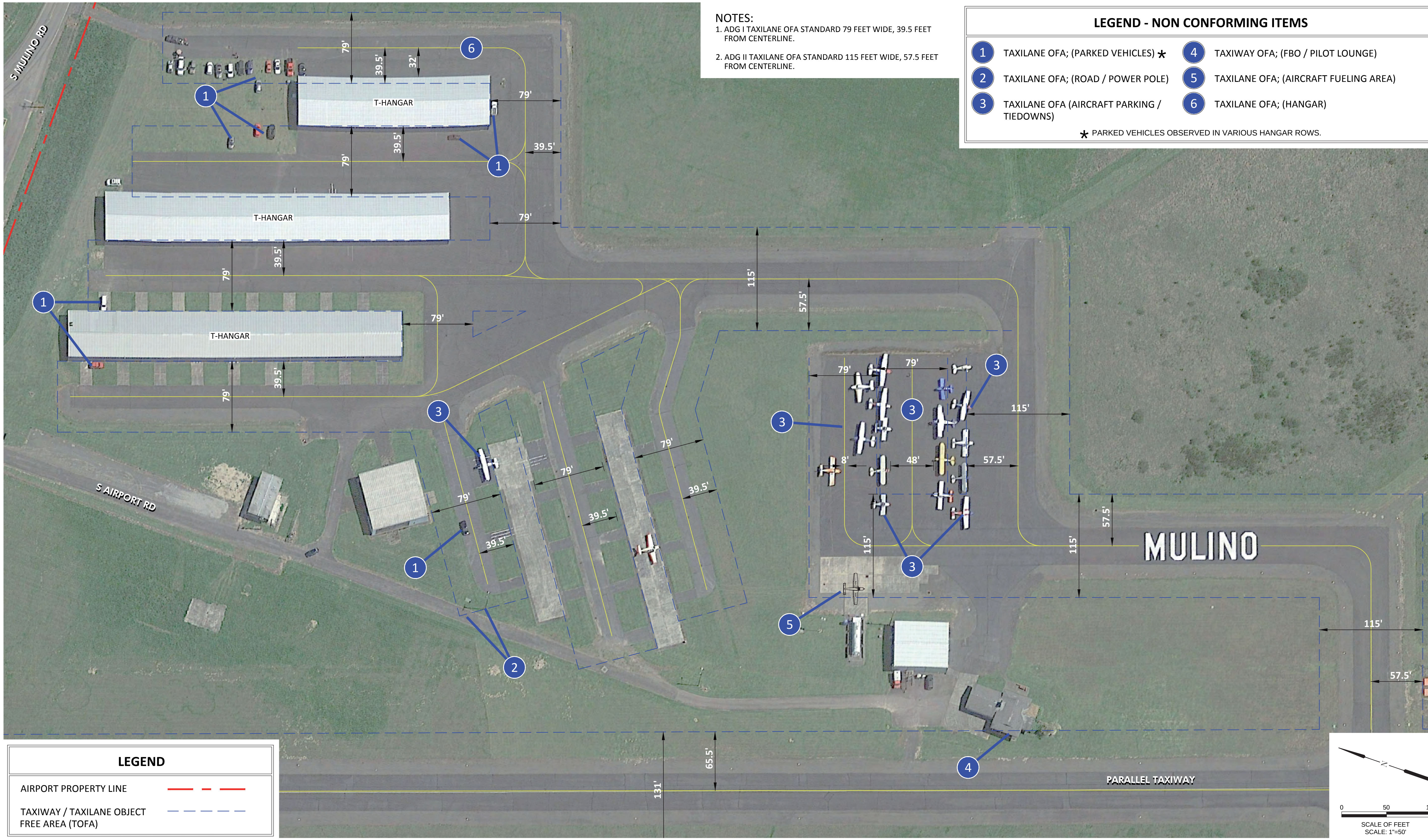


MULINO STATE AIRPORT | AIRPORT MASTER PLAN

CONFORMANCE FIGURE | **FIG. 4-1**

OREGON DEPARTMENT OF AVIATION

CENTURY WEST ENGINEERING



NOTES:

1. ADG I TAXILANE OFA STANDARD 79 FEET WIDE, 39.5 FEET FROM CENTERLINE.
2. ADG II TAXILANE OFA STANDARD 115 FEET WIDE, 57.5 FEET FROM CENTERLINE.

LEGEND - NON CONFORMING ITEMS

1. TAXILANE OFA; (PARKED VEHICLES) *
2. TAXILANE OFA; (ROAD / POWER POLE)
3. TAXILANE OFA (AIRCRAFT PARKING / TIEDOWNS)
4. TAXIWAY OFA; (FBO / PILOT LOUNGE)
5. TAXILANE OFA; (AIRCRAFT FUELING AREA)
6. TAXILANE OFA; (HANGAR)

* PARKED VEHICLES OBSERVED IN VARIOUS HANGAR ROWS.

LEGEND

- AIRPORT PROPERTY LINE
- TAXIWAY / TAXILANE OBJECT FREE AREA (TOFA)

MULINO STATE AIRPORT | AIRPORT MASTER PLAN

CONFORMANCE FIGURE | **FIG. 4-2**

CENTURY WEST ENGINEERING

Previous Airport Layout Plan Overview

The 2008 Airport Master Plan for Mulino Airport provided recommendations for airport facility improvements for the twenty-year planning period (2008-2027). **Table 4-1** summarizes the previous Airport Master Plan recommended projects and their status.

TABLE 4-1: PREVIOUS MASTER PLAN RECOMMENDED PROJECTS AND CURRENT STATUS

COMPLETED? YES/NO	PROJECTS
Yes	Fuel facility upgrade
Yes	Two rows of T-hangars
No	Drainage improvements
Yes*	Pavement maintenance (crack and fog seal) * *crackfill only conducted in 2016*
No	Relocate helicopter landing facility
No	T-hangar development
No	Taxilane development of one row with potential of 12 T-hangar units
No	Taxilane extensions to serve new T-hangars (50' x 275', 30' x 300', 30' x 250')
No	Property acquisition (avigation easements and removal of obstructions within approach)
No	Install automated weather observation station (AWOS)
No	T-hangar development of one row, with potential of 12 T-hangar units
No	Taxilane extensions to serve new hangars and hangar development
No	Install REILs and instrument approach lights
No	Construct new maintenance building
No	Taxilane access from parallel taxiway to aircraft storage area (35' x 400')
No	Relocate access taxiway at Runway 32 threshold (50' x 400')
No	Apron expansion (12,500 square yards)
No	Upgrade fencing
No	Construct access road (2,700')
No	Taxilane edge lights and electrical vault
Yes	Master plan update
No	Vehicle parking (40' x 120' approximately 15 spaces)
No	Conventional hangar development

Source: 2008 Airport Master Plan Update, WH Pacific (Table 7A Mulino Airport Proposed Capital Improvement Projects)

Airport Design Standards

Federal Aviation Administration (FAA) Advisory Circular 150/5300-13A; Airport Design, provides design standards for airports including dimensional standards. These dimensional standards are based on a number of criteria, which are discussed in the following narrative.

The criteria required for planning and design of an airport are determined by the airport's role, level of operations, and the "critical" aircraft using the airport. The critical or design aircraft, is defined as the most demanding aircraft operating at an airport on a regular basis. The design aircraft may be a specific aircraft or a composite aircraft representing a collection of aircraft classified by: Aircraft Approach Category (AAC), Airplane Design Group (ADG) and Taxiway Design Group (TDG). The design or critical aircraft (or type of aircraft) must perform 500 itinerant operations annually to be considered the critical aircraft.

Critical/Design Aircraft

FAA AC 150/5300-13A (Change 1), "Airport Design," defines the criteria used to determine Airport Reference Codes (ARC) based on the designated critical aircraft. The ARC is a coding system used by the FAA to relate airport design criteria to the operational and physical characteristics of the most demanding aircraft or family of aircraft (Critical Aircraft) operating at an airport.

The ARC has two components relative to the critical aircraft. The first, depicted by a letter, is the aircraft approach category, determined by the aircraft approach speed. The second, depicted by a Roman numeral, is the airplane design group.

Aircraft Approach Category: The FAA groups aircraft into five categories based on their approach speed. Approach speed is defined as 1.3 times stall speed (V_{SO}) when the aircraft is configured for landing at the maximum certificated landing weight. Generally, aircraft approach speed applies to runways and runway-related facilities. A general rule of thumb is that higher approach speed aircraft of all sizes require longer and wider runway with larger protected areas, than aircraft with slower approach speeds.

Airplane Design Group: The FAA establishes six groups based on the physical characteristics of the aircraft. The Airplane Design Group is determined by either the aircraft wingspan or tail height of the largest aircraft expected to operate on the runway and taxiways adjacent to the runway, whichever is most restrictive. Design groups define airport dimensional standards and physical separations (clearances) for runways, taxiways and taxilanes based on an aircraft's physical characteristics. As with higher aircraft approach speeds, larger aircraft require increased dimensional clearances for operating surfaces and protected areas to maintain adequate safety.

CURRENT AND FUTURE DESIGN AIRCRAFT

The 2008 Mulino Airport Master Plan identified a Beechcraft King Air multi-engine turboprop aircraft (ARC B-II) as the future design aircraft. When the updated forecasts were developed for this master plan in September 2015, the level of ADG II activity at the Airport was below the 500 annual operations required to meet the FAA threshold used to define "substantial use."

The forecast growth of ADG II activity during the planning period is sufficient to meet the FAA criterion used to determine "future" design aircraft. In the interim, it is reasonable to preserve and maintain the runway-taxiway system's historic use of ADG II design standards that also reflect future standards. An updated assessment of ADG II activity should be conducted as an element of future environmental or design projects that require a determination of appropriate ARC. However, since the majority of runway-taxiway facilities currently meet or exceed ADG II dimensional standards, downward compliance would not present a significant design challenge.

ADG I design standards that correspond to the current design aircraft and other similar aircraft, are presented for reference, but are not recommended to be applied based on the combination of existing facility configuration and forecast activity. This approach is consistent with the approach established in the previous master plan.

<u>2019 Note:</u> Since the master plan forecasts were presented for FAA review in September 2015, it appears that growth in ADG II activity is occurring, as indicated in the forecasts, including activity currently being generated by the local skydiving operator (Cessna Caravan). This activity alone, if sustained, likely approaches the 500 annual operations threshold required for application of ADG II standards. The FAA will require ADG II activity to be verified during future environmental or design projects that are ARC-dependent.

- **Current Design Aircraft**: Beechcraft Baron
  Multi-engine piston aircraft (ARC B-I, Small); MGTW: 5,500 pounds

- **Future Design Aircraft:** Beechcraft King Air 250
  Multi-engine turboprop aircraft (ARC B-II); MGTW: 12,500 pounds

The future design aircraft (Beechcraft King Air 250) is a typical multi-engine turboprop included in Approach Category B and Airplane Design Group II. With a maximum takeoff weight of 12,500 pounds, the King Air 250 is classified as a "small" airplane. These characteristics correspond to Airport Reference Code (ARC) B-II, Small Aircraft. However, several other common ARC B-II multi-engine turboprops are classified as "large" aircraft, weighing more than 12,500 pounds.

Turbine Aircraft Activity Trend

A relatively recent trend has emerged within general aviation business aircraft manufacturing that is affecting the demand-based criteria used to define airport planning. Single-engine models now represent the majority of deliveries fixed wing turboprops. In 2015, 71 percent of non-agricultural fixed-wing turboprop deliveries worldwide were single-engine models produced by six different manufacturers; only two manufacturers delivered multi-engine turboprops in 2015.[1] This trend has grown steadily since the introduction of new single-engine turboprop aircraft designs in the 1980s and 1990s that specifically targeted broad general aviation and business use, and specific commercial applications including small package express and medical evacuation (MEDEVAC) flights.

The wingspan for single-engine turboprops vary, which results in both ADG I and II designations. However, most single engine turboprops commonly used for personal or business use are certified as "small" aircraft under FAR Part 23, which limits weights to less than 12,500 pounds and stall speeds (V_{SO} and V_{S1}) that do not exceed 61 knots. This results in a slower approach speed that falls into Approach Category A, rather than Approach Category B, which is common to larger multi-engine aircraft.

Based on current manufacturing trends and attrition of the early generation business turboprop fleet, it is reasonable to assume that the balance of the active non-agricultural turboprop fleet will eventually be dominated by single-engine aircraft. However, during the current twenty year planning period, a diverse mix of single-engine and multi-engine turboprop activity may be expected. As such, it is reasonable to preserve the capabilities needed to accommodate both large and small aircraft included in ARC B-II.

The ADG II design standards defined for small and large aircraft included in Approach Category A and B are common except for the dimensions of two defined surfaces: the runway protection zone (RPZ) and runway obstacle free zone (OFZ) width. The aircraft hold line standard, which coincides with the outer edge of the OFZ, is dependent on the OFZ width. Protecting the larger OFZ is consistent with the existing 400-foot parallel taxiway separation for Runway 14/32. Based on the future approach visibility criteria (Not Lower than ¾ mile) planned for Runway 32, the RPZ dimensions are the same for ARC A/B –II Small Aircraft and ARC A/B-II.

[1] GAMA Aircraft Delivery Report (November, 2015)

Aside from these items, the primary airfield planning distinction between single-engine and multi-engine ADG II turboprops is related runway length. High performance single-engine aircraft typically require less runway than similarly sized multi-engine aircraft due in part to their lower operating speeds for takeoff and landing.

The existing airfield pavement strengths are consistent with small aircraft weighing 12,500 pounds and less. For long-term planning, a runway pavement strength of 30,000 pounds single wheel is appropriate to accommodate a wide range of B-II business aircraft. The appropriate future pavement strength for the runway, major taxiways, and apron will be determined at critical decision points (e.g., new construction, reconstruction, or rehabilitation), based on updated fleet mix assessments. Facilities used exclusively by small single-engine and multi-engine aircraft (wingspan less than 49 feet), such as small aircraft tiedowns or T-hangars are typically designed based on Airplane Design Group I (ADG I) standards.

Table 4-2 lists the Aircraft Approach Categories and Design Groups recommended for use at Mulino State Airport.

TABLE 4-2: AIRCRAFT APPROACH CATEGORIES* AND DESIGN GROUPS**

Approach Category	Approach Speed	
A	Less than 91 knots	
B	91 knots or more but less than 121 knots	
C	121 knots or more but less than 141 knots	
D	141 knots or more but less than 166 knots	
E	166 knots or more	
Design Group	**Tail Height**	**Aircraft Wingspan**
I	< 20’	Up to but not including 49 feet
II	20’ - <30’	49 feet up to but not including 79 feet
III	30’ - <45’	79 feet up to but not including 118 feet
IV	45’ - <60’	118 feet up to but not including 171 feet
V	60’ - <66’	171 feet up to but not including 214 feet
VI	66’ - <80’	214 feet up to but not including 262 feet
APPROACH VISIBILITY MINIMUMS		
RVR[1]	**Instrument Flight Visibility Category[2]**	
VIS	Visual (V)	
5000	Not lower than 1 mile (NPA)	
4000	Lower than 1 mile but not lower than ¾ mile (APV)	
2400	Lower than ¾ mile but not lower than ½ mile (CAT-I PA)	
1600	Lower than ½ mile but not lower than ¼ mile (CAT-II PA)	
1200	Lower than ¼ mile (CAT-III PA)	

* Aircraft approach categories are groupings of aircraft based on an approach speed of 1.3 times the aircraft stall speed at the maximum certificated landing weight.

** Aircraft design groups are categorized by aircraft wingspan. The aircraft design group concept associates airport dimensional standards with aircraft approach categories, aircraft design groups, or to runway instrumentation configurations.

1 – Runway Visual Range (RVR) in feet.

2 – Instrument flight visibility category in statute miles.

Approach Visibility Minimums and Airspace Planning

The 2008 Airport Layout Plan and Airspace Plan identify the future design criteria for Runway 32 based on approach visibility minimums as low as ¾-statute mile, which represents a one-quarter mile reduction (improvement) from the current one-mile visibility minima. Per FAA planning criteria, the ultimate FAR Part 77 airspace surfaces are used to define required airspace protections.

FAR Part 77 approach visibility minimums of ¾-mile or lower requires a 1,000-foot wide runway primary surface, compared to the 500-foot wide primary surface required for approaches with visibility greater than ¾-mile. The primary surface width directly affects the required setbacks for aircraft parking lines (APL) and building restriction lines (BRL). A larger runway protection zone (RPZ) is also required for the approach end of the runway with approach visibility minimums less than 1-mile.

The BRL depicted on the 2008 ALP is located 500 feet from runway centerline with an assumed building height clearance of 35 feet. This BRL location is consistent with a 500-foot wide primary surface, but not the required 1,000-foot wide primary surface noted above. If a 500-foot BRL was used in conjunction with a 1,000-foot wide primary surface, all structures located along the BRL would penetrate the 7:1 transitional surface slope, which begins 500 feet from runway centerline. The incompatibility between the BRL and required airspace protections will be addressed and reflected on the updated ALP drawings.

TAXIWAY DESIGN GROUP (TDG)

Taxiway Design Group (TDG) relates to the dimensions of the aircraft landing gear including distance from the cockpit to the main gear (CMG) and main gear width (MGW). These dimensions affect an aircraft's ability to safely maneuver around the taxiways at an airport and dictate pavement fillet design. Taxiways and taxilanes can be constructed to different TDG's based on the expected use of that taxiway/taxilane by the design aircraft. **Figure 4-3** illustrates the typical landing gear configuration of a general aviation aircraft associated with taxiway design group. The existing design aircraft (Beechcraft Baron) has a main landing gear width of 9 feet 7 inches, which falls within Taxiway Design Group IA. future design aircraft (Beechcraft King Air 250) has a main landing gear width of 15 feet, which falls within Taxiway Design Group 2.

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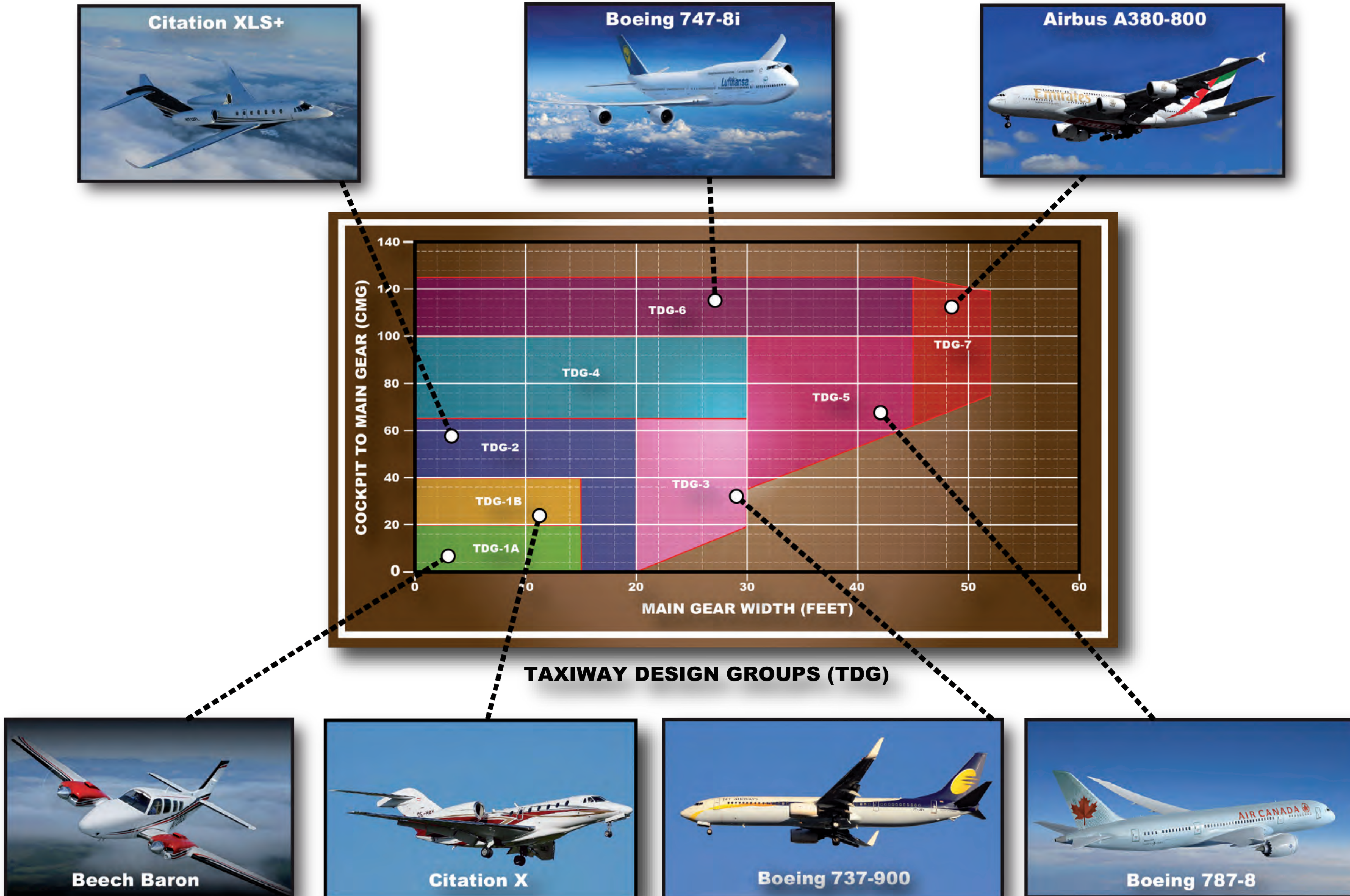
Citation XLS+
Boeing 747-8i
Airbus A380-800
COCKPIT TO MAIN GEAR (CMG)
140
120
100
80
60
40
20
0
TDG-6
TDG-7
TDG-4
TDG-5
TDG-2
TDG-3
TDG-1B
TDG-1A
0
10
20
30
40
50
60
MAIN GEAR WIDTH (FEET)
TAXIWAY DESIGN GROUPS (TDG)
Beech Baron
Citation X
Boeing 737-900
Boeing 787-8

RUNWAY DESIGN CODE

The Runway Design Code (RDC) is comprised of the selected Aircraft Approach Category, the Airplane Design Group, and the approach visibility minimums of a specific runway. For airports with more than one runway it would be possible to have differing RDCs for each individual runway. The RDC provides the information needed to determine specific design standards that apply to a specific runway. The approach visibility minimums relate to the visibility minimums expressed by runway visual range (RVR) values in feet. The possible RVR values are 1200 - corresponding to lower than 1/4 mile, 1600 (lower than 1/2 mile but not lower than 1/4 mile), 2400 (lower than 3/4 mile but not lower than 1/2 mile), 4000 (lower than 1 mile but not lower than 3/4 mile), and, and 5000 (not lower than 1 mile). Mulino does not have either non-precision or precision instrument approach capability at present. However, the 2008 Airport Master Plan recommended future non-precision approach capabilities with approach visibility minimums not lower than ¾ mile. This recommendation is retained in the current 20-year planning period which would result in a RDC B-II 4000 for Runway 14/32.

APPROACH AND DEPARTURE REFERENCE CODE

The **Approach and Departure Reference Codes** (APRC and DPRC respectively) represent the current operational capabilities of each specific runway end and their adjacent taxiways. **Approach Reference Code** (APRC) classifications are expressed with three components: AAC, ADG, and the lowest approach visibility minimums either end of the runway is planned to provide. **Departure Reference Code** (DPRC) classifications use AAC and ADG components only. Runways may have more than one APRC and DPRC depending on the minimums available to a specific AAC. **Table 4-3** lists the various Approach Reference Codes and **Table 4-4** lists the Departure Reference Codes.

TABLE 4-3 AIRPORT REFERENCE CODES (APRC)

VISIBILITY MINIMUMS	RUNWAY TO TAXIWAY SEPARATION									
	≥150’	≥200’	≥225’	≥240’	≥250’	≥300’	≥350’	≥400’	≥500’	≥550’
Visual	B/I(S)/VIS	B/I(S)/VIS	B/I/VIS	B/II/VIS	B/II/VIS	B/III/VIS D/II/VIS	B/III/VIS	D/IV/VIS D/V/VIS	D/VI/VIS	D/VI/VIS
Not lower than 1 mile	B/I(S)/5000	B/I(S)/5000	B/I/5000	B/II/5000	B/II/5000	B/III/5000 D/II/5000	B/III/5000	D/IV/5000 D/V/5000	D/VI/5000	D/VI/5000
Not lower than ¾ mile	B/I(S)/4000	B/I(S)/4000	B/I/4000	B/II/4000	B/II/4000	B/III/4000 D/II/4000	B/III/4000	D/IV/4000 D/V/4000	D/VI/4000	D/VI/4000
Lower than 3/4 mile but not lower than ½ mile		B/I(S)/2400	B/I/4000 B/I(S)/2400	B/II/4000	B/I/2400	B/III/4000 D/II/4000 B/II/2400	B/III/2400	D/IV/2400 D/V/2400	D/VI/2400	D/VI/2400
Lower than 1/2 mile								D/V/2400 D/IV/1600	D/VI/2400 D/V/1600	D/VI/1600

Notes: (S) denotes small aircraft

Entries for Approach Category D also apply to Approach Category E. However, there are no Approach Category E aircraft currently in the civil fleet.

For ADG-VI aircraft with tail heights of less than 66 feet (20 m), ADG-V separation standards may be used.

TABLE 4-4 DEPARTURE REFERENCE CODES (DPRC)

RUNWAY TO TAXIWAY SEPARATION					
≥150	≥225	≥240	≥300	≥400	≥500
B/I (S)	B/I	B/II	B/III D/II	D/IV D/V	D/VI

Notes: (S) denotes small aircraft

The existing APRC for each runway end, 14 and 32 is B/II VIS and the existing DPRC for each of these runway ends is B/II. A non-precision instrument approach is planned for Runway 14/32 with visibility minimums not lower than ¾ mile.

Table 4-5 compares existing conditions for Runway 14/32 and current and future design standards. **Table 4-6** summarizes Mulino State Airport’s current conformance with the standards listed in Table 4-5. Detailed narrative descriptions of these design standards are presented in the following sections of this chapter and are summarized on the following page.

Airport Planning & Design Standards Note:

Existing Conditions (actual conditions and configurations maintained for planning purposes, coincides with future design aircraft)

- Runway 14/32 – Airport Reference Code (ARC) B-II: Runway design standards for aircraft approach category A & B runways with a visual and not lower than 1-mile approach visibility minimums;
- The existing Runway Protection Zones (RPZ) for Runway 14/32 are based on visual and not lower than 1-mile visibility minimums (500' x 700' x 1,000'); and
- FAR Part 77 airspace planning criteria based on existing "larger than utility" runways with a "visual" approach visibility.

Future Conditions

- Runway 14/32 – Airport Reference Code (ARC) B-II: Runway design standards for aircraft approach category A & B runways with "not lower than 3/4-mile" approach visibility minimums
- The future RPZ dimensions for Runway 32 are 1,000' x 1,510' x 1,700'
- The future RPZ dimensions for Runway 14 are 500' x 700' x 1,000'
- FAR Part 77 airspace planning criteria based on "larger than utility" runways with "not lower than 3/4-mile" approach visibility
- The future 3/4-mile approach visibility minimums planned for Runway 32 requires a 1,000-foot wide Primary Surface (FAR Part 77)

Based on the updated activity forecasts described in Chapter 3, Mulino State Airport's existing design aircraft is the Beechcraft Baron 58 (B-I). The Baron 58 has a maximum takeoff weight of less than 12,500 pounds, which corresponds the FAA definition of "small" aircraft. ARC: B-I (Small). These standards are provided for reference; ARC B-II standards will continue to be protected based on forecast facility requirements. FAA determination of ARC applicability/eligibility will be determined at the time of future projects.

All references to the "standards" in the master plan update are based on these assumptions, unless otherwise noted (Per FAA Advisory Circular 150/5300-13A (Change 1) and FAR Part 77.25).

TABLE 4-5: AIRPORT DESIGN STANDARDS SUMMARY (DIMENSIONS IN FEET)

FAA STANDARD	RUNWAY 14/32 EXISTING CONDITIONS[1]	AIRPLANE DESIGN GROUP A/B-I (SMALL) [2] UTILITY VISUAL & ≥ 1-MILE	AIRPLANE DESIGN GROUP A/B-II LARGER THAN UTILITY VISUAL & ≥ 1-MILE	AIRPLANE DESIGN GROUP A/B-II LARGER THAN UTILITY ≥ ¾-MILE
Runway Length	3,425	3,050/3,600[8]	3,600[9]	3,600[9]
Runway Width	100	60	75	75
Runway Shoulder Width	15	10	10	10
Runway Safety Area • Width • Beyond RWY End • Prior to Landing Threshold	150 300 300	120 240 240	150 300 300	150 300 300
Obstacle Free Zone • Width • Beyond RWY End • Prior to Landing Threshold	400 200 200	250 200 200	400 200 200	400 200 200
Object Free Area • Width • Beyond RWY End • Prior to Landing Threshold	<500[6] 300 300	250 240 240	500 300 300	500 300 300
Primary Surface Width	500[12]	250	500	1,000
Primary Surface Length (Beyond RWY End)	200	200	200	200
Runway Protection Zone (RPZ) Length	1,000	1,000	1,000	1,700
RPZ Inner Width	500	250	500	1,000
RPZ Outer Width	700	450	700	1,510
Runway Centerline (CL) to: Parallel Taxiway/Taxilane CL Aircraft Parking Line (APL) Building Restriction Line (BRL)	400 690[7] 500[3]	150 181[4, 11] 251/370[5]	240 306[4] 376/495[5]	240 556[4] 626/745[5]
Taxiway Width	40	25	35	35
Taxiway Shoulder Width	15	10	10	10
Taxiway Safety Area Width	79	49	79	79
Taxiway Object Free Area Width	<131	89	131	131
Taxiway Centerline to Fixed/Movable Object	<65.5	44.5	65.5	65.5
Taxilane OFA Width	<115/79	79[10]	115/79[10]	115/79[10]
Taxilane CL to Fixed/Movable Object	<57.5/39.5	39.5[10]	57.5/39.5[10]	57.5/39.5[10]

	Table 4-5 Notes: 1. Existing airfield dimensions as depicted on current ALP (April 2008); ARC B-II 2. Dimensional standards consistent with current critical aircraft: ARC B-I (small). Existing facilities typically meet or exceed ARC B-II. 3. BRL is based upon a 35-foot tall building located approximately 500 feet from the runway centerline 4. Distance required to accommodate an 8-foot aircraft tail height without penetrating the 7:1 Transitional Surface extending from Primary Surface. This distance also clears the existing parallel taxiway OFA and the runway OFA. Setbacks for larger aircraft types (i.e., large business jets, etc.) would be based on tail height clearance of Transitional Surface slope. 5. Distances required to accommodate 18- and 35-foot structures without penetrating the 7:1 Transitional Surface extending from Primary Surface when ground elevation is the same for the runway and building. Setbacks for larger hangars or for hangars constructed in areas with terrain elevated above runway elevation would depend on roof elevation and actual clearance of Transitional Surface slope. 6. The 2008 ALP noted that the OFA width is non-standard due to a berm located on the west side of the runway approximately 150 feet from runway centerline. The berm extends the full length of the runway. 7. Distance between the nearest main apron parking positions and the runway centerline. 8. Runway length distance to accommodate 95/100 percent of small airplanes (less than 10 seats); AC 150/5325-4B Runway Length Requirements for Mulino State Airport with a mean temperature of 82.6 degrees F and elevation of 260 feet. 9. Runway length distance to accommodate 100 percent of small airplanes (less than 10 seats); AC 150/5325-4B Runway Length Requirements for Mulino State Airport with a mean temperature of 82.6 degrees F and elevation of 260 feet. 10. ADG I Taxilane OFA Standard (79 feet. 39.5 feet from centerline to fixed/moveable object) 11. APL distance increases to 194.5 feet if the runway is equipped with a parallel taxiway (150-foot separation) 12. Primary Surface (500 feet wide), as depicted on 2008 Airspace Plan (Sheet 2/4). The depicted primary surface width is not consistent with ultimate airspace (approach with visibility as low as ¾ mile), which requires a 1,000-foot wide surface.

TABLE 4-6: MULINO STATE AIRPORT CURRENT CONFORMANCE WITH FAA DESIGN STANDARDS

ITEM	AIRPLANE DESIGN GROUP B-I SMALL UTILITY - VISUAL & ≥ 1-MILE	AIRPLANE DESIGN GROUP B-II LARGER THAN UTILITY VISUAL & ≥ 1-MILE	AIRPLANE DESIGN GROUP B-II LARGER THAN UTILITY ≥ ¾-MILE
Runway Safety Area	Yes (*)	Yes	Yes
Runway Object Free Area	Yes (*)	Partial [1]	Partial [1]
Runway Obstacle Free Zone	Yes (*)	Partial [1]	Partial [1]
Taxiway Safety Area	Yes (*)	Yes	Yes
Taxiway Object Free Area	Yes (*)	No [4]	No [4]
Taxilane Object Free Area	Yes (*)	Partial [2]	Partial [2]
Building Restriction Lines	Yes (*)	No [4]	No [4]
Aircraft Parking Lines	Yes (*)	Yes	Yes
Runway Protection Zones	Yes (*)	Partial [3]	Partial [3]
Runway - Parallel Taxiway Separation	Yes (*)	Yes (*)	Yes (*)
Runway Width	Yes (*)	Yes (*)	Yes (*)
Runway Length	Yes (*)	Yes [5]	Yes [5]
Taxiway Width	Yes (*)	Yes (*)	Yes (*)

1. Restricted vehicular access within the ROFZ and ROFA; berm noted on 2008 ALP. It is anticipated these items will be addressed in the Alternatives Chapter.
2. Vehicles/aircraft and power pole within the TOFA, aircraft apron tiedowns within TOFA It is anticipated this will be addressed in the Alternatives Chapter.
3. Mulino Road in RPZ, Airport does not have full control of property within the RPZ. It is anticipated this will be addressed in the Alternatives Chapter.
4. Pilot Lounge/FBO Building partially located within ADG II parallel taxiway OFA and inside 500-foot BRL depicted on 2008 ALP.
5. Based on length required for 95% of small airplane fleet.

(*) Existing condition exceeds standards

RUNWAY SAFETY AREA (RSA)

The FAA defines runway safety area (RSA) as "A defined surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot, or excursion from the runway." Runway safety areas are most commonly used by aircraft that inadvertently leave the runway environment during landing or takeoff.

By FAA design standard, the runway safety area "shall be:

1. *cleared and graded and have no potentially hazardous ruts, humps, depressions, or other surface variations;*
2. *drained by grading or storm sewers to prevent water accumulation;*

3. *capable, under dry conditions, of supporting snow removal equipment, aircraft rescue and firefighting equipment, and the occasional passage of aircraft without causing structural damage to the aircraft; and*
4. *free of objects, except for objects that need to be located in the runway safety area because of their function. Objects higher than 3 inches above grade should be constructed on low impact resistant supports (frangible mounted structures) of the lowest practical height with the frangible point no higher than 3 inches. Other objects such as manholes should be constructed at grade. In no case should their height exceed 3 inches.*

The RSA needs to be maintained to meet gradient and compaction standards. It is also noted that the Runway 32 threshold was relocated 175 feet to address non-standard RSA conditions beyond the original runway end. This runway threshold configuration and RSA issue is discussed later in the chapter. A summary of the RSA requirements based on the existing and future B-II standards and current conditions is presented below:

RUNWAY SAFETY AREA (RSA)	
EXISTING CONDITIONS	**FUTURE**
ARC B-II VISUAL (1-MILE APPROACH VISIBILITY MINIMUMS)	**ARC B-II 4000 (≥ 3/4-MILE APPROACH VISIBILITY MINIMUMS)**
150 feet wide and extends 300 feet beyond each departure end of runway.	Same
The RSA meets the dimensional standard, and currently meets gradient and compaction standards. The area is free of built-items except those with locations fixed by function on breakaway mounts. Periodic maintenance and clearing is required.	Based on updated AGIS surveying within the RSA, a reconfiguration to the Runway 32 threshold and RSA may be possible and will be evaluated in the alternatives analysis to compare with the recommended pavement removal and taxiway reconfiguration depicted on 2008 ALP.

RUNWAY OBJECT FREE AREA (OFA)

Runway object free areas are two dimensional surfaces intended to be clear of ground objects that protrude above the runway safety area edge elevation. Obstructions within the object free area may interfere with aircraft flight in the immediate vicinity of the runway. The FAA defines the object free area clearing standard as:

"The object free area clearing standard requires clearing the object free area of above ground objects protruding above the runway safety area edge elevation. Except where precluded by other clearing standards, it is acceptable to place objects that need to be located in the object free area for air navigation or aircraft ground maneuvering purposes and to taxi and hold aircraft in the object free area. Objects non-essential for

air navigation or aircraft ground maneuvering purposes are not to be placed in the object free area. This includes parked airplanes and agricultural operations."

A summary of the OFA requirements based on the existing and future B-II standards and current conditions is presented below:

OBJECT FREE AREA (OFA)	
EXISTING CONDITIONS	**FUTURE**
ARC B-II VISUAL (1-MILE APPROACH VISIBILITY MINIMUMS)	**ARC B-II 4000 (≥ 3/4-MILE APPROACH VISIBILITY MINIMUMS)**
500 feet wide and extends 300 feet beyond each departure end of runway.	Same
The 2008 noted non-standard conditions (berm) within the Runway OFA along the west side of the runway. This and any other non-conforming issues will be addressed in the alternatives analysis. A section of wire fence is located within the ROFA on the west side of the runway, approximately 165 feet from runway centerline at its nearest point (near the Runway 14 end).	Same

OBSTACLE FREE ZONE (OFZ)

The obstacle free zone (OFZ) is a plane of clear airspace extending upward above the runway elevation intended to protect close-in obstructions that may create hazards for aircraft.

<u>The FAA defines the Runway Obstacle Free Zone (ROFZ) as</u>:

"The ROFZ is a defined volume of airspace centered above the runway centerline. The ROFZ is the airspace above a surface whose elevation at any point is the same as the elevation of the nearest point on the runway centerline. The runway OFZ extends 200 feet beyond each end of the runway."

<u>The FAA defines the following clearing standard for the OFZ:</u>

"The obstacle free zone clearing standard precludes taxiing and parked airplanes and object penetrations, except for frangible visual NAVAIDs [navigational aids] *that need to located in the obstacle free zone because of their function."*

The FAA standard ROFZ for Runway 14/32 (400 feet wide extending 200 feet beyond each runway end) is consistent with runway use by large airplanes (weighing 12,500 pounds or more).

RUNWAY OBSTACLE FREE ZONE (ROFZ)	
EXISTING CONDITIONS	**FUTURE**
ARC B-II VISUAL (1-MILE APPROACH VISIBILITY MINIMUMS)	**ARC B-II 4000 (≥ 3/4-MILE APPROACH VISIBILITY MINIMUMS)**
400 feet wide and extends 200 feet beyond each end of runway. This standard is based on runway use by large airplanes.	Same
Aircraft hold lines on Taxiways A1, A2, and A3 are located 125 feet from runway centerline. The hold lines need to be relocated to 200 feet from runway centerline to clear ROFZ. Berm located within the ROFZ along the west side of the runway. A section of wire fence is located within the ROFZ on the west side of the runway, approximately 165 feet from runway centerline at its nearest point (near the Runway 14 end). No other penetrations to the existing ROFZ were observed, during a recent visual inspection other than the runway lights and precision approach path indicator units, which have locations fixed-by-function and meet the FAA frangibility (breakaway) standard. The non-conforming items will be addressed in the alternatives analysis.	Same

TAXIWAY SAFETY AREA

Taxiway safety areas serve a similar function as runway safety areas and use the same design criteria for surface condition (see description of runway safety area provided earlier in this chapter). Safety area standards do not apply to *taxilanes,* which are typically located within hangar developments or on aircraft parking aprons. Taxilanes provide aircraft access within a parking or hangar area. Taxiways provide aircraft access between points on the airfield and serve runways (e.g. parallel taxiways and exit taxiways).

Taxiway safety areas have varying dimensions based on airplane design group. Mulino State Airport's existing taxiways consist of the parallel taxiway, runway exit taxiways, and midfield access taxiway. These taxiways are designed to meet Airplane Design Group II (ADG II) standards, which is consistent with design parameters for Runway 14/32.

The current and future ADG II taxiway safety area standard is 79 feet (39.5 feet from taxiway centerline). The airports taxiways are commonly 40 feet wide, which results in 19.5 feet of taxiway safety area beyond pavement edge. All the taxiways have 10- to 15-foot wide gravel shoulders. Items within the safety area that have locations fixed-by-function (taxiway reflectors, edge lights, signs, etc.) require mounting on frangible (breakaway) mounts. Based on the visual inventory inspection, all existing taxiways appear to meet the surface condition and obstruction clearing standards required for taxiway safety areas.

The ground surface located immediately adjacent to the taxiways as with runway safety areas, periodically requires maintenance or improvement to adequately support the weight of an aircraft or an airport vehicle. Grading and/or soil compaction within taxiway safety areas should be completed as needed, and grass, brush or other debris should be regularly cleared to meet FAA standards. Taxiway pavement edges should be periodically inspected to ensure that grass, dirt, or gravel build-up does not exceed 3 inches.

TAXIWAY SAFETY AREA		
EXISTING CONDITIONS		FUTURE
ADG I	ADG II	ADG I/II
49 feet wide, 24.5 feet from taxiway centerline	79 feet wide, 39.5 feet from taxiway centerline	Same
The TSA needs to be free of built items except those with locations fixed by function on breakaway mounts. The TSA surface needs to meet gradient and compaction standards.		

TAXIWAY/TAXILANE OBJECT FREE AREA

Taxiway and taxilane object free areas (OFA) are intended to provide unobstructed taxi routes (adequate wingtip clearance) for aircraft. The outer edge of the OFA defines the recommended standard distance from taxiway or taxilane centerline to a fixed or moveable object. The FAA clearing standard prohibits service vehicle roads, parked aircraft, and above ground objects (hangars, other built items, etc.), except for objects with locations fixed by function (navigational aids, airfield signs, etc.). The applicable design standard (ADG I or ADG II) is determined by the aircraft with the greatest wingspan or tallest tail height that may be accommodated in aircraft parking areas or hangars served by that taxiway/taxilane.

Taxiways and Taxilanes

As noted in the taxiway safety area section, Mulino State Airport's existing taxiways consist of the parallel taxiway, runway exit taxiways, and the primary access taxiway, located near midfield. These taxiways are designed to meet ADG II standards. The only non-conforming taxiway OFA item identified is the airport's pilot lounge/FBO building, which is located approximately 60 feet from the parallel taxiway centerline, within the required 65.5 feet clearance (ADG II) from centerline.

The airport's existing taxilanes are located within the main apron area and small aircraft hangar areas and accommodate primarily ADG I aircraft. While the hangar taxilanes are designed to meet ADG I standards, the main apron taxilanes do not meet OFA standards (distance from taxilane centerline to parked aircraft). The main apron would require reconfiguration to conform to design standards. The previous master plan did not specifically address the existing apron configuration and did not identify any future apron expansion. Options for reconfiguring the existing apron to meet FAA design standards and potentially expanding the apron will be evaluated in the alternatives analysis.

For hangar taxilanes, the appropriate method for determining taxilane clearance standards is based on the largest aircraft that can be physically accommodated within the hangar, since the type of aircraft located within a particular hangar can change over time. ADG I standards are applied to taxilanes serving small individual hangars or T-hangars with doors less than 50 feet wide and ADG II standards are applied to taxilanes serving larger hangars (door openings 50 feet and larger).

As noted on the landside conformance figure (see Figure 4-2) presented earlier in this chapter, the eastern-most taxilane in the airport's T-hangar area does not meet ADG I OFA standards (distance from taxilane centerline to hangar). This may be addressed by widening the taxilane pavement along its east edge to provide a standard 39.5 feet clearance between the centerline and the hangar front.

As an interim measure, applying a modification to standards would be reasonable to address the issue. The FAA allows a modification to standards for taxilane OFA clearance based on the following formula: 1.2 x airplane wingspan plus 20 feet. Applying this formula to the largest east-facing door opening on the eastern T-hangar is recommended to address the non-conforming taxilane OFA until a permanent reconfiguration can be completed.

It is noted that ADG I dimensional standards are based on aircraft wingspans up to but not including 49 feet. For comparison, the majority of small single-engine aircraft have wingspans less than 40 feet. Examples include the Cessna 150/152 (33.3 feet); Cessna 172, 182 and 206 (36 feet); Beechcraft A36 Bonanza (33.5 feet); Piper PA-28/32 Cherokee (35 feet); Piper PA-18 Super Cub (35.3 feet); and Cirrus SR22 (38.4 feet).

While relocation of existing hangars may not always be considered feasible, all new hangars (and the associated planned taxilanes) should meet the applicable ADG I or ADG II taxilane object free area clearance standard. A modification to FAA standards should be noted for the existing hangars, with the recommended disposition. The FAA alternative taxilane formula may also be used to address the non-conforming apron taxilane clearances as part of an interim reconfiguration, although reconfiguration done as part of apron pavement rehabilitation, reconstruction, or expansion should be designed meet full FAA dimensional standards.

It is also recommended that the airport consider installing signage noting the maximum aircraft wingspan for any taxilane with less than standard wingtip clearance (see sample signage below).

TAXIWAY/TAXILANE OBJECT FREE AREA (OFA)		
EXISTING CONDITIONS		**FUTURE**
ADG I	**ADG II**	**ADG I/II**
Taxiway Object Free Area 89 feet wide (44.5 feet from centerline) Taxilane Object Free Area 79 feet wide (39.5 feet from centerline)	Taxiway Object Free Area 131 feet wide (65.5 feet from centerline) Taxilane Object Free Area 115 feet wide (57.5 feet from centerline)	Same
The main apron and associated taxilanes serving ADG I and II aircraft will need to be reconfigured to meet applicable OFA standards as part of a future project. The main taxilanes that serve the aircraft fueling area and extend around the south and east sides of the main apron are should be designed to meet ADG II standards. The taxilanes located between the rows of small airplane tiedowns should be designed to meet ADG I standards. Any future aircraft aprons should be designed to meet the applicable ADG I or II taxilane OFA standards based on the size of aircraft accommodated. Taxilanes serving new hangar developments should be built to the applicable ADG I or II standards, depending on the size of aircraft accommodated (hangar door widths).		

BUILDING RESTRICTION LINE (BRL)

A BRL identifies the minimum setback required to accommodate a typical building height; such as a T-hangar or large conventional hangar. For most single-runway airports, landside facilities are constructed along one or both sides of the runway. The location of the BRL should ensure that structures do not penetrate the Part 77 primary or transitional surfaces, in addition to any clearances associated with existing or planned parallel taxiways.

The transitional surface starts at the edge of the primary surface and extends outward and upward at a 7:1 slope; that is there is a one foot in rise for every 7 feet of horizontal distance from the primary surface. The equation for determining a Building Restriction Line (BRL) based on Part 77 is:

> ***BRL****= (maximum height of planned structures multiplied by 7 to account for the transitional surface slope) plus ½ Primary Surface width.*

The 2008 Airspace Plan depicts a 500-foot wide primary surface, which is inconsistent with the future approach capabilities planned for Runway 32, as depicted on both the Airport Layout Plan and Airspace Plan drawings. Note 2 on the Airspace Plan indicates "Part 77 Surfaces Based on Ultimate Airspace Surfaces." For planning purposes, the approach capabilities attributed to the future Runway 32 RPZ represents the "ultimate" airspace configuration for Runway 14/32.

Based a 1,000-foot wide primary surface and a typical 18-foot hangar roof elevation (height above runway), the BRL would need to be located at least 626 feet from runway centerline to avoid a transitional surface penetration. The distance required to clear a 35-foot structure is 745 feet from runway centerline. It is noted that the 626- and 745-foot BRL locations are also compatible the setback required for the existing east parallel taxiway.

The existing pilot lounge/FBO building, the FBO maintenance hangar, a portion of the airport access road, and the western ends of two existing T-hangar building pads fall inside the 626-foot BRL, which indicates primary or transitional surface penetrations. Roof-mounted red obstruction lights should be installed for all primary or transitional surface penetrations. Setbacks for hangars above 18 feet are increased, and should be evaluated on an individual basis.

At Mulino, the parallel taxiway is located 400 feet east of Runway 14/32 (centerline to centerline). Based solely on the ADG II taxiway OFA standard, buildings should not be any closer than 65.5 feet from the taxiway centerline, which would be 465.5 feet from the centerline of Runway 14/32. However, as noted above, the separation required to clear FAR Part 77 airspace significantly exceeds the required parallel taxiway clearances. Observing a BRL that fully protects Runway 14/32 airspace also provides adequate parallel taxiway obstruction clearance. An updated evaluation of building obstructions identified on the 2008 Airspace Plan is required based on the corrected BRL placement.

AIRCRAFT PARKING LINE

The aircraft parking line (APL) represents the minimum setback required for locating aircraft parking positions in order to clear the adjacent runway-taxiway system. Like the BRL described above, the location of the APL is generally determined by the more demanding of Part 77 clearance and taxiway obstruction clearance. The APL is determined by the primary surface width, the design group, and visibility minimums.

A tail height of 10 feet and lower is typical of most single engine piston and small turbine aircraft and was used for calculating the APL. Based on a 1,000-foot wide primary surface for Runway 14/32, the APL would be located 570 feet from the runway centerline to clear a 10-foot aircraft tail height. The existing main apron tiedown area is approximately 690 feet from the runway centerline and exceeds the distance needed for Runway 14/32 and the east parallel taxiway clearances.

RUNWAY PROTECTION ZONES (RPZ)

The FAA provides the following definition for runway protection zones:

"The RPZ's [runway protection zone] *function is to enhance the protection of people and property on the ground. This is best achieved through airport owner control over RPZs. Control is preferably exercised through the acquisition of sufficient property interest in the RPZ and includes clearing RPZ areas (and maintaining them clear) of incompatible objects and activities. The RPZ is trapezoidal in shape and centered about the extended runway centerline. The RPZ's begins 200 feet beyond the end of the area useable for takeoff or landing." The central portion and controlled activity area are the two components of the RPZ.*

The central portion of the RPZ extends from the beginning to the end of the RPZ, centered on the [extended] *runway centerline and is equal to the width of the runway OFA.*

Runway protection zones (RPZ) with buildings, roadways, or other items located within do not fully comply with FAA standards. By definition, the FAA recommends that airport sponsors control the RPZs through ownership whenever possible, although avigation easements[2] are commonly used when outright purchase is not feasible.

[2] An avigation easement (*avigation = aviation + navigation*) involves the purchase of airspace rights over a particular defined ground area. The easement normally limits the maximum height of any natural or built items (to coincide with the runway approach surface slope) and may include provisions restricting the type of activities permitted. Compensation is negotiated between the airport owner and property owner.

<table>
<tr><th colspan="2">RUNWAY PROTECTION ZONE (RPZ)</th></tr>
<tr><th>EXISTING CONDITIONS</th><th>FUTURE</th></tr>
<tr><th>ARC B-II
(VISUAL APPROACH VISIBILITY MINIMUMS)</th><th>RWY 14: ARC B-II
(≥ 1-MILE APPROACH VISIBILITY MINIMUMS)
RWY 32: ARC B-II 4000 (RWY 32 ONLY)
(≥ 3/4-MILE APPROACH VISIBILITY MINIMUMS)</th></tr>
<tr><td><u>Runway 14 & 32</u>
Length - 1,000 feet
Inner Width - 500 feet
Outer Width - 700 feet</td><td><u>Runway 14</u>
Length - 1,000 feet
Inner Width - 500 feet
Outer Width - 700 feet

<u>Runway 32</u>
Length - 1,700 feet
Inner Width - 1,000 feet
Outer Width - 1,510 feet</td></tr>
<tr><td>The existing Runway 14 and 32 RPZ dimensions are consistent with approach visibility minimums not lower than 1-mile.

A portion of Mulino Road is located within the Runway 14 RPZ. Based on current FAA policy, no changes to the current road and RPZ are anticipated.
Long term option for relocating the roadway outside the RPZ may be considered in order to address current FAA policy on incompatible land uses within RPZs.

A portion of the RPZ for both Runway 14 and Runway 32 is off airport property. The 2008 ALP indicates that avigation easements are in place (verify). FAA recommends that airports acquire property within RPZs whenever possible.</td><td>Same</td></tr>
</table>

RUNWAY - PARALLEL TAXIWAY SEPARATION

Runway 14/32 has a full-length east parallel taxiway (Taxiway A) with a runway separation of 400 feet from centerline to centerline. The separation exceeds the 240-foot B-II standard for both the existing and future approach visibility minimums. When runway separation exceeds FAA standards, maintaining the existing configuration is generally more cost effective than relocating the taxiway, replacing its edge lighting system and signage, and removing the original taxiway pavement. However, this option could be considered at any time in the future without impacting adjacent landside facilities. A summary of B-II parallel taxiway separation standards based on the existing and future approach visibility minimums is presented below.

RUNWAY/TAXIWAY SEPARATION	
EXISTING CONDITIONS	**FUTURE**
ARC B-II VISUAL (≥1-MILE APPROACH VISIBILITY MINIMUMS)	**ARC B-II 4000 (≥ 3/4-MILE APPROACH VISIBILITY MINIMUMS)**
Runway-Parallel Taxiway separation is 400 feet, which exceeds the 240-foot separation standard.	Same

FAR Part 77 Surfaces

Federal Air Regulation (FAR) Part 77.25, Objects Affecting Navigable Airspace, defines airport imaginary surfaces, which are established to protect the airspace immediately surrounding airports, associated runways and designated helicopter landing areas. The airspace and ground areas surrounding a runway should be free of obstructions (i.e., structures, parked aircraft, trees, etc.) to the greatest extent possible to provide a safe operating environment for aircraft. Consistent with FAA airspace planning guidance, the "ultimate" airspace surfaces are to be depicted on the airspace plan drawing contained in an FAA-approved airport layout plan (ALP) drawing set. This also ensures that the planned airspace is recognized and adequately protected by local land use jurisdictions through the adoption of airport master plans and ALP drawings.

All new construction on or in the immediate vicinity of the airport should routinely involve FAA review for airspace compatibility. FAA Form 7460-1, Notice of Proposed Construction or Alternation, should be prepared and submitted to FAA at least 60 to 90 days prior to planned construction. The 7460 form is also reviewed by ODA for any projects located on the airport and for any projects located off airport property. The 7460 reviews determine if the proposed action would create any obstructions to FAR Part 77 surfaces. In general, the FAA will object to proposals that result in a significant penetration to any FAR Part 77 surfaces on the basis of safety.

The 2008 Airspace Plan depicts the ultimate airspace surfaces planned for Runway 14/32. The airspace surfaces are consistent with an "other than utility" runway with a visual approach to Runway 14 and a non-precision instrument approach for Runway 32. It is noted however, that the existing and future "FAR Part 77 Designation" listed in the ALP drawing data blocks is "Utility," which is not consistent with airspace plan itself. The continued protection of the airspace surfaces depicted on Sheet 2 of the 2008 Portland-Mulino ALP drawing set is recommended, as it is most consistent with the overall planning criteria defined for Runway 14/32.

The 2008 Airspace Plan lists 25 items in the obstruction table, although 9 of these items have no airspace penetration and are listed for "reference only." These include 2 PAPIs in the primary surface; 1 light on a windsock in the transitional surface; 2 trees; and 4 road locations in the approach or transitional surfaces. In most installations, PAPIs protrude through the runway primary surface, but are permitted based on their function/location and frangible design. The remaining 16 items consist of trees or tree groups in the runway horizontal, transitional, and/or approach surface and 1 windsock penetrating he primary surface. The recommended dispositions are to “top or remove” about half the trees and “light” the wind sock. The recommended disposition for trees located on forested hillsides north of the runway is “none.” The previously noted obstructions will be reevaluated through the AGIS survey and the change to the primary surface width and location of the transitional surface slopes.

Table 4-7 summarizes the airspace surface dimensions for Mulino State Airport based on the ultimate runway category and approach/visibility criteria depicted on the 2008 Airspace Plan.

TABLE 4-7: FAR PART 77 AIRSPACE SURFACES

AIRSPACE ITEM	RUNWAY 14/32 OTHER THAN UTILITY NON-PRECISION INSTRUMENT RUNWAY APPROACH VISIBILITY MINIMUMS AS LOW AS 3/4-MILE
Width/Length of Primary Surface	1,000 feet*/200 feet beyond both ends of runway ** Width based on approach visibility minimums as low as ¾-mile*
Transitional Surface	7:1 Slope to 150 feet above runway
Horizontal Surface Elevation/Radius	150 feet above airport elevation/10,000 feet
Conical Surface	20:1 for 4,000 feet
Approach Surface Length	10,000 feet (Rwy 32); 5,000 feet (Rwy 14)
Approach Surface Slope	20:1 (Rwy 14 – Visual) 34:1 (Rwy 32 – NPI Vis. ≥ ¾ mile)
Approach Surface Width at End	1,500 feet (Rwy 14 – Visual) 4,000 feet (Rwy 32 – NPI Vis. ≥ ¾ mile)

Figures 4-4 and 4-5 on the following pages illustrate plan and isometric views of generic Part 77 surfaces.

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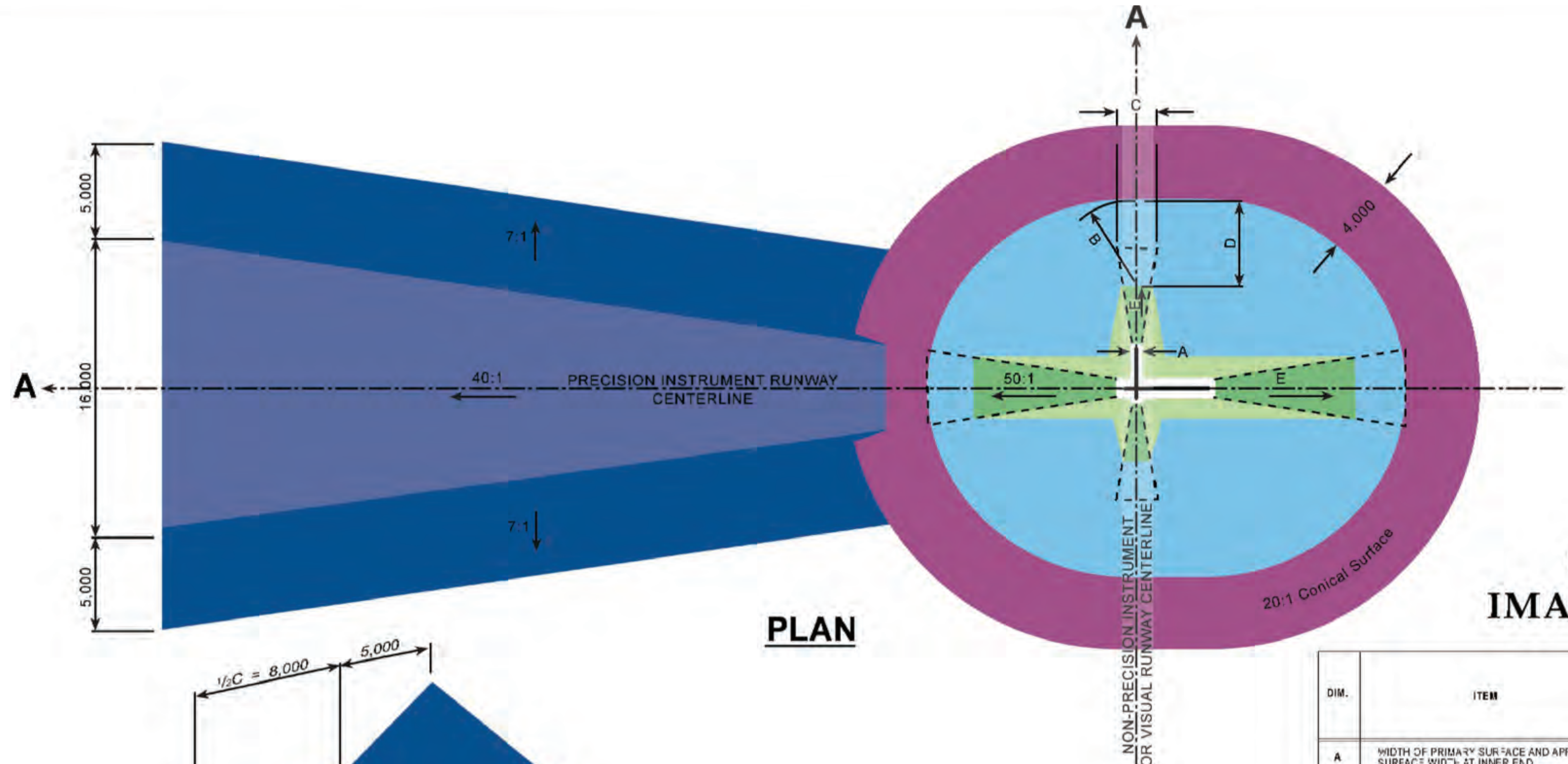
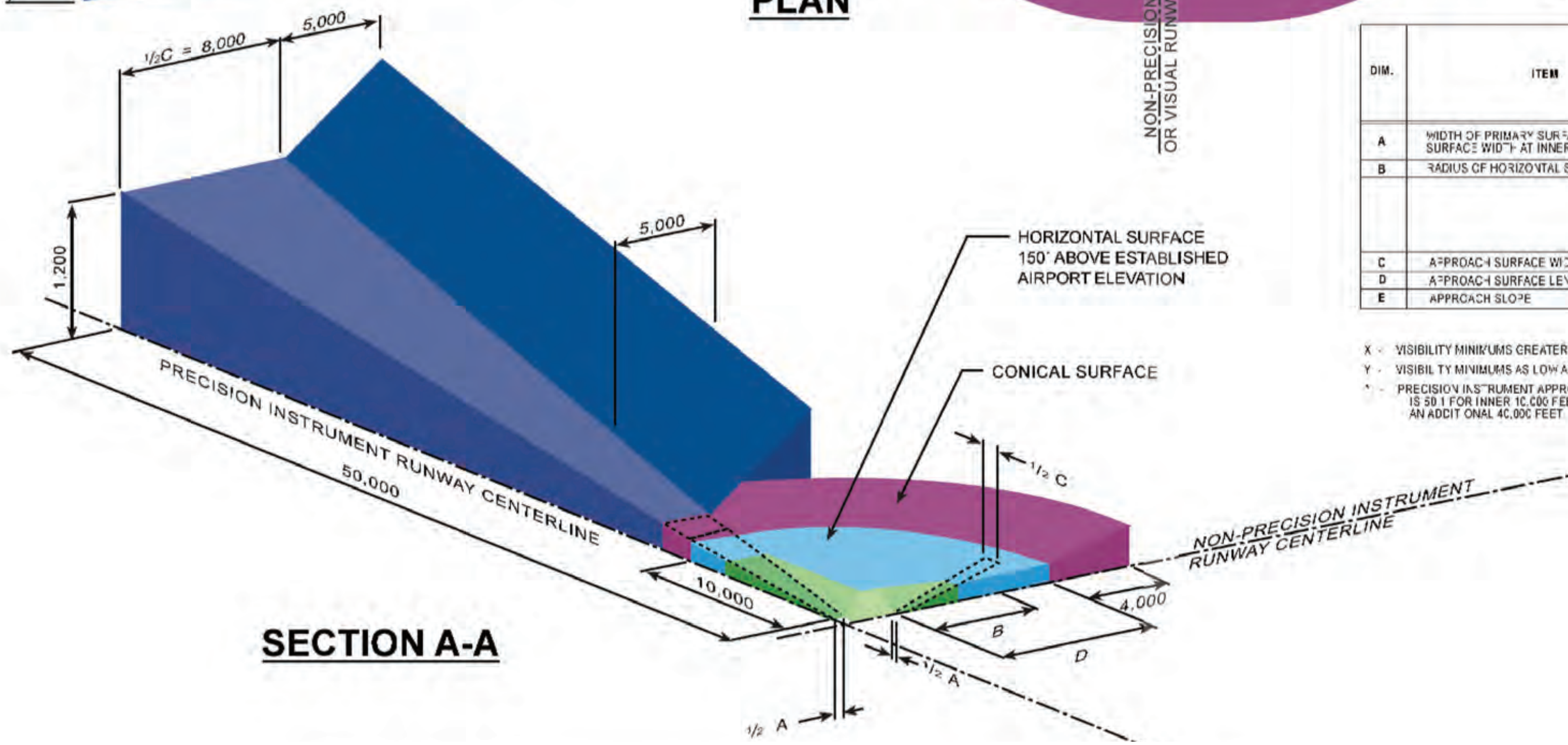


SURFACE SLOPE KEY

- HORIZONTAL SURFACE
- 20:1
- 7:1
- 7:1
- VARIES (SEE "E" VALUE IN TABLE BELOW)
- 40:1 (PRECISION INSTRUMENT RUNWAY ONLY)



CIVIL AIRPORT IMAGINARY SURFACES

DIM.	ITEM	DIMENSIONAL STANDARDS (FEET)					
		VISUAL RUNWAY		NON-PRECISION INSTRUMENT RUNWAY			PRECISION INSTRUMENT RUNWAY
		UTILITY	LARGER THAN UTILITY	UTILITY	LARGER THAN UTILITY		
					X	Y	
A	WIDTH OF PRIMARY SURFACE AND APPROACH SURFACE WIDTH AT INNER END	250	500	500	500	1,000	1 000
B	RADIUS OF HORIZONTAL SURFACE	5,000	5 000	5,000	10,000	10,000	10,000
		VISUAL APPROACH		NON-PRECISION INSTRUMENT APPROACH			PRECISION INSTRUMENT APPROACH
		UTILITY	LARGER THAN UTILITY	UTILITY	LARGER THAN UTILITY		
					X	Y	
C	APPROACH SURFACE WIDTH AT END	1,250	1,500	2,000	3 500	4 000	16,000
D	APPROACH SURFACE LENGTH	5 000	5,000	5,000	10,000	10,000	*
E	APPROACH SLOPE	20:1	20:1	20:1	34:1	34:1	*

X - VISIBILITY MINIMUMS GREATER THAN 3/4 MILE
Y - VISIBILITY MINIMUMS AS LOW AS 3/4 MILE
* - PRECISION INSTRUMENT APPROACH SLOPE IS 50:1 FOR INNER 10,000 FEET AND 40:1 FOR AN ADDITIONAL 40,000 FEET

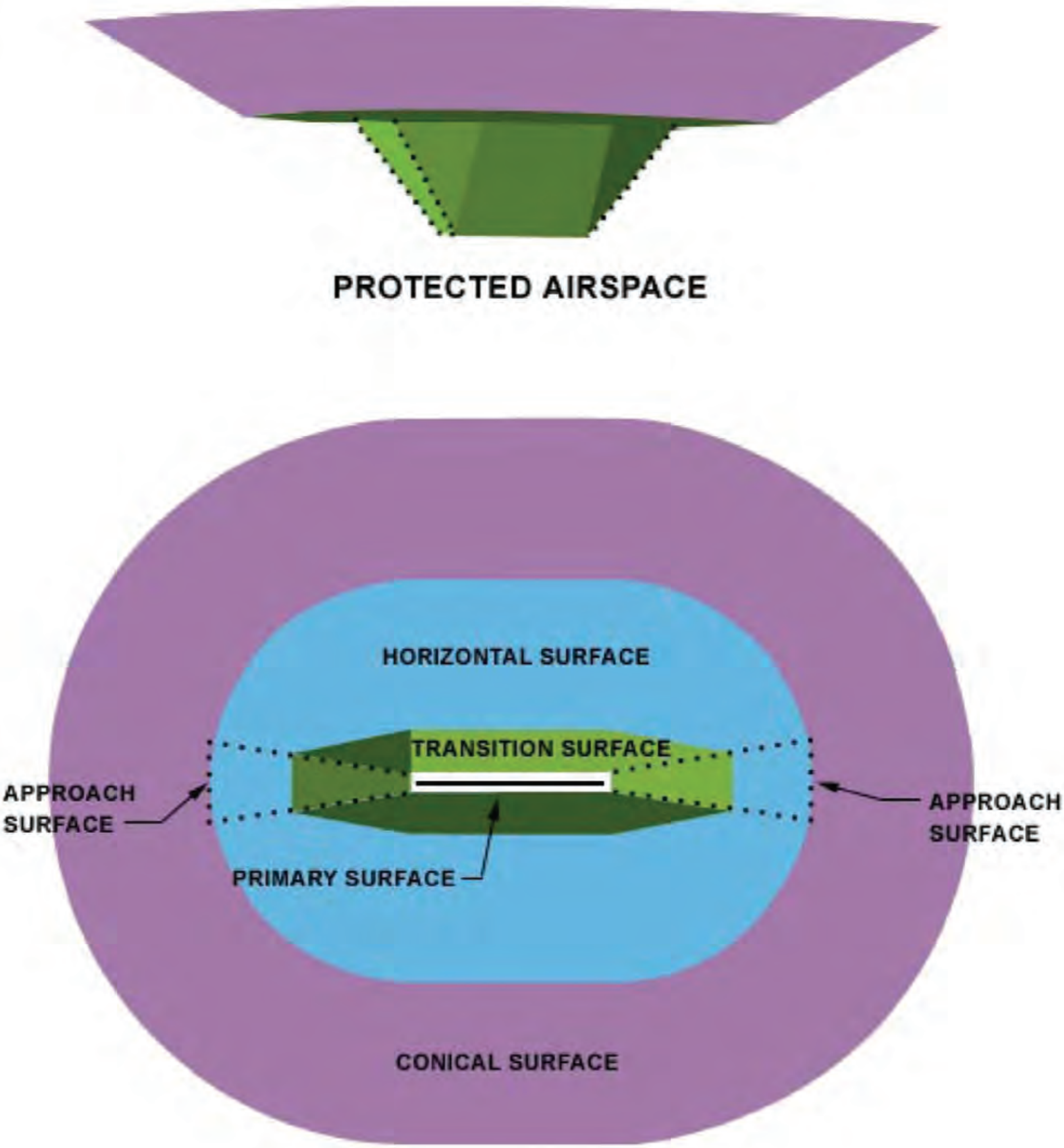


IMAGE SOURCE: WASHINGTON STATE DEPARTMENT OF TRANSPORTATION (AVIATION DIVISION).

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PRIMARY SURFACE

The primary surface is a rectangular, flat plane of airspace longitudinally centered on the runway, with the same elevation as the nearest point on the runway centerline. The primary surface for paved runway extends 200 feet beyond each runway end, where it connects to the inner portion of the runway approach surfaces. The primary surface should be free of any penetrations, except items with locations fixed by function.

The Runway 14/32 primary surface width is 1,000 feet, consistent with future "Other than Utility" non-precision instrument (NPI) designation and approach visibility minimums as low as ¾-mile, as noted on the 2008 Airport Layout Plan and Airspace Plan drawings.

As noted earlier, the 2008 Airspace Plan drawing did not depict the correct primary surface width for the stated approach visibility capabilities. As a result, close-in objects located along the sides of the runway will require obstruction reevaluation based on the increased primary surface width and corresponding outward lateral shift of the 7:1 transitional surface slopes.

A windsock was identified on the 2008 airspace plan as a primary surface obstruction surface with a recommendation to install an obstruction light. The 2008 ALP noted a berm located within the 500-foot wide runway object free area (OFA) as a non-standard item. Although this item was not identified as a Part 77 obstruction, any object that exceeds the vertical limits of the runway OFA, also is likely to penetrate the runway primary surface and should be mitigated.

TRANSITIONAL SURFACE

The transitional surface is located at the outer edge of the primary surface and is represented by a plane rising perpendicularly at a slope of 7:1 to an elevation 150 feet above the airport elevation. The transitional surface connects to the horizontal surface and the sides of the runway approach surfaces at common elevations. For Runway 14/32, the transitional surface begins 500 feet from the runway centerline, in both directions.

The 2008 airspace plan identified 6 tree obstructions in the transitional surface. The proposed dispositions for these trees are to remove or topped. Close-in objects located along the sides of the runway will require obstruction reevaluation based on the increased primary surface width and corresponding outward lateral shift of the 7:1 transitional surface slopes.

HORIZONTAL SURFACE

The horizontal surface is a flat plane of airspace located 150 feet above the runway elevation. The horizontal surface for Mulino State Airport is constructed with two 10,000-foot radii that extend beyond each end of Runway 14/32 (ends of primary surface), consistent with future "Other than Utility" non-precision instrument (NPI) runway designation recommended in the 2008 Airport Master Plan. The outer edges of the radii for each runway are connected with tangent lines to form an oval, which represents the horizontal surface.

The 2008 airspace plan identified 7 tree group obstructions in the horizontal surface with estimated penetrations ranging from 130 to 260 feet. These obstructions are located off airport property on rising terrain east and north of the runway. No action was recommended for these trees.

CONICAL SURFACE

The conical surface is an outer band of airspace that encircles the horizontal surface. The conical surface begins at the outer edge of the horizontal surface and extends outward 4,000 feet at a slope of 20:1. The conical surface has the same width and slope for all runways.

No conical surface obstructions are listed on the 2008 airspace plan, however areas of terrain penetration are depicted through large areas of the conical surface east of the extended runway centerline.

Terminal Instrument Procedures (TERPS) Surfaces

In addition to the FAR Part 77 airspace surfaces noted above, instrument departure surfaces should be protected for both runway ends based on the planned addition of instrument capabilities. FAA Order 8260.3B Terminal Instrument Procedures (TERPS), defines the airspace surfaces used in designing instrument approach and departure procedures. For airport planning purposes, protecting the TERPS instrument departure surface is recommended for runways with existing or planned instrument capabilities. The TERPS departure surface extends 10,200 feet from each end of the runway at a slope of 40:1, with an inner width of 1,000 feet and an outer width of 6,466 feet. If a clear departure surface cannot be achieved, instrument departures for that runway end may not be authorized.

Airside Requirements

Airside facilities are those directly related to the arrival, departure, and movement of aircraft and include:

- Runways
- Taxiways
- Airfield Instrumentation and Lighting

Runways

The adequacy of the existing runway system at Mulino State Airport was analyzed relative to runway orientation, airfield capacity, runway length, and pavement strength.

RUNWAY THRESHOLD

Runway 14/32 has 3,600 feet of pavement, with a 175-foot relocated threshold on the south end, resulting in 3,425 feet of useable runway length (as published in FAA Airport/Facility Directory).

As noted on the 2008 Airport Layout Plan (Note 3), the Runway 32 threshold was relocated in 2003 to meet FAA runway safety area standards:

> *"The Molalla River has eroded portions of the Runway 32 Runway Safety Area, which required a 175' threshold relocation. If more erosion of the safety area occurs, it may be necessary to extend Runway 14 commensurate to the loss of runway length."*

The 2008 ALP depicts future removal of the 175 feet of former runway pavement south of the relocated threshold and the adjacent taxiway sections and a new connector/exit taxiway and aircraft hold area adjacent to the parallel taxiway. These recommendations were proposed in accordance with guidance provided in FAA Engineering Brief 75: Incorporation of Runway Incursion Prevention into Taxiway and Apron Design.

A review of the existing terrain south of Runway 14/32 and the existing relocated threshold indicates that options may exist to optimize threshold location and increase useable runway. These options will be further assessed in the Alternatives Chapter.

2019 Update: The original (2016) recommendation for the future runway configuration involved eliminating the existing aligned taxiway at the end of Runway 32, and converting the taxiway to runway. A displaced threshold was recommended for Runway 32 to mitigate runway safety area limits beyond the runway end, and declared distances were recommended to reflect the reconfigured runway for specific runway operations. The recommended configuration eliminated the need to remove and replace existing taxiway pavement sections, including the aligned taxiway, a section of the parallel taxiway, and the south connecting taxiway. After an extended period of review, the FAA Seattle ADO indicated that they would not support use of displaced threshold and declared distances at Mulino. The FAA indicated that a north runway extension should be considered to provide the desired length of 3,600 feet. The FAA acknowledged the additional cost involved with the runway and taxiway modifications, but determined that it was not a significant consideration in their support of the reconfiguration. A meeting was held in Mulino on January 10, 2019 to present the updated preferred alternative that reflected FAA preferences. The draft ALP drawing set, originally presented to FAA in 2017, was updated and re-submitted to FAA for review in early 2019, then went through additional coordination, eventually leading to the formal airspace review by FAA.

RUNWAY ORIENTATION & WIND COVERAGE

Runway orientation for aircraft operations is primarily a function of wind velocity and direction. A runway's wind coverage is quantified by summing an extended period recorded observations of wind speed and direction. For planning purposes, the maximum direct crosswind (90 degrees to the direction of flight) for small aircraft (Design Group A-I and B-I) is 12 miles per hour (10.5 knots); for larger general aviation aircraft (Design Group A-II and B-II), a 15-mile per hour (13 knot) direct crosswind is calculated.

Aircraft can operate safely in progressively higher crosswinds as the angle of the wind decreases and the wind direction aligns more closely with the direction of flight. In addition, increasingly larger aircraft (Design Groups D and above) can safely operate during higher crosswinds. Ideally, an aircraft will take off and land directly into the wind or with a light crosswind. The FAA recommends that primary runways accommodate at least 95 percent of local wind conditions; when this level of coverage is not met, the FAA recommends development of a secondary (crosswind) runway.

The wind rose depicted on the 2008 Airport Layout Plan Report indicates Runway 14/32 accommodates approximately 96.3 percent of local wind conditions for small aircraft (12 Miles Per Hour "MPH") and 98.4 percent at 15 MPH. The 2008 wind rose data was taken between 1930 and 1960 from several nearby locations including Portland, Salem, and two urban areas near Mulino.

As noted in Chapter Two (Inventory), the 2008 Airport Master Plan indicated that local pilots reported south-southwest crosswinds, particularly during fall and spring months. The master plan recommended a wind study to evaluate the crosswind coverage provided by Runway 14/32 and suggested that the 100-foot width of the runway provides a safety benefit for small aircraft operating during crosswind conditions.

It is recommended that a wind study be conducted prior to the next runway rehabilitation or reconstruction project to evaluate the potential need for a crosswind runway and evaluating runway width.

RUNWAY LENGTH

Runway length requirements are based on airport elevation, mean maximum temperature of the hottest month, runway gradient, and critical aircraft expected to use the runway. This methodology captures the most common aircraft within a particular category.

The 2008 Airport Master Plan recommended runway length planning at Mulino to be based on accommodating the small airplane fleet (aircraft weighing less than 12,500 pounds). This recommendation was consistent with the future design aircraft (Beechcraft King Air 200, multi-engine turboprop). Based on its updated aviation activity forecasts, the 2008 Airport Master Plan did not maintain the 1993 master plan recommendation to relocate Mulino Road and extend the runway 1,600 feet to the north. In addition, the recommended master plan concept included a reduced runway length of 3,425 feet, which reflected a 175-foot relocation of the Runway 32 threshold to address non-standard runway safety area.

Despite the planning assumptions based on the needs of small aircraft, the FAR Part 77 Airspace Plan drawing (sheet 2 of 4) from the 2008 Airport Master Plan depicts airspace surfaces consistent with a "larger than utility" runway designation. The master plan recognized that several components of the existing airfield (runway width, runway-parallel taxiway separation, etc.) were consistent with the design requirements of larger aircraft and protecting airspace for this potential was a reasonable planning approach. The result was a hybrid of small and large aircraft planning criteria that retained most of the facility design and airspace standards consistent with large airplane use. A key exception is runway length planning, which was based on accommodating the small airplane fleet and also reflected the practical limits of the existing site. Maintaining this approach is recommended for the airport master plan update.

FAA Advisory Circular (AC) 150/5325-4B, Runway Length Requirements for Airport Design provides the guidelines for determining runway length requirements. "Chapter 2. Runway Lengths for Small Airplanes with Maximum Certificated Takeoff Weight of 12,500 Pounds (5,670 KG) or Less," of this advisory circular provides the specific guidance used to determine runway lengths at Mulino State Airport. **Table 4-8** presents the runway lengths for the different segments of the small airplane fleet derived from AC 150/5325-4B.

The future design aircraft for Mulino State Airport identified in the updated aviation activity forecasts is the Beechcraft King Air 250, a multi-engine turbine aircraft with a maximum gross takeoff weight of 12,500 pounds. This aircraft is slightly larger, but similar to other King Air models (E90, A100) that are cited in AC as being representative of "Small Airplanes Having 10 or More Passenger Seats." The FAA defines small aircraft as having a maximum certificated takeoff weight of 12,500 pounds or less.

TABLE 4-8: FAA RECOMMENDED RUNWAY LENGTHS FOR PLANNING

Runway Length Parameters for Mulino State Airport • Airport Elevation: 260 feet MSL • Mean Max Temperature in Hottest Month: 80° F • Maximum Difference in Runway Centerline Elevation: 12 Feet • Wet Runway • Existing Runway Length: 3,425’	
Small Airplanes <12,500 lbs. with less than 10 seats	
75 percent of these airplanes	2,480 feet
95 percent of these airplanes	3,050 feet
100 percent of these airplanes	3,600 feet
Small airplanes with 10 or more seats	4,050 feet
Source: AC 150/5325-4B Runway Length Requirements for Airport Design	

The original length of Runway 14/32 (3,600 feet) is capable of accommodating 100 percent of the small airplane fleet (10 or fewer seats), which corresponds to the majority of forecast activity at Mulino State Airport. The current runway length of 3,425 feet will accommodate approximately 98 percent of the small airplane fleet under the same conditions. At a length of 3,600 feet or 3,425 feet, Runway 14/32 is 450 to 625 feet shorter than the length identified to accommodate small airplanes with 10 or more seats at maximum gross takeoff weight.

At either 3,425 or 3,600 feet, Runway 14/32 is capable of accommodating large and small multi-engine aircraft with varying operational limits (payload or fuel) on warmer days during the summer months, particularly when calculating accelerate-stop distance requirements for takeoff.

The runway length requirements for a variety of business aircraft are summarized in **Table 4-9** for comparison to the output from the FAA model. The information presented in Table 4-9 suggests that a variety of business aircraft can operate on the existing 3,425-foot runway, although some reduction in operating weight may be required, depending on weather conditions. The potential reconfiguration of the Runway 32 threshold discussed in this chapter may restore the original 3,600-foot runway length for some flight operations.

TABLE 4-9: TYPICAL BUSINESS AIRCRAFT RUNWAY REQUIREMENTS

AIRCRAFT	PASSENGERS (TYPICAL CONFIGURATION)	MAXIMUM TAKEOFF WEIGHT	RUNWAY LENGTH REQUIRED FOR TAKEOFF[1]	RUNWAY LENGTH REQUIRED FOR LANDING[2]
Beech Baron 55	6	5,071	2,154	2,148
King Air 250	6-8	12,500	2,111(a)	2,845(a)
Beechcraft 99	15	11,300	2,480	1,810
Citation 510-Mustang	6	8,645	3,110	2,390
Cessna Citation CJ1+	4-6	10,700	3,530	2,660
Cessna Citation CJ2+	6-7	12,500	3,590	3,060
Cessna Citation CJ3	6-7	13,870	3,610	3,140
Cessna Citation CJ4	6-7	16,950	3,440	2,740
Cessna Citation Excel	7-8	20,000	3,750	3,260

1. FAR Part 25 or 23 Balanced Field Length (Distance to 35 Feet Above the Runway); Sea Level, 77 degrees F; Zero Wind, Dry Level Runway, 15 degrees flaps, except otherwise noted.
2. Distance from 50 Feet Above the Runway; Flaps Land, Zero Wind.

(a) Standard day at sea level, zero wind, hard surfaced, dry runway, maximum weight

The FAA "substantial use threshold" is 500 annual itinerant takeoffs and landings for the design aircraft or family of design aircraft. To pursue a runway extension to accommodate larger aircraft, such as the variety of ADG II multi-engine turbine aircraft, ODA would need to document sufficient activity (either aircraft currently using the airport that are regularly constrained by current runway length or new aircraft unable to operate at the airport due to inadequate runway length) to meet the FAA substantial use threshold.

RUNWAY WIDTH

Runway 14/32 is 100 feet wide, which exceeds the 75-foot minimum width dimensional standard for an ARC B-II runway with approach visibility minimums not lower than ¾ - mile (future standard). Options for reducing runway width to the ADG II standard 75 feet should be evaluated prior to the next runway rehabilitation or reconstruction project to determine overall cost and benefits. Narrowing the runway will require relocation/replacement of existing lighting systems and modification of drainage system, which is considered in the cost-benefit calculation.

As noted earlier, a study of airport wind conditions is recommended to evaluate the adequacy of existing wind coverage on Runway 14/32 and the potential need to address crosswind conditions. Maintaining the current width of Runway 14/32 was identified in the 2008 Airport Master Plan as a potential option for addressing crosswind conditions.

Airfield Pavement

The current airfield pavement strength rating is 12,500 pounds for aircraft equipped with a single-wheel (SW) landing gear. Ideally, airfield pavements designed to accommodate all aircraft operating at an airport should have the same weight bearing capacity as the primary runway. Pavements accommodating small aircraft are typically designed for 12,500-pound aircraft weights.

For long term planning, increasing pavement strength on the runway, parallel taxiway and aprons to accommodate ARC B-II aircraft weighing more than 12,500 pounds may be considered. Future changes in pavement strength would be addressed in project design based on aircraft fleet mix. A pavement rating of 20,000 to 30,000 pounds SW is common for runways used by larger turboprops and jets included in ADG II. This would typically be achieved through an asphalt overlay to increase the thickness of the surface course, unless the underlying base/subbase courses also required upgrade, which would require reconstruction and repaving.

The airport should also conduct ongoing maintenance to maximize the longevity of the airfield pavements including periodic crack filling and fog/slurry seals.

The pavement conditions over the past three inspections were outlined for each of the pavement sections in Chapter Two. **Table 4-10** summarizes the 2015 pavement condition and the predicted condition for the airfield through 2025. The future pavement ratings are used to identify and prioritize critical maintenance needs as part of the overall airfield capital improvement program. The pavement ratings indicate that there are no areas of pending critical failure and that normal pavement maintenance and rehabilitation is anticipated during the current twenty year planning period.

TABLE 4-10: CURRENT/FORECAST PAVEMENT CONDITION INDICES

PAVEMENT SECTION	2015 PCI [1]	2020 PCI [1]	2025 PCI [1]
Runway 14/32	86	78	73
Taxiway A (north section)	82/88	76/81	72/75
Taxiway A (south section)	79/89	74/81	71/75
Taxiway A1 (north exit)	81/92	75/84	71/77
Taxiway A2 (mid-field exit)	83/87	77/80	72/74
Access Taxiway (between Taxiway A and Main Terminal Apron)	90/95	82/85	76/78
Taxiway A3 (south exit)	81/93/91	75/84/83	71/77/76
Hangar Access Taxilane (between Main Terminal Apron and T-Hangars)	82	76	72
T-Hangar Taxilanes (existing T-Hangars)	83/81/82/77	77/75/76/73	72/71/72/70
Hangar Taxilanes (former hangars)	77/75/76	73/71/72	70/70/70
Main Tiedown Apron	88	81	77
Runway 14 Holding Apron	98	87	80
Runway 32 Holding Apron	100	88	81

1. The Pavement Condition Index (PCI) scale ranges from 0 to 100, with seven general condition categories ranging from "failed" to "good." For additional details, see *Oregon Aviation System Plan Pavement Evaluation/Maintenance Management Program* (2015) for Mulino State Airport.

2012 PCI Rating Categories
85-100 = **Good** (previously "Excellent")
70-85 = **Satisfactory** (previously "Very Good")
55-70 = **Fair** (previously "Good")
40-55 = **Poor** (previously "Fair")
25-40 = **Very Poor** (previously "Poor")
10-25 = **Serious** (previously "Very Poor")
0-10 = **Failed** (previously "Failed")

Taxiways

Taxiways are used to optimize runway use and to facilitate safe and efficient aircraft movement between runways and adjacent landside facilities. The existing taxiway system at Mulino State Airport provides efficient access within the immediate runway environment and a single access route between the runway-parallel taxiway and adjacent landside facilities. The 2008 Airport Layout Plan recommended the addition of a second access taxiway between the parallel taxiway and adjacent landside facilities, near the north hangar area, to improve access and traffic flow.

PARALLEL TAXIWAY

Taxiway A is located on the west side of Runway 14/32 and has three 90-degree exit taxiways (A1, A2, and A3) connecting it to the runway. Taxiway A is 40 feet wide, the runway end exit taxiways (A1 and A3) are 50 feet wide, and the mid-field exit taxiway (A2) is 40 feet wide. The parallel taxiway and runway exit taxiways all exceed the ADG II width standard of 35 feet[3]. The parallel taxiway and runway centerline-to-centerline separation is 400 feet, which exceeds the ADG II standard of 240-foot separation.

TAXILANES

The taxilane linking Taxiway A and the main apron is 40 feet wide while the taxilane from the main apron to the north T-hangar area is 35 feet wide. There are seven hangar taxilanes with varying widths (22 to 40 feet wide). While there are no taxilane width requirements, taxilane OFA requirements do apply. The Design Group I taxilane OFA standard is 79 feet wide, 39.5 feet from centerline. The Design Group II taxilane OFA standard is 115 feet wide, 57.5 feet from centerline.

The taxilanes located within the main aircraft apron should be configured to provide the standard OFA clearances for the specific aircraft types (ADG I or ADG II). Small airplane tiedown rows and adjacent taxilanes are typically designed to accommodate ADG I aircraft; parking positions for larger business class aircraft should be designed based on ADG II standards. A detailed description of the existing apron configuration is presented later in the chapter, under Landside Facilities.

Airfield Instrumentation, Lighting, and Marking

NAVIGATIONAL AIDS

There are no navigational aids (NAVAID) at Mulino State Airport. The nearest NAVAID are the Newberg Very High Frequency Omnidirectional Range (VOR) located approximately 18 NM northwest of Mulino, and the localizer at Aurora State Airport (8 NM west-northwest).

The 2008 Airport Master Plan recommended the addition of global positioning systems (GPS) instrument approach capabilities for Runway 14/32. It was noted that during its tenure as the airport sponsor, the Port of Portland had undertaken efforts to protect the airspace and clear obstructions to accommodate future instrument capabilities.

The addition of satellite-based instrument procedures is recommended for Mulino State Airport. The FAA is currently developing procedures using GPS and NextGen, which represent the current evolution of

[3] Note: FAA typically only funds the taxiway width required to meet standards (ADG II is 35 feet). Additional width may be funded through other sources.

satellite-based systems and a departure from the ground-based system of air traffic control. No onsite equipment is required to support the GPS-based procedures currently being developed at most general aviation airport. The addition of an approach lighting system (ALS) is required to support approaches with reduced visibility minimums (less than 3/4-mile), but is not required for the most common non-precision procedures with 1-mile or greater visibility minimums. The 2008 Airport Layout Plan depicts a future Omni-Directional Approach Lighting System (ODALS) for Runway 32.

RUNWAY/TAXIWAY LIGHTING

The airfield lighting systems are adequate for current visual and future instrument flight activity.

Based on planned instrument approach capabilities, the 2008 Airport Layout Plan depicted a future FAA-approved approach lighting system (ALS) on Runway 32. The ALS was recommended to obtain approach visibility minimums as low as ¾-mile for a future non-precision instrument approach. Until recently, the FAA required the installation of an approved ALS to reduce future approach visibility minimums below 1 mile. However, the FAA has eliminated this minimum equipment standard and procedures are now evaluated by FAA on a case by case basis. For planning purposes, a future ALS will continue to be assumed, although the system may not be required by FAA pending its technical review when an instrument procedure is developed. Current systems used at general aviation airports include the Omni-Directional Approach Lighting System (ODALS) and the Medium-Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALS-R).

It is recognized that the installation of a traditional ALS for Runway 32 is challenging based on the need to extend the system to the opposite (south) side of the Molalla River. Runway End Identifier Lights (REILs) could be considered as a lower cost option for improving runway end identification during night or reduced visibility conditions. REILs consist of two fixtures installed near a runway end that produce a sequenced strobe when activated, and automatically shut down after use.

The blue retro-reflective edge markers on taxilanes are adequate for current and future use. Normal replacement of existing lighting and marking systems is anticipated during the current twenty year planning period.

RUNWAY MARKINGS

The runway is currently painted with visual (basic) markings, which include runway designation numbers and a centerline stripe. The approach end of Runway 32 has been painted with relocated threshold markings including a white threshold bar, yellow taxiway centerline, and four yellow arrowheads markings pointing to the threshold bar.

The 2008 Airport Layout Plan depicts future non-precision instrument (NPI) markings for both ends of Runway 14/32, although only Runway 32 was identified on the FAR Part 77 Airspace Plan with a 34:1 non-precision instrument approach surface. NPI markings are required only for runway ends supporting straight-in instrument approaches.

It is important to note that the FAA Flight Procedures Office is limited in designing and publishing instrument procedures (straight-in versus circling) that are consistent with the runway markings in place at the time of procedure design. For this reason, upgrading the runway markings prior to procedure design is recommended once basic feasibility has been established for a procedure to a particular runway end.

For planning purposes, the recommendation to add NPI markings to Runway 14 and 32 is maintained until the final determination of feasibility is made regarding actual procedure design. NPI runway markings include designation (numbers), centerline stripe, edge stripes (optional), threshold bar, threshold markings, aiming point (not required on runways less than 4,300 feet) and a runway demarcation bar (required on runways with a displaced threshold or blast pad).

All runway markings require periodic repainting, typically in conjunction with runway sealcoats. Any changes in runway configuration may require updating runway markings.

AIRFIELD SIGNAGE

The airfield signage appears to be adequate for existing facilities. The addition of new access taxiways may require additional signage and existing signs will need to be replaced at the end of their useful lives, near the end of the current 20-year planning period.

AIRFIELD LIGHTING

The airfield lighting systems including the airport beacon and wind cones are in good condition and reportedly function normally. It is anticipated that the airport beacon will need to be replaced at the end of its useful life (within the current twenty-year planning period).

On Field Weather Data

The airport does not have on-site weather observation capabilities such as an Automated Weather Observation System (AWOS). The nearest weather reporting station is Aurora State Airport's Automated Surface Observation System (ASOS), located 8 NM northwest of Mulino.

The 2008 ALP drawing depicts two alternative siting locations for a future AWOS, one each on the west and east side of Runway 14/32. The ALP indicates that the selected location would be determined through a siting analysis. This recommendation is maintained.

The planned addition of instrument approach capabilities at the airport combined with the local weather conditions, suggests that the addition of an AWOS or ASOS would support this activity and also benefit visual flight rules (VFR) users with better weather data for the local area. The FAA typically requires a benefit/cost analysis be undertaken to determine if the airport qualifies for AWOS installation.

Parachute Drop Zones

Mulino State Airport accommodates regular skydiving activity and has a designated parachute drop zone on the east side of the runway. The overall acreage of the drop zone appears to be adequate for current and future needs. It is noted that a portion of the current drop zone is located in an area identified on the 2008 Airport Layout Plan for future hangar development. The evaluation of updated landside development options may include proposed reconfiguration of the existing drop zone to accommodate facility development, although the existing acreage will be maintained.

Landside Facilities

Landside facilities at general aviation airports are generally defined as those that serve aircraft, passenger needs, and their related functions. Mulino State Airport's landside facilities include a main aircraft apron, hangars, pilot lounge/fixed base operator (FBO) facilities, and aircraft fueling facilities.

AIRCRAFT PARKING AND TIEDOWN APRON

Aircraft aprons provide parking for both locally based aircraft not stored in hangars and for transient aircraft visiting the airport. The main apron at Mulino State Airport is located east of Runway 14/32 and comprises approximately 6,162 square yards (236 feet by 235 feet). The apron currently accommodates two double-sided rows of aircraft parking with steel cables installed along the front and back of each row to secure aircraft. The previous airport master plan indicated that the apron had 16 tiedown positions, although the cable system allows more flexibility in aircraft parking, which may increase actual storage. 17 aircraft were observed parked on the apron during a recent site visit.

As depicted on **Figure 4-2**, earlier in the chapter, the existing spacing between the tiedowns/parked aircraft and the adjacent taxilanes does not meet FAA taxilane object free area (OFA) clearing standards. The tiedown positions are used by small aircraft included Airplane Design Group I (ADG I). The main access taxilane and the taxilane to the fueling area are intended to serve both ADG I and II aircraft. Options for reconfiguring the apron to meet FAA design standards will be evaluated in the alternatives analysis. However, it is anticipated that the current apron capacity will be significantly reduced (approximately 1/3 reduction) as a result of meeting design standards for taxilane clearances. The need to expand the apron to accommodate current and forecast demand will also be addressed in the alternatives analysis.

Individual aircraft owner's needs vary and demand can be influenced by a wide range of factors beyond the control of an airport. In addition, the moderate growth in forecast based aircraft may be exceeded if conditions are favorable. For this study, it is assumed that 90% of forecast based aircraft will be hangared and the other 10% will use apron parking due to the airport's mild and wet climate.

For planning purposes, it is assumed that existing hangar space is committed and all additional (forecast) demand would need to be met through new construction. As indicated in the updated aviation activity forecasts, based aircraft at the airport are expected to increase from 58 to 96 (+38 aircraft) within the twenty-year planning period. Based on the stated storage assumptions, the airport will require 10 tiedowns to support the locally based aircraft by 2035. It is noted that the aircraft parking apron currently accommodates a significantly larger portion of based aircraft. The planned construction (replacement) of new hangar units on the concrete pads located north of the apron is expected to result in the majority of these aircraft relocating from the apron.

FAA AC 150/5300-13A suggests a methodology by which itinerant aircraft parking requirements can be determined based on knowledge of busy day operations. Peak demand for itinerant small aircraft parking spaces was estimated based on 22 percent of design day itinerant operations, divided by two. FAA planning criteria assume a small airplane tiedown requirement of 360 square yards per itinerant aircraft. This factor was used to determine future itinerant tiedown requirements. Additional parking needs for transient helicopter and business aircraft (drive-through parking positions) were estimated based on the anticipated mix of air traffic. Projected aircraft parking requirements are summarized in **Table 4-11**.

AIRCRAFT HANGARS

The projected aircraft storage hangar requirements are presented in **Table 4-11** and reflect the assumption that 90 percent of forecast based aircraft will be stored in hangars. Additional hangar requirements (FBO, maintenance, other commercial, etc.) should be anticipated, but are difficult to quantify. It is recommended that space for three or four commercial hangars be reserved in the terminal area, with additional reserve areas identified elsewhere on the airport.

TABLE 4-11: APRON AND HANGAR FACILITY REQUIREMENTS SUMMARY

ITEM	BASE YEAR 2014	2020	2025	2030	2035
Based Aircraft Forecast	**58**	**70**	**78**	**86**	**96**
Aircraft Parking Apron *(Note: capacities reflect current configuration of existing public use apron areas, actual capacity when reconfigured may be different.)*					
Small Aircraft Tiedowns (SE/ME)	16[1]				
Large Aircraft Tiedowns (ME/TP)	0				
Small Helicopter Parking Spaces	0*				
Total Parking Spaces Available	16				
Total Apron Area *(main apron area including taxilanes)*	6,162 SY				
Projected Needs (*Gross Demand)* [2] - Aircraft Parking					
Transient Small Airplane Tiedowns (@ 360 SY each)		8 Spaces 2,880 SY	9 Spaces 3,240 SY	10 Spaces 3,600 SY	11 Spaces 3,960 SY
Locally-Based Tiedowns (@ 300 SY each)		7 Spaces 2,100 SY	8 Spaces 2,400 SY	9 Spaces 2,700 SY	10 Spaces 3,000 SY
Transient Business Aircraft Parking Positions (@ 625 SY each)		1 Space 625 SY	1 Space 625 SY	2 Spaces 1,250 SY	2 Spaces 1,250 SY
Transient Helicopter Parking Positions (@ 380 SY each)		1 Space 380 SY	1 Space 380 SY	1 Space 380 SY	1 Space 380 SY
Total Apron Needs		**17 Spaces 5,985 SY**	**19 Spaces 6,645 SY**	**22 Spaces 7,930 SY**	**24 Spaces 8,590 SY**
Projected Needs (*Gross Demand)* [2] - Aircraft Hangars					
Existing Hangar Storage Spaces • T-Hangars • Conventional Hangars[3]	 43 4				
Redeveloped Hangar Demand[4] *(@ 1,500 SF per unit)*	-	5 spaces 7,500 SF	6 spaces 9,000 SF	-	-
(New) Hangar Demand[5] *(@ 1,500 SF per unit)*	-	9 spaces 13,500 SF	1 spaces 1,500 SF	7 spaces 10,500 SF	9 spaces 13,500 SF
Cumulative 20-Year Demand for Additional Hangar Units: (37 spaces / 55,500 SF) [5]	-	+14 spaces / 21,000 SF	+7 spaces / 10,500 SF	+7 spaces / 10,500 SF	+9 spaces / 13,500 SF

* These aircraft are accommodated on the main apron or in other open areas

1. Existing small aircraft tiedowns do not meet FAA design standards and reconfiguration would result in a loss of tiedowns.
2. Aircraft parking demand levels identified for each forecast year represent forecast gross demand.
3. Non-commercial conventional hangars accommodates multiple aircraft.
4. Planned multi-unit hangars to be constructed on existing T-hangar pads (Phase-I 5 units, Phase-II 6 units, total 11 units). Totals represent additional net demand for each forecast year.
5. Assumes 90% of based aircraft will be stored in hangars. Totals represent additional net demand for each forecast year.

SURFACE ACCESS AND VEHICLE PARKING

The existing surface access to the airport is adequate for current activities. However, the 2008 Airport Master Plan recommended relocating the airport access road to enter the east landside area. The primary benefit of the relocation would be to accommodate a second access taxiway between the runway-parallel taxiway and the adjacent landside area. The current access road extends along the east side of the parallel taxiway, which prevents aircraft crossings. The previously recommended roadway alignment will be evaluated as part of the alternatives analysis along with other potential alignments.

Additional designated vehicle parking is needed in the terminal area and adjacent to aircraft hangars. As depicted on **Figure 4-2**, vehicles routinely park on or adjacent to taxilanes and hangars (within the taxilane OFA), which creates an obstruction for taxiing aircraft. County parking standards will be reviewed to determine an appropriate formula for calculating parking demand based on type of use.

AIR TRAFFIC CONTROL TOWER

Existing and forecast airport activity levels currently do not justify an Airport Traffic Control Tower (ATCT). The nearest ATCT is located at Aurora State Airport located approximately 8 NM northwest of Mulino.

Support Facilities

AVIATION FUEL STORAGE

Mulino State Airport has one 12,000-gallon above ground double-wall storage tank containing 100LL (AVGAS). The tank includes a dispensing facility and was installed near the west end of the main apron. The current 100LL tank is sufficient to accommodate existing and future demand. However, if the airport experiences and increase in turbine and jet aircraft, then the addition of Jet-A fuel storage and dispensing may be needed.

UTILITIES

The airport is supplied with electricity, water, and telephone services as described in Chapter Two. The airport buildings are served by individual septic systems. The Mulino Water District provides water on the airport and Portland General Electric provides electricity.

Any extension of new electrical service should be placed underground in a conduit in order to minimize any potential aircraft operational conflicts. NW Natural Gas provides natural gas to areas around the airport, but currently there are no direct service lines to the airport. Molalla Communications Cooperative provides telephone and internet service for the airport.

The existing water system serving Mulino State Airport does not have sufficient capacity to actively sustain fire suppression at the airport. In particular, the fire hydrants are below the state capacity standard of 20 psi. Expansion of airport facilities would further strain the existing fire-fighting ability and would not be supported by the state fire marshal if no improvements are made to the existing water system. The fire marshal has stated that no new facilities, other than replacement of the dismantled hangars on the existing concrete pads can be undertaken until improvement to the water system have been completed.

The Mulino Water District's inventory maps show specific constraints in the system serving the existing hangars on the north side of the airfield, and along Darnell Road. On the north side starting at the intersection of Mulino Road and Highway 213, an 8-inch waterline is stubbed to the west along Mulino Road. This line is continually downsized to 6 inches and eventually 4-inches at the intersection of Mulino Road and Landing Way. This 4-inch line feeds all the facilities on the north end of the airport including the existing hangars. Several fire hydrants are located in this area as well.

The 4-inch waterline continues south along the west side of the existing hangars and is then upsized to 8-inches. This 8-inch line then continues south, turns east, then south again eventually tying back into a 4-inch waterline at a point along the extension of Darnell Road. This 4-inch line continues along Darnell Road tying back into the main 8-inch line located in Highway 213.

Century West Engineering undertook an evaluation of the options available to upgrade the existing water system to meet the requirements of the fire marshal. Three options were developed and are discussed in **Appendix B**. The recommended option entails upgrading the existing six inch and four inch lines along Mulino Road to eight inch diameter, which should provide the required water pressure needed to meet fire safety requirements. Siting a new well on airport property may also be an option that benefits on-airport fire flow and provides additional supply to the water district.

Security

The airport currently has 3-foot wire field fencing surrounding the airport perimeter with an automated vehicle gate located on the main access road and padlocked swing gates located in various locations around the airport perimeter.

Although fencing is not required at general aviation airports, it is recommended that the airport install new fencing to increase security and protect the airfield from potential wildlife conflicts. Typical airport fencing consists of six- to eight-foot high chain link with three-strand barbed wire. Flood lighting is also recommended in aircraft fueling locations, and aircraft parking and hangar areas. The use of full or partial cutoff light fixtures is recommended for all exterior lighting to limit upward glare.

Facility Requirements Summary

The projected twenty-year facility needs for Mulino State Airport are summarized in **Table 4-12**. Maintaining existing pavements represents a significant, ongoing facility need. The updated forecast of aviation activity anticipates moderate activity growth that will result in similar airside and landside facility demands beyond existing capabilities. The need for new or expanded facilities, such as aircraft hangars for the most part will be market driven. Construction of several near-term aircraft storage hangars will use existing hangar foundations and taxilanes. Any additional hangars will require significant front-end investments for site preparation; utility extensions, road extensions, and taxilane construction to the new development areas.

TABLE 4-12: FACILITY REQUIREMENTS SUMMARY

ITEM	SHORT-TERM	LONG-TERM
Runway 14/32	• Pavement maintenance - Slurry seal • Update runway markings with NPI markings • Reconfigure runway based on updated ALP	• Pavement maintenance includes periodic sealcoats and overlay/reconstruction (based on pavement condition) • Replace MIRL (at end of useful life)
Taxiways	• Pavement maintenance - Slurry seal • Add second access taxiway to east landside area • Eliminate aligned taxiway @ Rwy 32 end • Expand AC hold areas based on TOFA clearance requirements	• Pavement maintenance includes periodic sealcoats and overlay/reconstruction (based on pavement conditions). • Replace MITL (at end of useful life)
Taxilanes	• Pavement maintenance - Slurry seal	• Pavement maintenance includes periodic sealcoats and overlay/reconstruction (based on pavement conditions). • Replace edge reflectors (as needed)
Aircraft Aprons	• Pavement maintenance - Slurry seal	• Main Apron requires reconfiguration to meet design group I and II taxilane OFA standards • Expand apron to accommodate forecast demand for aircraft parking • Pavement maintenance includes periodic sealcoats and overlay/reconstruction (based on pavement conditions)
Hangars	• There are plans for constructing two rows of rectangular hangars on the existing paved pads	• Additional Hangar development and taxilanes (demand based)
Navigational Aids and Lighting	• No short-term facility needs planned for navigational aids and lighting • Develop Non-precision instrument approach	• Assess eligibility for installation of an automated weather observation system (AWOS) • Install Approach Lighting System (ODALS/MALSF) and REILs
Fuel Storage	• No short-term facility needs planned for fuel storage and dispensing	• Tank reserve for second fuel grade (Jet-A)
FBO	• No short-term facility needs planned for the FBO	• Identify needs based off market changes • Relocate existing building to address parallel taxiway OFA clearance or maintain modification to standards

Utilities	• Upgrade existing water system to support new hangar development and fire protection requirements • Identify areas of future development and utility needs	• Extend utilities to support future development
Roadways & Vehicle Parking	• Extend roads to new development areas • Add vehicle parking area in existing and future hangar areas	• Same • Relocate airport access road to support landside development
Security	• Identify fencing, access gates, and lighting needs	• Install new perimeter fencing and automated gates for landside areas • Install flood lighting in hangar and apron areas
Note: Vegetation control, crack fill, sealcoat, slurry seal, localized patching, joint rehabilitation, etc., as required.		

Airfield Capacity

Annual service volume (ASV) is a measure of estimated airport capacity and delay used in long-term planning. ASV, as defined in FAA Advisory Circular (AC) 150/5060-5, Airport Capacity and Delay, provides a reasonable estimate of an airport's operational capacity. The ratio between demand and capacity helps define a timeline to address potential runway capacity constraints before they reach a critical point. If average delay becomes excessive (greater than 3 minutes per aircraft), significant congestion can occur on a regular basis, which significantly reduces the efficient movement of air traffic. ASV is calculated based on the runway and taxiway configuration, percent of VFR/IFR traffic, aircraft mix, instrumentation, and the level of air traffic control.

The FAA estimates annual capacity (ASV) for a single runway with no air carrier traffic at approximately 230,000 operations; hourly capacity is estimated to be 98 operations during visual flight rules (VFR) conditions and 59 operations during instrument flight rules (IFR) conditions. Although these estimates assume optimal conditions (instrument approach capability, etc.), they provide a reasonable basis for approximating existing and future capacity:

Existing (2014) Capacity: 24,360 Annual Operations / 230,000 ASV = 10.6% (demand/capacity ratio)

Future (2035) Capacity: 43,200 Annual Operations / 230,000 ASV = 18.8% (demand/capacity ratio)

Based on these ratios, the average delay per aircraft would be expected to remain below one minute throughout the planning period. FAA recommends that airports proceed with planning to provide additional capacity when 60 percent of ASV is reached. Airport operations are projected to remain well below the 60 percent threshold during the planning period as indicated in the updated aviation activity forecasts and therefore additional airfield capacity will not be required.

Chapter 5 – Environmental Review

Chapter 5 – Environmental Review

Introduction

The purpose of this environmental review is to identify physical or environmental conditions of record that may affect the recommended improvements at Mulino State Airport.

The scope of work for this element is limited to compiling, reviewing, and briefly summarizing information of record from applicable local, federal, and state sources for the airport site and its environs. The environmental review technical memorandum1 is included in **Appendix C** and a brief overview is provided below.

An environmental review of the existing airport site conditions and items of interest was conducted as part of the master plan. This environmental review evaluated land use, federal lands, water resources (wetlands and stormwater), water quality, species of concern, and essential fish habitat.

Local Site Conditions

Mulino State Airport is located in an area that is predominantly rural, made up of agricultural and forest lands. The eco-region has a mild climate with wet winters and warm, dry summers. Mulino receives an

[1] ESA. Laszlo, Ava. Cunningham, Susan. Mulino State Airport Memorandum. February 24, 2016.

average of 46 inches of precipitation a year. The project area is within a mixed-use area of agriculture, commercial, and residential uses.

Wetlands

Wetlands are under the jurisdiction of both the Oregon Department of State Lands (DSL) and the U.S. Army Corps of Engineers (Corps). A wetland inventory was included in the review, which identified six wetlands within airport property (4 freshwater forested/shrub, 1 freshwater emergent, and 1 riverine). It is recommended that further evaluation and a formal wetland delineation with concurrence from DSL and the Corps be conducted in these areas.

Floodplains

A review of the flood rate insurance map for Clackamas County shows portions of the Molalla River floodway, 100-year floodplain, and 500-year floodplain to be within parts of airport property or areas containing avigation easements. Development within the 100-year floodplain would require a Floodplain Development Permit from Clackamas County and a permit from the Federal Emergency Management Agency (FEMA).

Protected Species and Habitat

The environmental review queried the Oregon Biodiversity Information Center (ORBIC) database to obtain records of known sensitive, threatened, and endangered plant and animal species within the vicinity of Mulino State Airport. StreamNet fish distribution data was used to identify the presence of listed species in the Molalla River.

The review identified nine ESA species that could potentially occur in the project area including the Northern Spotted Owl, Streaked Horned Lark, Bradshaw's Desert-parsley, Kincaid's Lupine, Nelson's Checker-mallow, Water Howelli, Willamette Daisy, Steelhead Trout, and the Chinook salmon. Of the nine ESA species identified, only two (Steelhead Trout and Chinook salmon) have known occurrences in the Molalla River, which is designated as Critical Habitat.

Molalla River

The Molalla River is located on the south side of Mulino State Airport. This river is the largest undammed tributary of the Willamette River. Its waters support a number of fish species including salmonids, lamprey, and trout. The Molalla River is designated as Critical Habitat for both Upper Willamette River steelhead ESU and Upper Willamette River Chinook salmon ESU.

Chapter 6 – Airport Development Alternatives

Chapter 6 – Airport Development Alternatives

The evaluation of future development alternatives represents a critical step in the airport master planning process. The primary goal is to define a path for future development that provides an efficient use of resources and is capable of accommodating the forecast demand and facility needs defined in the master plan.

Introduction

Current and long-term planning for Mulino State Airport is based on maintaining and improving the airport's ability to serve a wide range of general aviation and business aviation aircraft, as noted in the facility requirements evaluation.

All proposed facility improvements are consistent with applicable FAA airport design standards and FAR Part 77 airspace planning standards. Airplane Design Group II (ADG II) standards are recommended for facilities used by both large and small aircraft including the runway, major taxiways, and specific landside facilities. Facilities that accommodate small aircraft, such as T-hangar taxilanes and aircraft tiedown aprons, are normally designed to meet ADG I standards. For hangar areas with a variety of hangar sizes, the largest hangar door width determines the maximum size of aircraft to be accommodated.

The FAA recommends that airport master plans be developed in an "unconstrained" manner when initially defining future demand and related facility improvements, rather than establishing pre-defined limits that drive the planning process. The evaluation of development options for Mulino State Airport will be unconstrained, consistent with FAA guidance, forecast demand, and the defined facility requirements.

Evaluation Process

Developing preliminary alternatives represents the first step in a multi-step process that leads to the selection of a preferred alternative. It is important to note that the current FAA-approved airport layout plan (ALP) dated April 2008, identifies future improvements that were the product of the last master planning process. This master plan update provides a fresh look at addressing facility needs, but also allows the components of the previous preferred alternative to be retained or modified, if they meet current needs.

The preliminary alternatives will be evaluated to identify general preferences for both individual items and the overall concepts. This process will provide the widest range of ideas for consideration and define the most effective facility development concept. A preferred alternative with elements that can best accommodate all required facility improvements will emerge from this evaluation process. The Consultant will integrate these elements into a draft preferred alternative for review and refinement as ODA proceeds through the process of selecting a final preferred development alternative for Mulino State Airport. Public input and coordination with the FAA will also help shape the preferred alternative throughout this process.

Once the preferred alternative is selected by ODA, a detailed capital improvement program will be created that identifies and prioritizes specific projects to be implemented. The preferred alternative will be integrated into the updated airport layout plan (ALP) drawings to guide future improvements at the airport.

No-Action Alternative

In addition to proactive options designed to respond to future facility needs, a "no-action" alternative is also an option. ODA may choose to maintain existing facilities and capabilities without investing in facility upgrades or expansion to address future demand. The existing airfield would remain unchanged from its present configuration and the airport would essentially be operated in a "maintenance-only" mode.

This alternative would primarily result in the inability of the airport to accommodate forecast aviation demand beyond current facility capabilities. Future aviation activity beyond current levels would be constrained by the capacity, safety, and operational limits of the existing airport facilities.

The no-action alternative establishes a baseline from which the other alternatives will be developed and compared. The purpose and need for proactive development alternatives (e.g., airport improvements) is defined by the forecast aviation activity and corresponding facility needs for the current twenty-year planning period as identified in Chapters 3 and 4 of this study. Proposed improvements are based on safety considerations and the responsibility to effectively manage demand through a well-defined and economical program.

It should be noted, the no-action alternative is inconsistent with the mission and policies of ODA. ODA has a long-established commitment to provide safe and efficient public air transportation facilities that are socially and environmentally sustainable, based on the factors identified above.

Preliminary Development Alternatives

The facility needs identified in Chapter 4 include a variety of airside (runway-taxiway) and landside needs (aircraft parking, hangars, fueling, FBO facilities, etc.). Items such as fencing, lighting improvements, minor roadway extensions, and pavement maintenance do not typically require an alternatives analysis. However, these items will be incorporated into the preferred development alternative and the ALP.

The preliminary alternatives are organized by type of facilities (airside and landside) and are intended to facilitate a discussion and evaluation about the most efficient way to meet the facility needs of the airport. The preliminary development alternatives are described below with graphic depictions (**Figures 6-1 through 6-7**) provided to illustrate the key elements of each alternative.

The preliminary alternatives are presented to facilitate a discussion and evaluation of viable options to address defined facility needs. It is important to note that the eventual preferred alternative selected by ODA may come from one of the preliminary alternatives, a combination or hybrid of the preliminary alternatives, or a new concept that evolves through the evaluation and discussion of the preliminary alternatives. As noted earlier, ODA also has the option of limiting future facility improvements based on financial considerations or development limitations.

The final section of this chapter to be added later, will reflect the refined/preferred development alternative once the evaluations of preliminary alternatives are completed. Individual elements of the preferred alternative concept will be added to the updated Airport Layout Plan (ALP) and Capital Improvement Program (CIP) after they are defined.

Airside Development Alternative (Runway-Taxiway Improvements)

The 2008 Airport Master Plan recommended a change to the existing taxiway system based on the existing 175-foot relocation of the Runway 32 threshold. The 2008 ALP depicts removal of the pavement between the relocated threshold and the original runway end and the section of taxiway used to access the original runway end. A new connecting taxiway from the proposed shortened parallel taxiway to the existing relocated threshold is also depicted on the 2008 ALP. This recommended reconfiguration eliminates the existing 175-foot in-line taxiway (former runway pavement) located south of the relocated Runway 32 threshold. No new pavement has been constructed or existing pavement removed in this area since the 2008 ALP was approved.

The ALP also depicts runway marking and lighting improvements consistent with the addition of a future non-precision instrument approach.

Runway 14-32 generally meets the Airport's facility needs as outlined in the Facility Requirements chapter, therefore no significant changes to the airside are proposed. However, a preliminary assessment of the existing Runway 32 approach area indicated a further review of the relocated Runway 32 threshold was warranted, which is discussed in the following section.

RUNWAY 32 THRESHOLD RECONFIGURATION

The evaluation of airside improvements includes a review of the relocated Runway 32 threshold and planned taxiway reconfiguration as depicted on the 2008 ALP. A new Airports Geographic Information System (Airports GIS, or AGIS) survey conducted concurrent with this airport master plan update was used to evaluate the terrain within the runway safety area (RSA) at the south end of Runway 14-32. Perceived physical limits within the FAA mandated RSA initiated the runway threshold relocation and associated airfield reconfiguration. A threshold analysis was conducted in association with this Master Plan Update and is presented in a technical memorandum included in **Appendix D**. The analysis found that the current relocation of the Runway 32 threshold is not required based on existing grade within the RSA at the south end of the runway. The proposed changes in taxiway configuration associated with the threshold relocation, which have not yet been constructed, were also reviewed.

The **Airside Alternative** (see **Figure 6-1**) includes an option for reconfiguring the runway by removing the relocated threshold and implementing a displaced threshold. The location of the Runway 32 threshold would be shifted approximately 92 feet south of its current location based on the available RSA beyond the south end of the runway, resulting in an 83-foot displaced threshold. The full length (300 feet) of ADG II RSA is provided from this displaced threshold location. Declared distances would be used to define available runway lengths for takeoff and landing for both runway directions. The primary benefits of the proposed runway reconfiguration include:

- 175-foot (5.1%) increase in runway length available for takeoff (all aircraft) and accelerate-stop distance calculation for multi-engine aircraft on Runway 32 (increased from current 3,425 feet to 3,600 feet):
- 92-foot (2.7%) increase in runway length available for takeoff and landing (all aircraft) and accelerate-stop distance calculation for multi-engine aircraft on Runway 14 (increased from current 3,425 feet to 3,517 feet):
- 92-foot (2.7%) increase in runway length available for landing (all aircraft) Runway 32 (increased from current 3,425 feet to 3,517 feet):
- Improves operating safety for all aircraft types:
- Eliminates the need to remove existing pavement and construct a new access taxiway to the relocated Runway 32 threshold.

Implementation of a displaced threshold will require both approach and departure runway protection zones (RPZ). The approach RPZ is located 200 feet from the displaced runway threshold and the departure RPZ for the opposite runway end is located at the physical or useable end of the runway.

By FAA definition, "declared distances represent the maximum distances available and suitable for meeting takeoff, rejected takeoff, and landing distance performance requirements for turbine powered aircraft as outlined in FAA AC 150/5300-13A. The declared distances are:

- **TORA** – Takeoff run available is the length of runway available and suitable for the ground run of an airplane takeoff.
- **TODA** – Takeoff distance available is the length of the takeoff run available plus the length of a clearway (if provided).
- **ASDA** – Accelerate stop distance available includes the length of the runway and stopway available for the acceleration and deceleration of an airplane aborting takeoff.
- **LDA** – Landing distance available is the runway length declared available and suitable for landing an aircraft."[1]

FAA guidelines note that "Declared distances may be used to obtain additional RSA and/or ROFA prior to the runway's threshold (the start of the LDA) and/or beyond the stop end of the LDA and ASDA, to mitigate unacceptable incompatible land uses in the RPZ, to meet runway approach and/or departure surface clearance requirements, in accordance with airport design standards, or to mitigate environmental impacts. Declared distance may also be used as an incremental improvement technique when it is not practical to fully meet these requirements. However, declared distances may only be used for these purposes where it is impracticable to meet the airport design standards or mitigate the environmental impacts by other means, and the use of declared distances is practical."

The declared distances associated with the proposed runway reconfiguration are summarized in **Table 6-1** (the current runway length available for all operations is 3,425 feet).

TABLE 6-1: DECLARED DISTANCES FOR RUNWAY 14/32 (RECONFIGURED)

DECLARED DISTANCE COMPONENT	RUNWAY 14	RUNWAY 32
Takeoff Distance Available (TODA)	3,517 feet	3,600 feet
Takeoff Run Available (TORA)	3,517 feet	3,600 feet
Accelerate Stop Distance Available (ASDA)	3,517 feet	3,600 feet
Landing Distance Available (LDA)	3,517 feet	3,517 feet

[1] FAA Advisory Circular 150/5300-13A (Change 1), 322.B(1), Pg. 96, notes

Implementing a displaced threshold and applying declared distances will enable the airport to regain the full 3,600 feet of pavement for departures to the north (TORA, TODA, and ASDA). This alternative would eliminate the need to remove the existing runway pavement prior to the existing Runway 32 relocated threshold, and the need to construct a new runway end entrance taxiway.

The 3,600 feet of pavement available for departures to the north will enable the airport to accommodate 100 percent of small aircraft in the general aviation fleet with less than ten (10) seats.

AIRCRAFT HOLDING AREAS

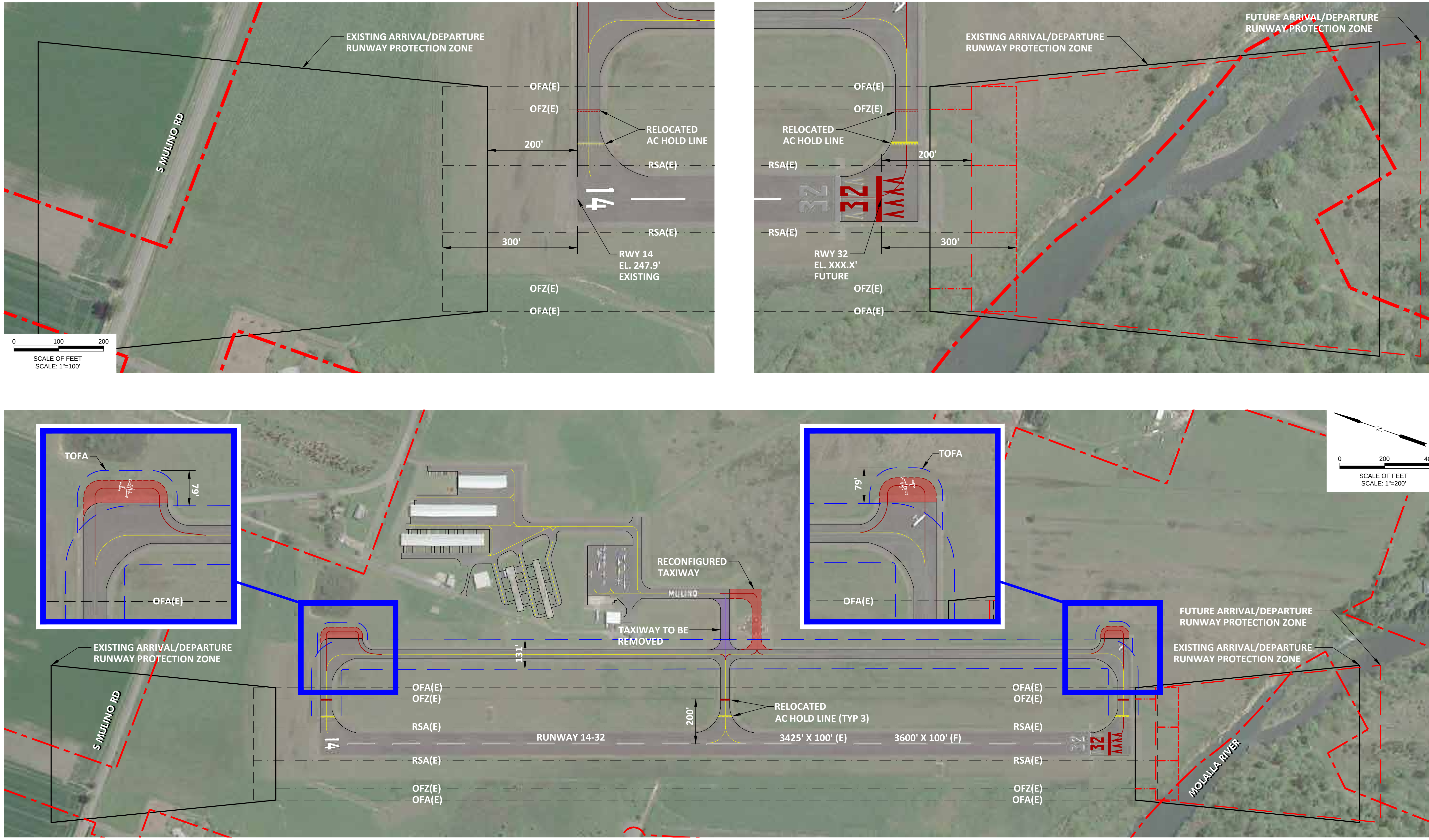
As noted in the conformance review contained in the facility requirements chapter, the existing aircraft hold areas located adjacent to the parallel taxiway do not provide full clearance for the ADG II parallel taxiway object free area (OFA). The proposed improvement would expand the hold areas to allow the holding aircraft to be clear of the parallel taxiway OFA.

MAIN ACCESS TAXIWAY RECONFIGURATION

The intersection between the main access taxiway, parallel taxiway, and the mid-runway exit taxiway (A2) provides a direct path between the landside facilities and the runway. The FAA has identified uninterrupted straight-line taxi routes between landside facilities and runways as a contributor to runway incursions. The FAA's current design guidance encourages taxi routes that require distinct changes in aircraft direction when entering the runway environment as a way to increase situational awareness for pilots. The proposed improvement would realign the access taxiway to connect with the parallel taxiway south of Taxiway A2 and remove the current east-west section of taxiway that connects to the parallel taxiway.

AIRCRAFT HOLD LINES (TAXIWAYS A1, A2, A3)

The existing aircraft hold lines are located 125 feet from runway centerline. Based on the 400-foot width dimension of the runway obstacle free zone (OFZ) noted on the 2008 ALP and recommended in the master plan update, the hold lines should be located a minimum of 200 feet from runway centerline. The proposed improvement relocates the aircraft hold lines and associated runway signage on the three exit taxiways for Runway 14/32.



MULINO STATE AIRPORT | AIRPORT MASTER PLAN

OREGON AVIATION

AIRSIDE ALTERNATIVE | **FIG. 6-1**

CENTURY WEST ENGINEERING

Landside Development Alternatives

The landside area of the airport is located on the east side of the runway and includes the aircraft apron, FBO facilities, hangars, and aircraft fueling. The preliminary development alternatives focus on improving the efficiency of facility layouts, conforming to FAA design standards, and identifying future development areas. A primary consideration in evaluating the landside alternatives is to determine the desired mix of aircraft parking and other development (hangars, etc.) that can be accommodated within the defined areas, while meeting FAA design standards.

The landside development alternatives were created with the assumption the existing potable water limitations will be mitigated within the planning period and future development will no longer be constrained.

A new airport access road is planned to replace the existing public access that enters the airport at Mulino Road and South Airport Road, near the north end of the runway. The three new landside options (A, B, and C) propose to extend the new roadway from the west end of Darnell Road at Highway 213. The new roadway would provide access to the entire east landside area. The fourth landside option retains the access road depicted on the 2008 ALP, which enters the airport from South Mulino Road east of the T-hangar rows, and continues toward the apron area. The existing airport access road would be terminated on the north side of a proposed access taxiway that extends from the parallel taxiway to the north hangar area and remain available to access the north hangar area.

Four landside concepts are presented (see **Figures 6-2 through 6-5**), including the recommended configuration depicted on the 2008 ALP. The concepts share a relatively similar expansion of aircraft apron within the existing terminal area. Two apron layouts (see **Figures 6-6 and 6-7**) were developed to illustrate different aircraft parking and fueling configurations; these layouts are compatible with each of the landside alternatives.

The proposed landside improvements include:

- Aircraft hangar sites (T-hangars, large and small conventional hangars);
- Reconfigured/expanded aircraft apron;
- Future FBO and aircraft fueling facilities;
- Helicopter parking;
- Parachute drop area;
- A second access taxiway from the parallel taxiway to the east landside area;
- New airport access road to replace the existing access road; and
- Vehicle parking adjacent to hangars and aircraft apron.

LANDSIDE DEVELOPMENT ALTERNATIVE A

Landside Development Alternative A (see **Figure 6-2**) concentrates facility development within the terminal area by expanding the main apron to the south and siting new T-hangars immediately east of the access taxiway connecting the main apron and the north hangar area. The existing easternmost parachute drop area would be reconfigured to accommodate additional T-hangar development, although the overall acreage is maintained. A new north access taxiway connects the north hangar area to the parallel taxiway to reduce the taxiing distance to/from the runway.

The reconfigured terminal area will accommodate new/relocated FBO facilities, aircraft fueling, and commercial hangar development, although existing facilities can be maintained with the apron reconfiguration with changes in existing taxiway access. The future fueling facility and FBO facilities would be relocated near the southeast corner of the new apron.

The elements of Landside Alternative A include:

- A new ADG II access taxiway between the north hangar area and the parallel taxiway;
- Construction of a new airport access road (entering the east side of the airport from Highway 213 and Darnell Road);
- Construction of vehicle parking areas adjacent to the main apron and hangars;
- Expanded and reconfigured aircraft apron to accommodate aircraft parking, fueling, FBO services, and meet FAA design standards;
- Development of commercial hangar area adjacent to expanded main apron;
- New aircraft storage hangars (conventional and T-hangars) and taxilanes north and east of the terminal area;
- Development of transient helicopter parking position (approximately 50'x50');
- Construction of future fixed base operator (FBO) building/hangar;
- Development of future aircraft fuel storage and dispensing adjacent to new FBO (SE corner of apron);
- Construction of multi-unit hangars on the existing hangar pads;
- Relocation of segmented circle to the west side of Runway 14/32;
- Reconfiguration of parachute drop zone; and
- Relocation of the turf taxilane to the EAA building to accommodate other improvements.

LANDSIDE DEVELOPMENT ALTERNATIVE B

Landside Development Alternative B (see **Figure 6-3**) has many of the same elements as Alternative A, but locates new T-hangars south of the main apron. The south hangar area would be accessed by a parallel taxilane that connects with the parallel taxiway and the main access taxiway.

The proposed apron expansion, north access taxiway, helicopter parking, and new airport access road presented in Landside Development Alternative A are comparable. The future fueling facility and FBO facilities are located near the northeast corner of the new apron. The existing parachute drop area would not be impacted by proposed improvements.

LANDSIDE DEVELOPMENT ALTERNATIVE C

Landside Development Alternative C (see **Figure 6-4**) uses the same main apron footprint and south hangar location as Alternative B, but eliminates the access taxiway connection between the main apron and north hangar area.

In Alternative C, the new airport access road extends around the north and east sides of the existing and future apron to serve the existing FBO building/pilot lounge, fuel area, and aircraft maintenance hangar, and several new hangars located adjacent to the expanded apron area. This roadway configuration provides public access to these facilities, but requires eliminating the north-south taxiway connection between the existing north T-hangars and the existing apron area. The FAA generally permits airport tenants to access hangars and aircraft tiedowns via taxilanes if control (locked gate) is provided. However, the general public is not permitted to drive on or over taxiways or taxilanes on an airport therefore requiring abandonment of a portion of the existing access taxiway.

With this configuration, separate access taxiway connections to the parallel taxiway are required to reach the north hangar area and the terminal area/south landside areas. This change in taxiway access maintains public access to existing businesses located adjacent to the existing and future main apron. The new north access taxiway connects the existing landside development and a new conventional hangar row located adjacent to a new parallel taxilane and between the existing airport access road and the existing parallel taxiway. The existing/modified main access taxiway is used to access the existing apron and hangars located in the south landside area.

The existing parachute drop area located adjacent to the parallel taxiway would be eliminated to accommodate new hangar development. The drop zone located east of the north hangar area would be expanded to offset the loss of acreage in the current drop zone.

LANDSIDE DEVELOPMENT ALTERNATIVE D

Landside Development Alternative D – ALP Option (see **Figure 6-5**) includes the recommended facilities that are depicted on the 2008 ALP drawing.

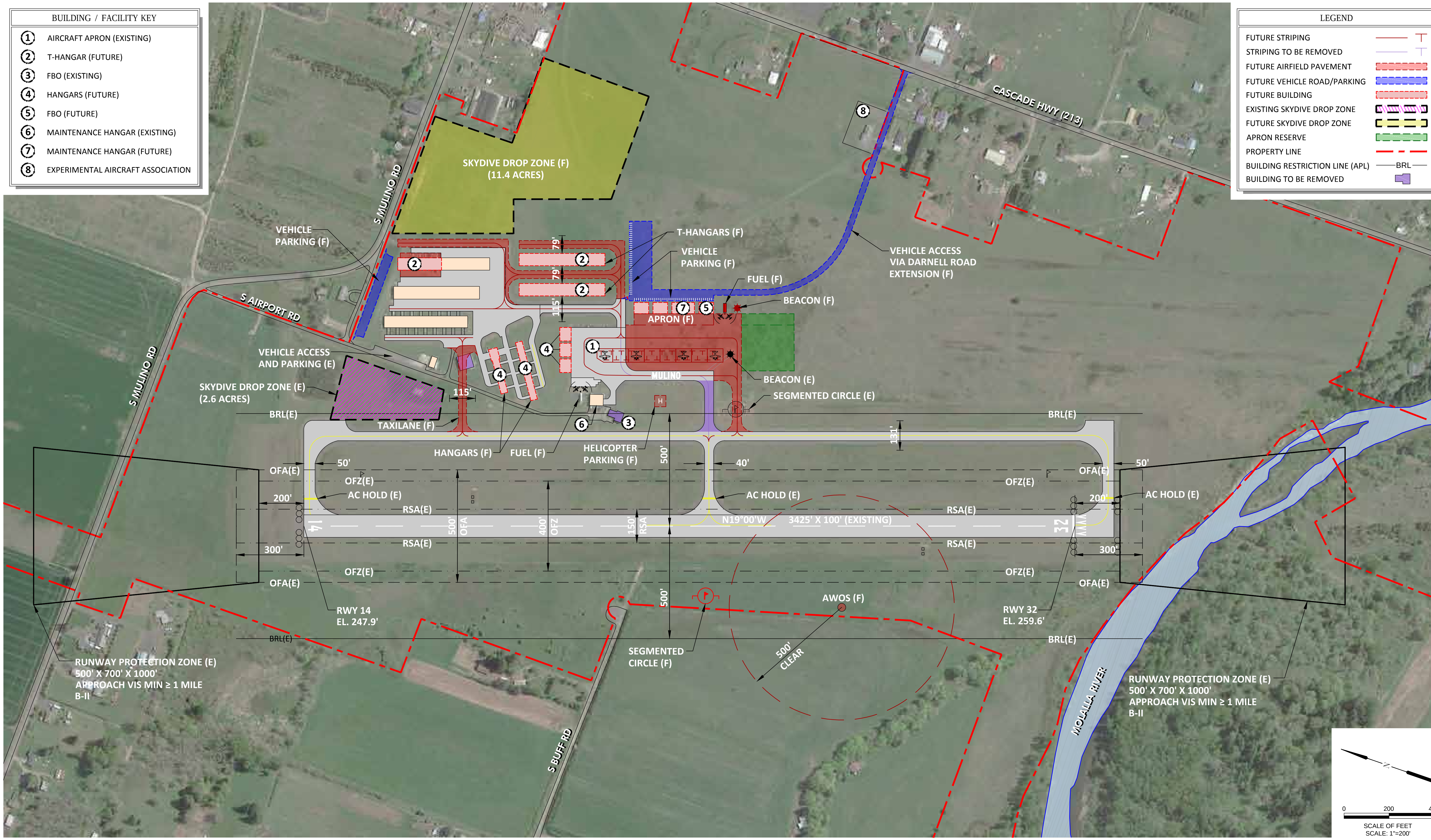
The elements of Alternative D include:

- Construction of three T-hangars north of the existing T-hangar units (24 units);
- Expansion of the main apron with reconfigured tiedowns;
- Construction of a new vehicle access road east of the new T-hangars, connecting Mulino Road to the main apron area;
- FBO reserve;
- A relocated maintenance building;
- New hangar development and reserve:
- Additional vehicle parking;
- Upgraded fencing; and
- A modified parachute drop zone (note: a drop zone was not in place in 2008, when the ALP was finalized and has been added to this Alternative for consistency).

Alternative D adds three rows of T-hangars east of the existing T-hangars, thereby placing it within the existing skydive landing zone. It should be noted that the skydiving operation was not in established during the time of the 2008 master plan update. The smaller existing drop zone would be maintained and a new large drop zone would need to be located in the development reserve area.

An access taxiway would be constructed between Taxiway A and the T-hangar development area. This taxiway would cut off public vehicle access along Airport Road to the FBO and maintenance hangar. This alternative would construct a new maintenance hangar north of the T-hangars adjacent to the new vehicle access road.

An aviation reserve area is located north of the main apron and east of the new T-hangars. This area has public vehicle access and can be used for hangar development, tiedowns, or commercial activities.



MULINO STATE AIRPORT | AIRPORT MASTER PLAN

LANDSIDE DEVELOPMENT ALTERNATIVE A | **FIG. 6-2**

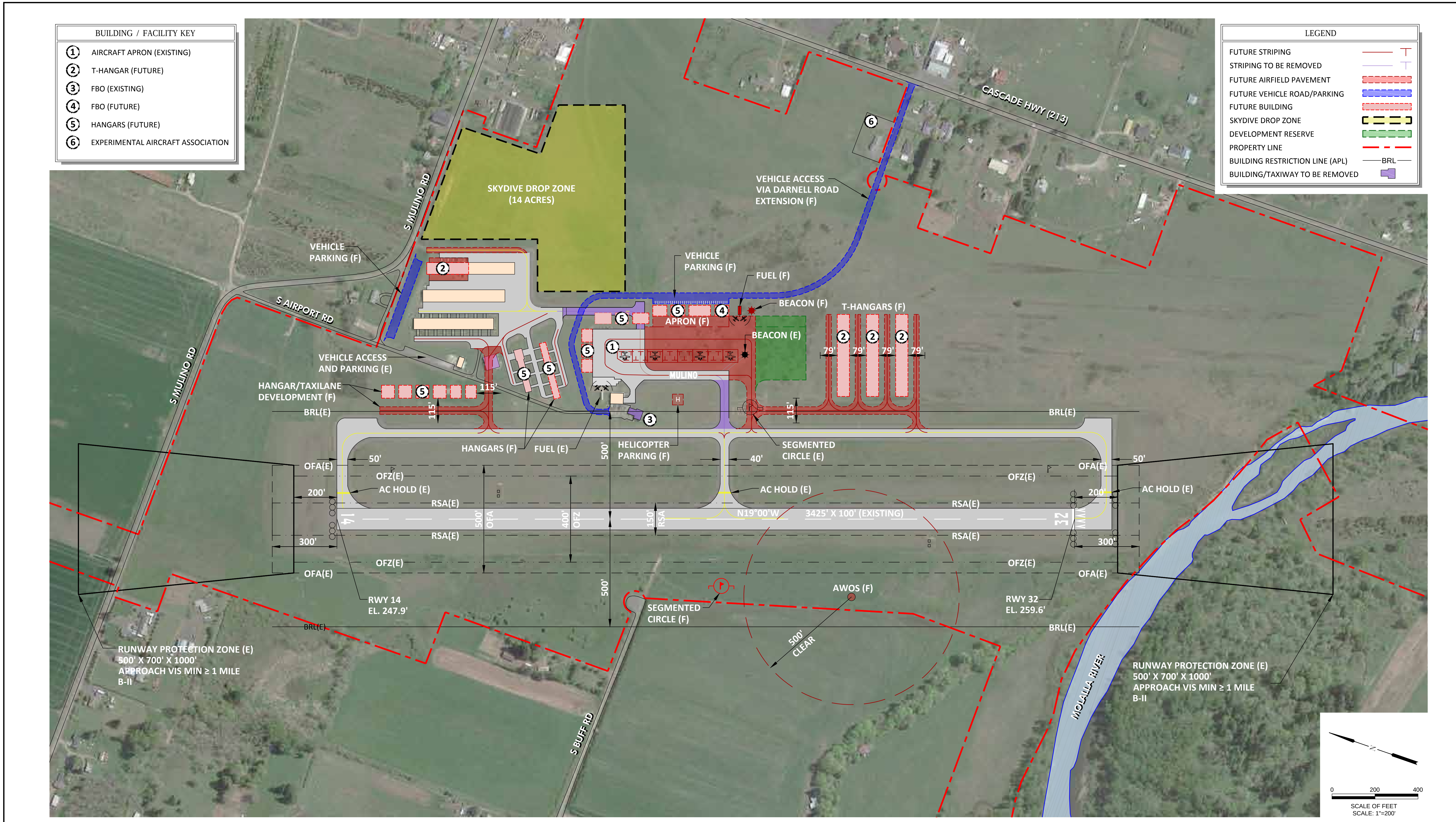
CENTURY WEST ENGINEERING

MULINO STATE AIRPORT | AIRPORT MASTER PLAN

OREGON AVIATION

LANDSIDE DEVELOPMENT ALTERNATIVE B | **FIG. 6-3**

CENTURY WEST ENGINEERING

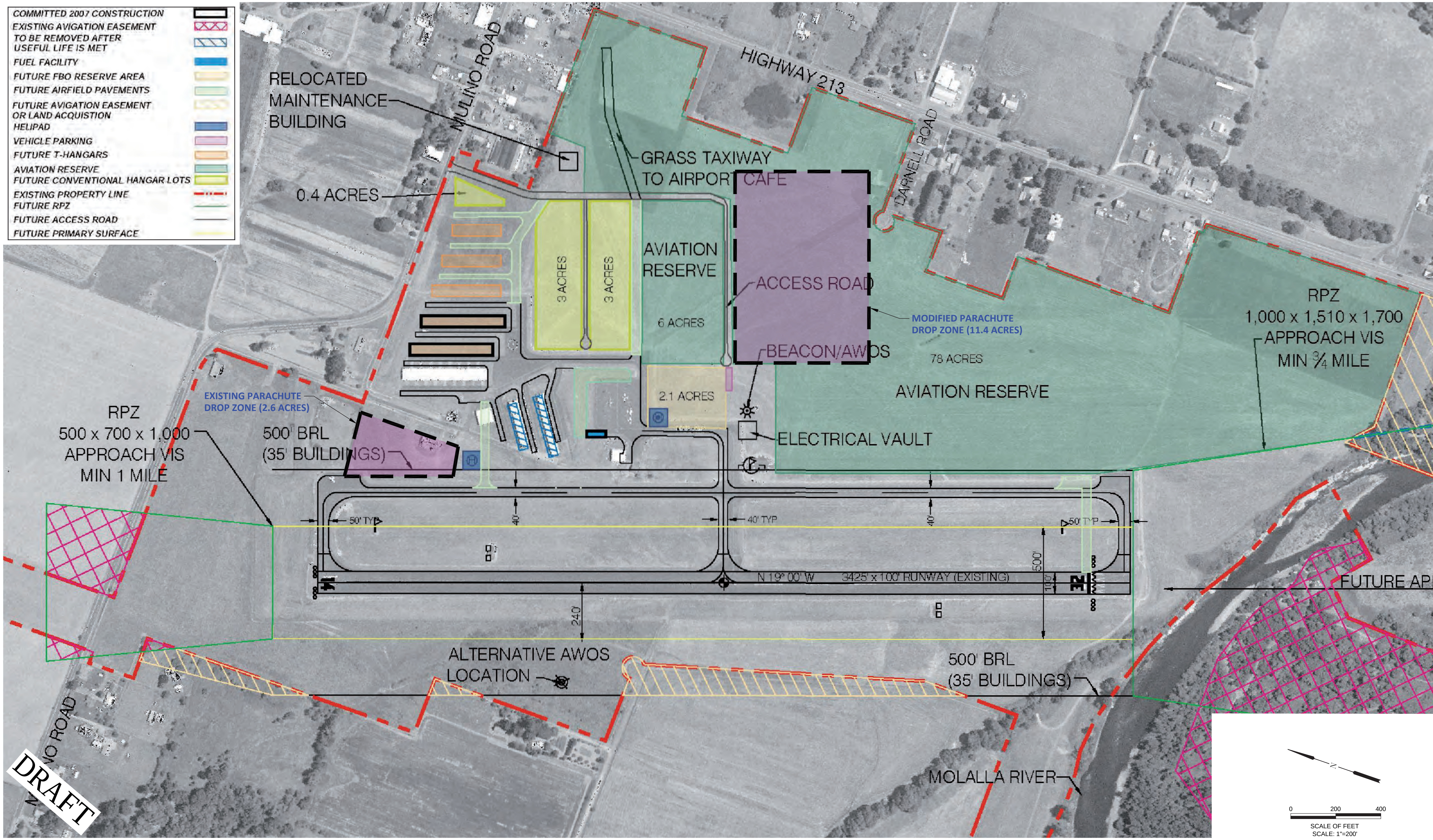


MULINO STATE AIRPORT | AIRPORT MASTER PLAN

LANDSIDE DEVELOPMENT ALTERNATIVE C | **FIG. 6-4**

OREGON AVIATION

CENTURY WEST ENGINEERING



MULINO STATE AIRPORT | AIRPORT MASTER PLAN

LANDSIDE DEVELOPMENT ALTERNATIVE D | FIG. 6-5

Apron Alternatives

Two apron alternatives were created to expand and reconfigure the main apron to serve the forecast demand and meet FAA design standards. Both apron alternatives are interchangeable and can be used with any of the three-landside alternatives. Many of the elements shown in these alternatives are optional and can be developed over time including the construction of a new FBO building, relocation of the aviation fuel tanks, and construction of new hangars. A new transient helicopter parking pad is proposed to be located between the parallel taxiway and the expanded main apron, south of the existing FBO building/pilot lounge.

APRON ALTERNATIVE A

Apron Alternative A (see **Figure 6-6**) reconfigures the main apron with tiedowns in a north-south orientation. Future commercial hangar development is located on the east side of the apron with new public vehicle access from South Darnell Road. The future FBO and fueling facilities are located near the north end of the expanded apron. This alternative shifts the existing main access taxiway and parallel taxiway connection to the south, eliminating the direct (straight line) taxi route to the runway.

The elements of Alternative A include:

- Expanded main apron with an apron reserve;
- Reconfigured airplane tiedowns and main apron taxilanes (ADG I and II);
- New Apron Section - Three convertible parking rows (dual markings) capable of accommodating large aircraft drive-through parking and small airplane tiedowns;
    - Six (6) large airplane drive-through parking positions or 21 small airplane tiedowns;
- Existing Apron Section - One double-sided row and one single sided row of small airplane tiedowns (11 tiedowns), served by an ADG I taxilane;
- Relocated aviation fuel storage and dispensing area (Jet A and AVGAS) to the northeast corner of the apron, adjacent to the future FBO building;
- New FBO building with public access;
- Remove existing FBO building within TOFA for Taxiway A;
- Three new commercial use hangars with public access along the east edge of the apron;
- Construct new public access road from South Darnell Road;
- Vehicle parking;
- Relocate rotating beacon;
- Construct helicopter parking position (approximately 50’x50’);

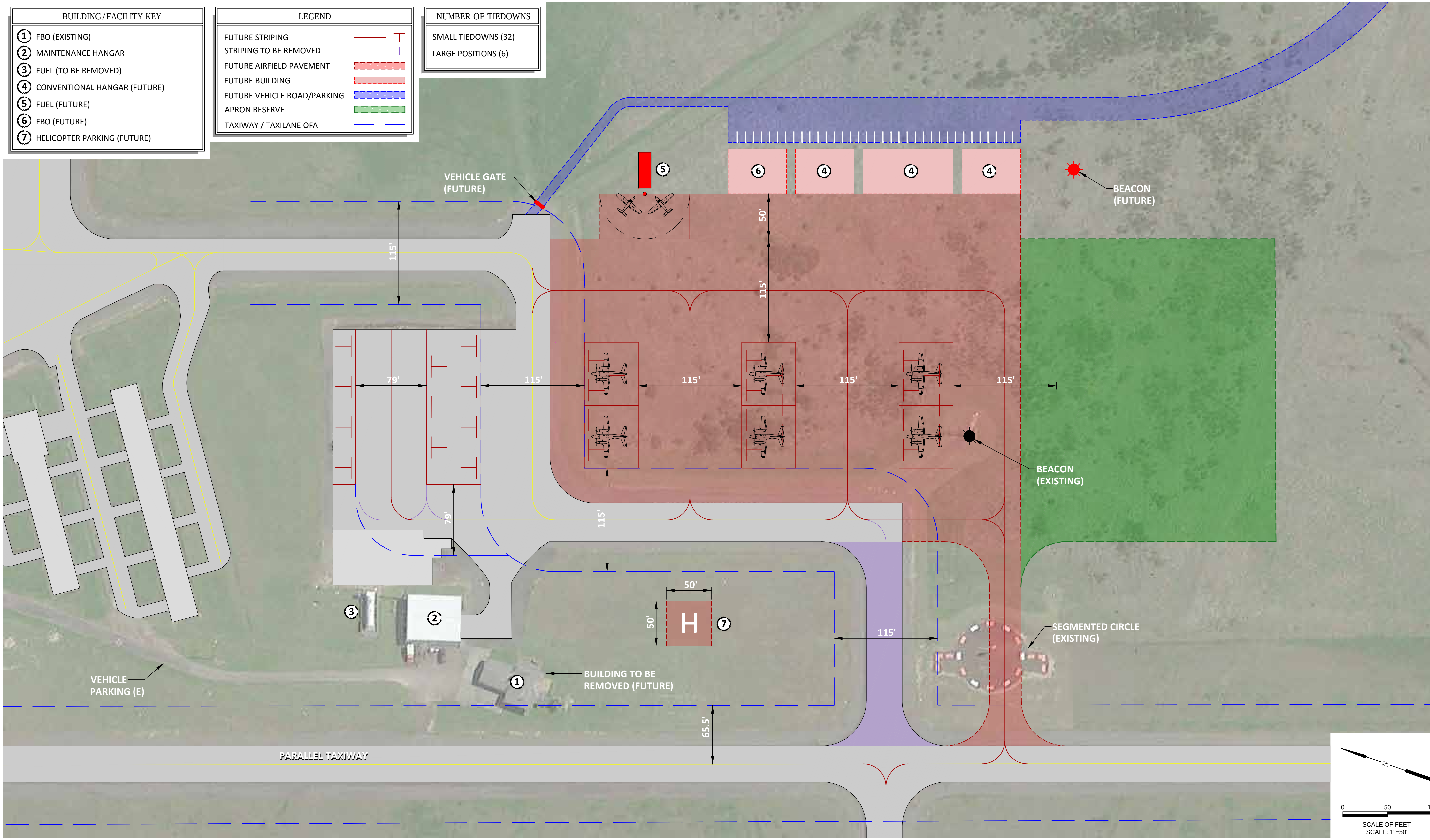
- Relocate segmented circle to the west side of Runway 14/32; and
- Shift the taxilane between the apron and Taxiway A to the south.

APRON ALTERNATIVE B

Apron Alternative B (see **Figure 6-7**) reconfigures the main apron with tiedowns in an east-west orientation. Future commercial hangar development is located on the east side of the apron with new public vehicle access from South Darnell Road. Future conventional hangar development is located on the north side of the main apron. The future FBO and fueling facilities are located near the south end of the expanded apron with direct taxiway access to the runway-taxiway system. This alternative also shifts the existing main access taxiway and parallel taxiway connection to the south, eliminating the direct (straight line) taxi route to the runway.

The elements of Alternative B include:

- Expanded main apron with an apron reserve;
- Reconfigured airplane tiedowns and main apron taxilanes (ADG I and II);
- New & Existing Apron Section - One convertible parking row (dual markings) capable of accommodating large aircraft drive-through parking and small airplane tiedowns;
  - Eight (8) large airplane drive-through parking positions or 24 small airplane tiedowns;
- Future aviation fuel storage and dispensing area (Jet A and AVGAS) to the east end of the apron, adjacent to the future FBO building;
- New FBO building with public access;
- Remove existing FBO building within TOFA for Taxiway A;
- Three new commercial use hangars with public access located along the east edge of the apron;
- Three conventional hangars, located along the north edge of the apron;
- Construct new public access road from South Darnell Road;
- Vehicle parking;
- Relocate rotating beacon;
- Construct helicopter parking position (approximately 50’x50’);
- Relocate segmented circle to the west side of Runway 14/32; and
- Relocate section of taxilane between the apron and Taxiway A.

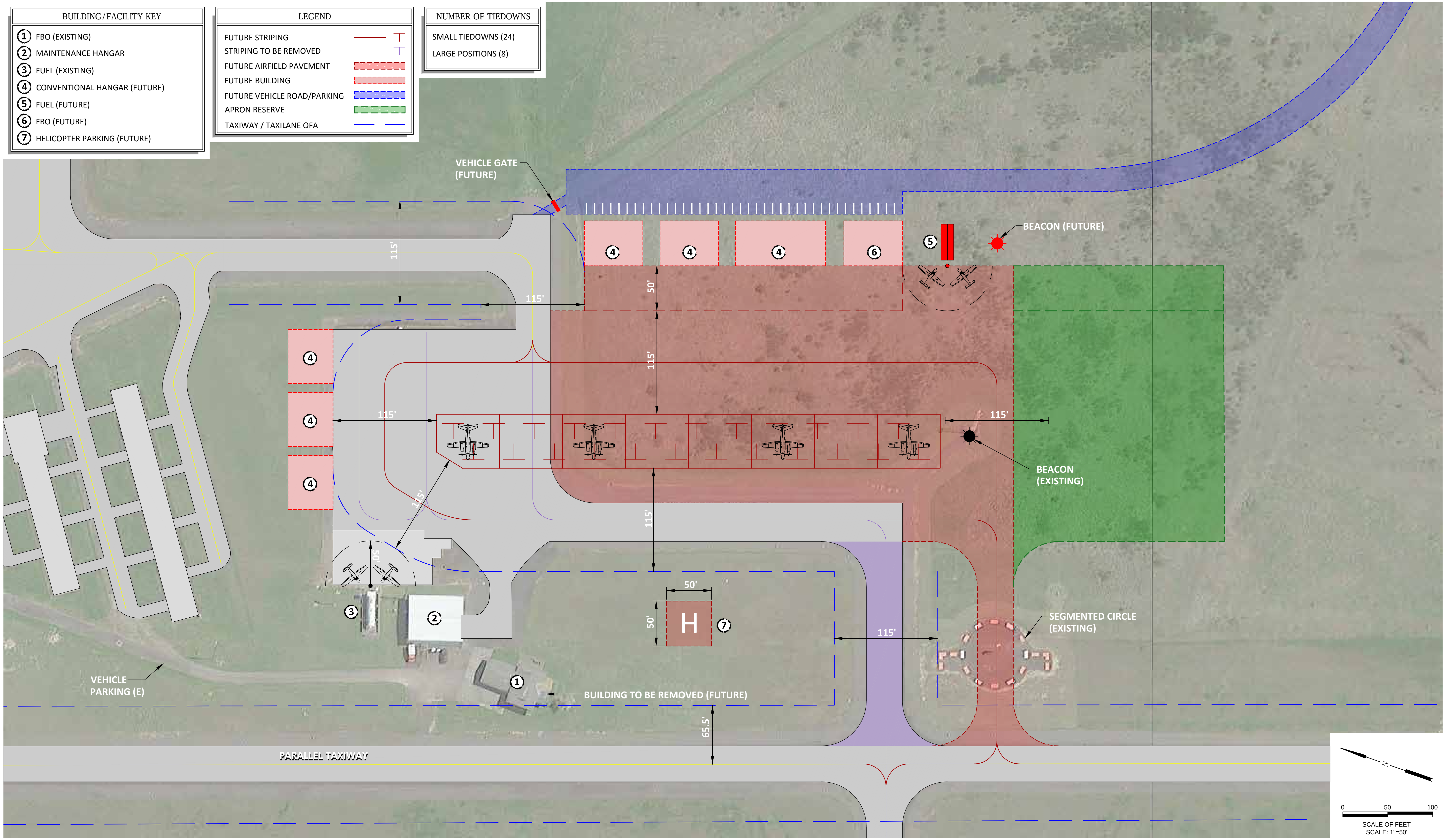


MULINO STATE AIRPORT | AIRPORT MASTER PLAN

APRON ALTERNATIVE A | **FIG. 6-6**

OREGON AVIATION

CENTURY WEST ENGINEERING



MULINO STATE AIRPORT | AIRPORT MASTER PLAN

OREGON AVIATION

APRON ALTERNATIVE B | **FIG. 6-7**

CENTURY WEST ENGINEERING

Recommended Development Options

PREFERRED AIRSIDE DEVELOPMENT (PRELIMINARY)

The preliminary preferred airside development was selected and refined, based on a review of the preliminary development options identified previously in this chapter. The selection was based on input from ODA staff and the Planning Advisory Committee. The recommended airside configuration remains as was depicted in **Figure 6-1 "Recommended Airside Development"**. The recommended airside development will remove the existing relocated Runway 32 threshold and replace it with an 83-foot displaced threshold. Changing from a relocated threshold to a displaced threshold will also entail implementation of Declared Distances, as discussed previously in this chapter.

The Recommended Airside Development retains the future Non-Precision instrument approach capability on the Runway 32 end with a 34:1 approach surface and an expanded runway protection zone (1,000' inner width, 1,510' outer width, and 1,700' length), which is required to accommodate approach visibility minimums not lower than ¾ mile. The expanded RPZ will also require acquisition of additional avigation easements for those areas not owned by ODA with further study to determine the need for any obstruction clearing of trees within the expanded RPZ.

PREFERRED AIRSIDE DEVELOPMENT (FINAL)

The final preferred airside development was created following FAA review of the runway configuration. The recommended runway length of 3,600 feet mirrors the original length of Runway 14/32. The final configuration extends the runway 175 feet at its north end and removes the 175-foot aligned taxiway at the south end of the runway. The change in runway configuration requires pavement removal and new construction to the parallel taxiway, exit taxiways, and the aircraft hold areas.

Extending the runway to the north brings South Mulino Road closer to the Runway 14 end and RPZ. The final configuration relocates South Mulino Road outside of the future Runway 14 RPZ with airport control provided through property acquisition or an avigation easement.

The final configuration includes:

- Removal of the existing 175-foot aligned taxiway at the Runway 32 end;
- The existing threshold location is maintained (re-designated Runway 33);
- The south exit taxiway, the southern section of the east parallel taxiway, and aircraft hold area pavement is removed;
- A new south exit taxiway and aircraft hold area are constructed with a 90-degree connection to the Runway 33 threshold;
- Construction of a 175-foot extension at the north end of the runway (re-designated Runway 15);
- Update runway lighting configurations, as needed;

- The north exit taxiway, the north section of the east parallel taxiway, and aircraft hold area pavement is removed;
- A new north exit taxiway and aircraft hold area are constructed with a 90-degree connection to the Runway 15 threshold;
- Vacate a 1,500-foot section of South Mulino Road and realign road to avoid the new Runway 15 RPZ (county road right of way to be acquired);
- Approximately 2 acres of property acquisition (or avigation easement) is required to provide control for new Runway 15 RPZ; and
- Realign fencing at north end of airport to control access to the RPZ.

The final preferred airside development is depicted on the Airport Layout Plan in Chapter 7.

PREFERRED LANDSIDE OPTION (FINAL)

The preferred Landside Option depicted in **Figure 6-8** represents modified versions of Landside Option B (Figure 6-3) and Apron Alternative A (Figure 6-6). The preferred Landside Option includes several improvements including aircraft parking, hangars, and service facilities. As noted earlier, the expanded landside development area is located on the east side of the airport, which requires reconfigured surface

The primary features of the preferred Landside Option include:

- Construct a new vehicle access road that connects Darnell Road/Highway 213 to the east terminal area and hangar development areas;
- Main apron expansion with apron reserve:
    - Existing Apron Section – Reconfigure with one double-sided row of small airplane tiedowns (7 tiedowns) and one single row of tiedowns (4) located along the north edge of the apron (to be eliminated when hangars are constructed along the north edge of the apron), tiedowns served by ADG I taxilanes;
    - New Apron Section - Three convertible parking rows (dual markings) capable of accommodating large aircraft drive-through parking and small airplane tiedowns (6 large airplane drive-through parking positions or 15 small airplane tiedowns);
    - Reconfigure aircraft tiedowns and main apron taxilanes (ADG I and II);
    - Apron Reserve – Two additional rows of small airplane parking (20 tiedowns);
    - Construct a concrete helicopter parking position (approximately 50’x50’) south of the existing maintenance hangar between the main apron and Taxiway A;
    - Relocate the rotating beacon to an area south of the expanded apron area;
    - Relocate the segmented circle to the west side of Runway 14/32;
    - Remove the eastern portion of Taxiway A2 between the apron and Taxiway A to the south (to prevent direct taxi from the apron onto the runway);

- New FBO Facilities:
  - New FBO building and maintenance hangar sites;
  - Aircraft fuel storage and dispensing area;
  - Public access and vehicle parking;
- South Hangar Area Improvements:
  - Four 10-unit T-hangars;
  - New hangar taxilane access (loop taxilane connects to south end of main apron with two direct access connections to parallel taxiway);
  - Hangar Reserve – east row of conventional hangars located adjacent to loop taxilane;
  - Public access and vehicle parking;
- North Hangar Area:
  - Small conventional hangar sites (approximately 7 hangar sites between north end of main apron and existing T-hangar building pads (future T-hangars);
  - Expansion of NE T-hangar (north end of building) and taxilane improvements;
- Construct a new vehicle parking area along Mulino Road to serve the existing T-hangars and Skydive operator;

Future public vehicle access would be provided by extending Darnell Road to the terminal area and hangar development areas. The extension of Darnell Road would require a modification to the existing turf taxilane and the boundaries of the existing parachute drop area (no change in acreage is proposed). New vehicle access gates will be added to control access to the north and south hangar areas, and the main apron.

A new taxilane would connect Taxiway A to the existing northernmost T-hangar area. Once this taxilane is constructed, Airport Road would be restricted to tenant- only use and a vehicle gate would be installed. This will prevent public access to the existing maintenance hangar and pilot lounge. A new maintenance hangar and FBO building would eventually be sited on the east side of the expanded apron with public vehicle access and parking. These new facilities would replace the existing maintenance hangar and pilot lounge, both of which would be within the expanded building restriction line when the upgraded instrument approach is implemented.

The existing Pilot Lounge/FBO building is currently being renovated and will ultimately be relocated to eliminate obstruction to the parallel taxiway OFA and the runway primary surface.

The recommended landside improvements will be integrated into the updated Airport Layout Plan and Terminal Area Plan.

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MULINO STATE AIRPORT | AIRPORT MASTER PLAN

APRON PREFERRED ALTERNATIVE | FIG. 6-8

OREGON AVIATION

CENTURY WEST ENGINEERING

Chapter 7 – Airport Layout Plan Drawings

Chapter 7 – Airport Layout Plan Drawings

Introduction

The options considered for the long-term development of Mulino State Airport described in the Airport Development Alternatives Chapter (Chapter 6) resulted in the selection of a preferred alternative. The preferred alternative, with subsequent refinements, has been incorporated into the Airport Layout Plan drawings. The set of airport plans, which is referred to in aggregate as the "Airport Layout Plan" (ALP) has been prepared in accordance with FAA guidelines. The drawings illustrate existing conditions, recommended changes in airfield facilities, property ownership, land use, and obstruction removal. The ALP set is presented at the end of this chapter:

- Sheet 1 – Cover Sheet
- Sheet 2 – Airport Data Sheet
- Sheet 3 – Airport Layout Plan
- Sheet 4 –Terminal Area Plan
- Sheet 5 – Airport Airspace Plan (FAR Part 77)
- Sheet 6 – Airport Airspace Plan (FAR Part 77)
- Sheet 7 – Runway 14/32 Inner Approach Surface Plan & Profile and Runway Protection Zone
- Sheet 8 – Off-Airport Land Use Plan
- Sheet 9 – On-Airport Land Use Plan
- Sheet 10 – Exhibit "A" Airport Property Plan

The Airport Layout Plan drawings provide detailed information for existing and future facilities. The future improvements depicted in the drawing set are consistent with the Airport Master Plan's updated twenty-year capital improvement program contained in the Financial Chapter (Chapter 9).

The ALP drawing set was submitted along with the draft final Airport Master Plan report to the Federal Aviation Administration (FAA) for review and approval. The drawings were reviewed by the FAA Airports District Office (ADO), with additional review coordinated between other FAA offices (Flight Procedures, Flight Standards, etc.). The final ALP drawing set is signed by Oregon Department of Aviation (ODA) and the FAA Seattle Airports District Office (ADO). As individual projects are completed, minor "as-built" updates to the ALP drawings may be completed (with FAA coordination) without updating the Airport Master Plan.

The Airport Layout Plan drawings are prepared using AutoCAD® computer-aided drafting software, which allows for easier updating and revision. The drawing files may also be imported into local geographic information systems (GIS) to support land use planning, airport overlay zone mapping, etc.

A brief summary of the individual drawings is provided below:

AIRPORT DATA SHEET DRAWING

The Airport Data Sheet drawing contains detailed runway and airfield dimensions, FAA dimensional standards, wind rose, and other data that is reflected on the sheets in the drawing set.

AIRPORT LAYOUT PLAN DRAWING

The Airport Layout Plan (ALP) drawing graphically depicts existing and future airfield facilities.

Future facilities are depicted in red to distinguish them from existing facilities (depicted in black). Future facilities are represented in the Airport Master Plan's twenty-year Capital Improvement Program (CIP) as individual projects or project groupings. Long-term development reserves depicted on the ALP are also color-coded (green). These items are intended to serve as placeholders or are provided for reference only. Demand for facilities identified as development reserves is not anticipated to occur in the current twenty-year planning period and therefore the corresponding projects are not included in the Airport Master Plan CIP. A change of events that could move a development reserve into an actual project would require updated planning and coordination with FAA.

Small areas of the property acquisition are required to accommodate the future realignment of South Mulino Road and the runway protection zone (RPZ) for Runway 14.

TERMINAL AREA PLAN DRAWINGS

The Terminal Area Plan drawing depicts facilities in the landside area located on the east side of Runway 14/32. The drawing provides additional detail for existing and new facilities. Recommended improvements include reconfigured/expanded aircraft parking apron; future hangar sites and FBO facilities; relocated segmented circle, beacon, wind cone; new/relocated aircraft fuel storage and dispensing area; new airport access road and vehicle parking areas.

FAR PART 77 AIRSPACE DRAWING

The FAR Part 77 Airspace drawing depicts the protected airspace defined for Runway 14/32 in Federal Aviation Regulation (FAR) Part 77, *Objects Affecting Navigable Airspace* based on the ultimate configuration depicted on the Airport Layout Plan drawing.

The Airspace Plan depicts the five "imaginary surfaces" defined in FAR Part 77.25 including the primary, transitional, approach, horizontal, and conical surfaces, previously described in Chapter 4. The "ultimate" airspace configuration is consistent with the future runway configuration depicted on the ALP. The physical characteristics of the Part 77 surfaces are defined by the size of aircraft using the runway and the approach capabilities of the runway.

- **Runway 14/32 Approach Surfaces:**
  - The **Runway 32** approach surface extends 10,000 feet from the end of the runway primary surface. The approach surface has a slope of 34:1, which represents the horizontal distance required for each increment of vertical rise. This approach surface corresponds to the ultimate non-precision instrument approach capabilities (≥ 3/4–mile visibility) for this runway end.
  - The **Runway 14** approach surface extends 5,000 feet from the end of the runway primary surface. The approach surface has a slope of 20:1. This approach surface corresponds to the ultimate visual approach capabilities (1–mile visibility) for this runway end.
- **Primary Surface:** Based on the planned non-precision approach standards and the ≥ ¾-mile approach visibility criteria for Runway 32, combined with the "other than utility" runway designation for Runway 14/32, the required primary surface is 1,000 feet wide and extends 200 feet beyond each runway end. The primary surface is a flat plane of airspace centered on the runway with the same elevation as the nearest point on the runway centerline.

- **Transitional Surface:** The runway transitional surface extends outward and upward from each side of the primary surface. The transitional surface has a slope of 7:1 and extends upward to an elevation 150 feet above the airport elevation, where it connects to the horizontal surface. Runway 14/32 has an approach transitional surface that extends upward at a 7:1 slope, extending 5,000 feet beyond the sides of the runway approach surface. There are areas of terrain penetration identified along the west side and the southwest side of the runway.

- **Horizontal Surface:** The horizontal surface is defined by 10,000-foot radii arcs that extend outward from the midpoint of both ends of the primary surface and are connected with parallel lines to form an oval. The horizontal surface is a flat plane of airspace with an elevation 150 feet above the airport elevation. The majority of obstructions identified in the horizontal surface are trees located off airport property.

- **Conical Surface:** The conical surface extends outward 4,000 feet from the outer edge of the horizontal surface at a slope of 20:1.

Part 77 surfaces should be free of built objects or terrain obstructions to the greatest extent possible. Objects that penetrate FAR Part 77 surfaces may require marking or removal depending on their severity, location, and the feasibility of the action. The drawing includes a table of obstructions with recommended dispositions. New obstruction data that is obtained through a future Airport GIS (AGIS) survey may be incorporated into the drawing/obstruction table once the survey is completed and the data has been approved by FAA.

RUNWAY AND APPROACH SURFACE PLAN AND PROFILE DRAWING

The Runway and Approach Surface Plan and Profile drawing depicts plan and profile views of the runway and the approach surfaces depicted in the FAR Part 77 Airspace Plan. The drawing provides additional detail to identify obstructions, terrain, and other physical features within the approach surfaces. The drawing depicts obstructions within these defined areas, using common identifiers from the FAR Part 77 Airspace Plan.

RUNWAY PROTECTION ZONE & INNER APPROACH SURFACE DRAWING

The Runway Protection Zone (RPZ) and Inner Approach Surface Drawing depict detailed plan views of these areas and a profile view of the approach surface and threshold siting surface (when used). The drawing depicts obstructions within these defined areas, using common identifiers from the FAR Part 77 Airspace Plan.

AIRPORT LAND USE PLANS

The Airport Land Use Plan drawings depict existing comprehensive plan land use and zoning designations for the airport and surrounding areas. Mulino State Airport is located within Clackamas County. The existing skydiving drop zones located on the airport are also depicted.

EXHIBIT "A" – AIRPORT PROPERTY MAP

The Airport Property Map drawing depicts all property owned by ODA and property controlled through avigation easements associated with the airport. The drawing notes the form of ownership or control (fee simple, avigation easement, etc.) and the date of acquisition, FAA funding source (where applicable), per FAA guidelines.

Small areas of the property acquisition are required to accommodate the future realignment of South Mulino Road and the runway protection zone (RPZ) for Runway 14.

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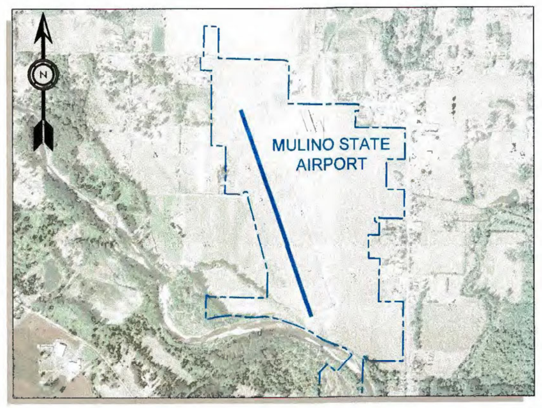
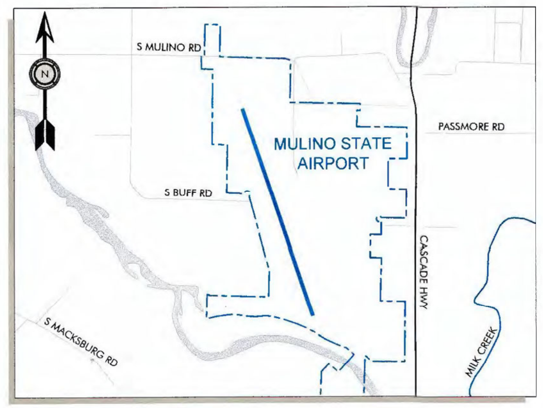
MULINO STATE AIRPORT
MASTER PLAN

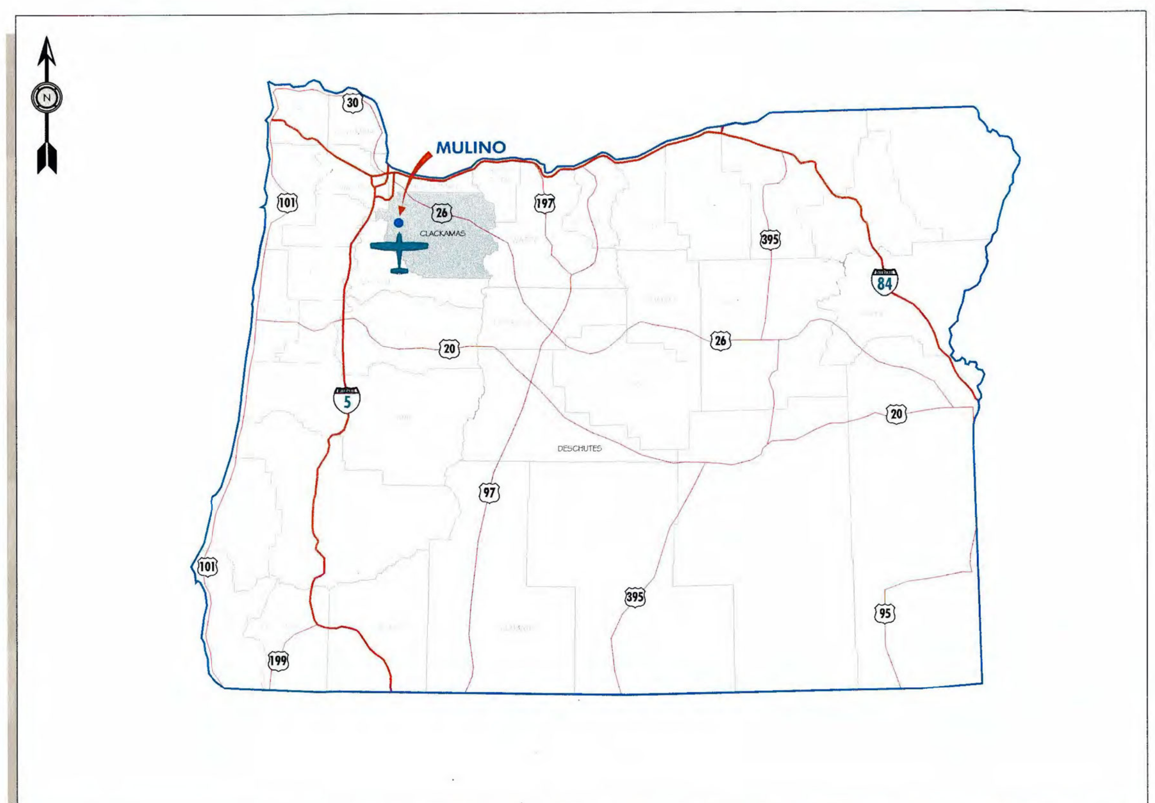
MULINO, OREGON
CWEC PROJECT NO. 4009705501
AIP NO. 3-41-0072-012
APRIL 2019



AERIAL PHOTO



VICINITY MAP



LOCATION MAP

SHEET INDEX

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DESIGNED BY: DM	DRAWN BY: JLS	CHECKED BY: WMR	SCALE: AS SHOWN
DATE: APRIL 2019		PROJECT NO: 4009705501	

MULINO STATE AIRPORT
COVER SHEET

FIGURE NO. -
SHEET NO. 1 OF 10

AIRPORT DATA TABLE

DESCRIPTION		EXISTING	FUTURE
AIRPORT ELEVATION		259.6'	SAME
AIRPORT ACREAGE		275	281
ARP COORDINATES	LAT. LONG.	N 45° 12' 59.58" W 122° 35' 24.73"	N 45° 13' 00.39" W 122° 35' 16.10"
MAGNETIC DECLINATION		15°12'E (2/2019) ANNUAL RATE OF CHANGE 0°6'W	SAME
MEAN MAX. DAILY TEMPERATURE		82.6°	SAME
FAA IDENTIFIER		4S9	SAME
DATUM		NAD83/NAVD88	SAME
CRITICAL AIRCRAFT (ARC)		BEECH BARON (MULTI ENGINE PISTON)	BEECHCRAFT KING AIR 250
WINGSPAN		<49'	<79
WEIGHT		≤12,500 LBS.	12,500 LBS.
APPROACH SPEED		<91 KNOTS	<121 KNOTS
LENGTH OF HAUL		<500 MILES	<500 MILES
NPIAS ROLE / SERVICE LEVEL		GENERAL AVIATION	SAME
AIRPORT REFERENCE CODE (ARC)		B-I (SMALL)	B-II

RUNWAY DATA TABLE

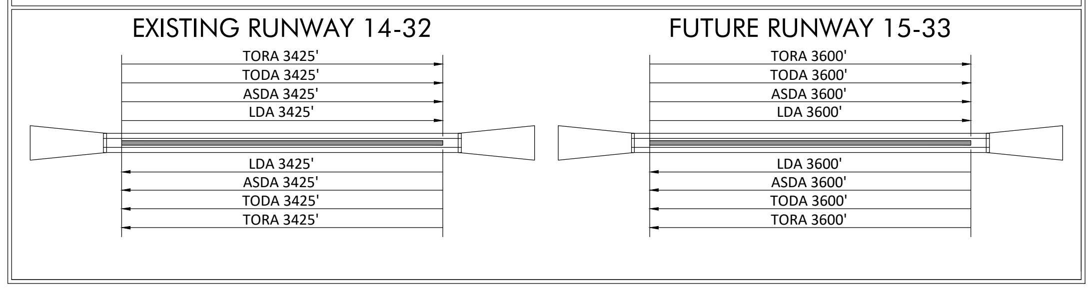
	EXISTING CONDITIONS RUNWAY 14 - 32	FUTURE CONDITIONS RUNWAY 15 - 33
RUNWAY LENGTH AND WIDTH	3425' X 100'	3600' X 75' (SEE NOTE 3)
RUNWAY PAVEMENT STRENGTH (IN 1000 LBS)	12 SW	12.5 SW
RUNWAY PAVEMENT TYPE	ASPHALT	SAME
RUNWAY PERCENT WIND COVERAGE (12 MPH)	N/A	SAME
RUNWAY PERCENT GRADIENT / MAXIMUM GRADE	0.34%	0.36%
RUNWAY DESIGN CODE (RDC)	B-I	B-II
FAR PART 77 DESIGNATION	UTILITY	LARGER THAN UTILITY
TERMINAL NAVAIDS	-	-
TAXIWAY LIGHTING	MITL	SAME
TAXIWAY MARKING	BASIC	SAME

RUNWAY DATA TABLES

	EXISTING CONDITIONS	EXISTING STANDARD	FUTURE CONDITIONS	FUTURE STANDARD
RUNWAY SAFETY AREA LENGTH AND WIDTH LENGTH BEYOND RUNWAY END	4025' X 150' 300'	3905' X 120' 240'	4200' X 150' 300'	4200' X 150' 300'
OBJECT FREE AREA LENGTH AND WIDTH LENGTH BEYOND RUNWAY END	4025' X 500' 300'	3905' X 250' 240'	4200' X 500' 300'	4200' X 500' 300'
OBSTACLE FREE ZONE LENGTH AND WIDTH LENGTH BEYOND RUNWAY END	3825' X 400' 200'	3825' X 250' 200'	4000' X 400' 200'	4000' X 400' 200'

		EXISTING CONDITIONS		FUTURE CONDITIONS	
RUNWAY LIGHTING		MIRL		SAME	
RUNWAY END		14	32	15	33
RUNWAY APPROACH CATEGORY		VISUAL	VISUAL	VISUAL	NPI
RUNWAY APPROACH SLOPE	PART 77 REQUIRED	20:1	20:1	20:1	34:1
	ACTUAL	20:1	34:1	20:1	34:1
RUNWAY DEPARTURE SURFACE		N/A	N/A	YES	YES
APPROACH VISIBILITY MINIMUMS		≧ 1 MILE	≧ 1 MILE	≧ 1 MILE (SEE NOTE 2)	≧ 3/4 MILE (SEE NOTE 2)
RUNWAY PROTECTION ZONE	ARRIVAL	500' X 700' X 1000'	500' X 700' X 1000'	500' X 700' X 1000'	1000' X 1510' X 1700'
	DEPARTURE	500' X 700' X 1000'	500' X 700' X 1000'	500' X 700' X 1000'	500' X 700' X 1000'
TOUCHDOWN ZONE ELEVATION (TDZE)		258.9'	260.1	SAME	SAME
RUNWAY MARKINGS		BASIC	BASIC	BASIC	NPI
RUNWAY END COORDINATES	LAT. LONG.	N 45° 13' 15.424" W 122° 35' 33.109"	N 45° 12' 43.743" W 122° 35' 16.359"	N 45° 13' 17.041" W 122° 35' 33.964"	N 45° 12' 43.743" W 122° 35' 16.359"
INSTRUMENTATION AND APPROACH AIDS		NONE	NONE	RNAV (GPS)	RNAV (GPS)
VISUAL AIDS		PAPI, REIL	PAPI, REIL	PAPI, REIL	PAPI, REIL / ALS
OFZ PENETRATION		NO		NO	

DECLARED DISTANCES



NON STANDARD CONDITIONS

NO.	ITEM	DESCRIPTION	DISPOSITION
1	APRON TAXILANE OFA	TIEDOWNS	RECONFIGURE
2	PARALLEL TAXIWAY OFA	FBO BUILDING	RELOCATE/REMOVE PORTION OF BUILDING WITHIN ADG II TOFA
3	HANGAR TAXILANE OFA	T-HANGARS	RECONFIGURE TAXILANE WHERE FEASIBLE & WHEN DEVELOPMENT IS AT END OF USEFUL LIFE.
4	RUNWAY 32	ALIGNED TAXIWAY	REMOVE PAVEMENT; CONSTRUCT NEW ACCESS TAXIWAY TO THRESHOLD
5	RUNWAY OFA	BERM	REMOVE

MODIFICATION TO STANDARDS

"NONE REQUIRED"

TAXIWAY / TAXILANE DATA

TAXIWAY DESIGN GROUP (TDG) : 1A (E) / 2 (F)

	EXISTING CONDITIONS	EXISTING STANDARDS	FUTURE CONDITIONS	FUTURE STANDARDS
TAXIWAY WIDTHS	40' / 50'	25'	35'	35'
TAXILANE WIDTHS	VARIES	25'	25' / 35'	25' / 35'
TAXIWAY OBJECT FREE AREA	VARIES	89'	131'	131'
TAXILANE OBJECT FREE AREA	VARIES	79'	115'	115'
TAXIWAY SAFETY AREA	VARIES	49'	79'	79'

APRON DIMENSIONS

	SQUARE FOOTAGE APPROX.
APRON EXISTING	56,144
APRON FUTURE	176,987
APRON RESERVE	79,650

LEGEND

	EXISTING	FUTURE
BUILDINGS		
AIRFIELD PAVEMENT		
BUILDING RESTRICTION LINE (BRL)	BRL (E)	BRL (F)
AIRPORT PROPERTY LINE		
RUNWAY SAFETY AREA (RSA)		
OBJECT FREE AREA (OFA)		
OBSTACLE FREE ZONE (OFZ)		
TAXIWAY OBJECT FREE AREA (TOFA)		
TAXIWAY SAFETY AREA (TSA)		
RUNWAY PROTECTION ZONE (RPZ)		
GROUND CONTOURS	100'	SAME
AIRPORT REFERENCE POINT (ARP)		
VISUAL GUIDANCE INDICATORS (PAPI)		
WIND INDICATOR		
SEGMENTED CIRCLE WIND INDICATOR		
FENCE 4' EXISTING 6' FUTURE		
BEACON		
THRESHOLD LIGHTS		
REIL		
MEDIUM INTENSITY RUNWAY LIGHTS (MIRL)		N/A
ACCESS ROAD/VEHICLE PARKING	N/A	
AVIGATION EASEMENT		
AERONAUTICAL RESERVE	N/A	
TO BE REMOVED		N/A
WATER		SAME
TREES		SAME
SKYDIVE DROP ZONE		N/A
TURF TAXIWAY		
AUTOMATED AIRPORT WEATHER STATION (AWOS)	N/A	
APPROACH LIGHTING SYSTEM (ALS)	N/A	
HELICOPTER PARKING	N/A	H

NOTES:

1. RUNWAY 14/32 TO BE REDESIGNATED 15/33 DUE TO CHANGE IN MAGNETIC DECLINATION.
2. VERTICALLY GUIDED SURVEY REQUIRED.
3. RUNWAY WIDTH OF 100' AND TAXIWAY WIDTH OF 40' / 50' EXCEEDS STANDARD FOR B-I/ B-II AIP. AIP ELIGIBILITY WILL BE DETERMINED AT THE TIME OF A FUTURE PROJECT.
4. FUTURE 3/4 MILE VISIBILITY MAY BE IMPLEMENTED WITH THE EXISTING OR FUTURE DESIGN AIRCRAFT.
5. THE EXISTING STANDARDS LISTED REFLECT THE MASTER PLAN DEFINED EXISTING CRITICAL AIRCRAFT (ARC: B-I SMALL). THE EXISTING CONDITIONS LISTED REFLECT ACTUAL FACILITIES.

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NO.	DATE	BY	APPR	REVISIONS

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APPROVAL DATE: ______

SIGNATURE

OREGON DEPARTMENT OF AVIATION APPROVAL

APPROVAL DATE: ______

SIGNATURE

CENTURY WEST ENGINEERING

BEND OFFICE
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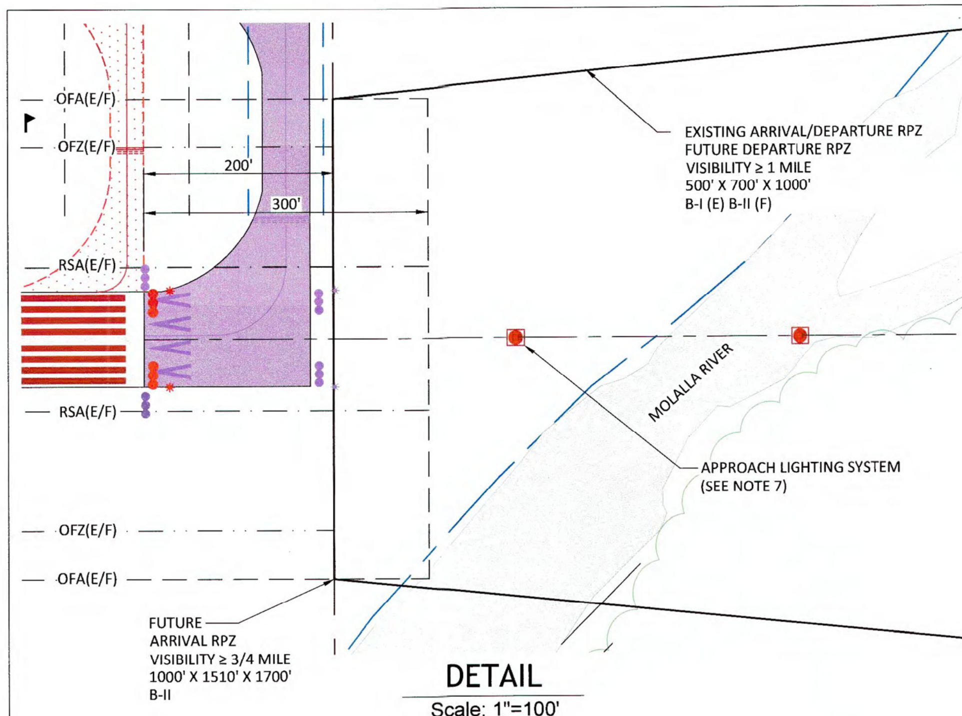
DESIGNED BY: DM	DRAWN BY: JLS	CHECKED BY: WMR	SCALE: AS SHOWN
DATE: APRIL 2019		PROJECT NO: 4009705501	

MULINO STATE AIRPORT

AIRPORT DATA SHEET

FIGURE NO. -



DETAIL

Scale: 1"=100'

BUILDING/FACILITY KEY

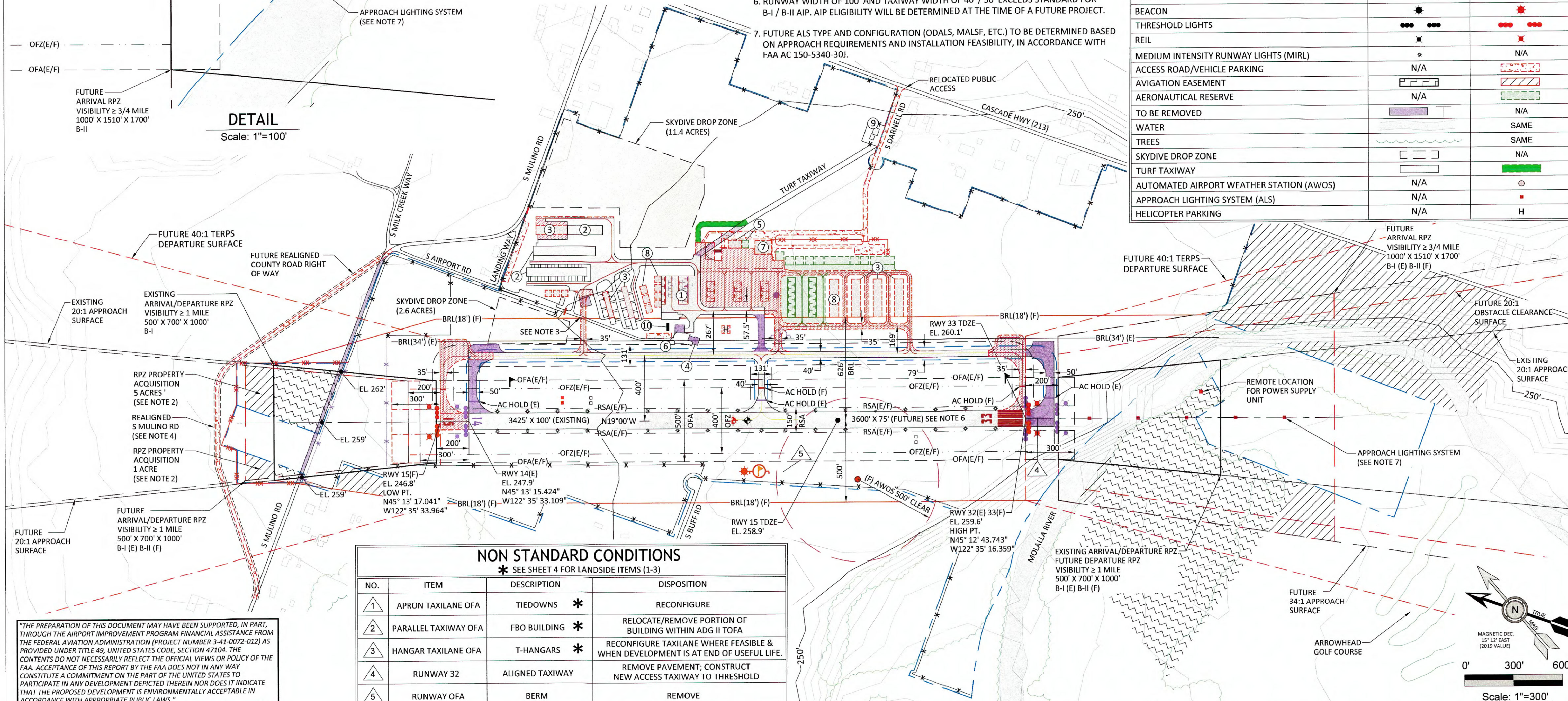
NO.	DESCRIPTION
1	AIRCRAFT APRON (EXISTING)
2	T-HANGAR (EXISTING)
3	T-HANGAR (FUTURE)
4	FBO (EXISTING)
5	FBO (FUTURE)
6	MAINTENANCE HANGAR (EXISTING)
7	MAINTENANCE HANGAR (FUTURE)
8	HANGARS (FUTURE)
9	EXPERIMENTAL AIRCRAFT ASSOCIATION
10	FUEL (EXISTING)

NOTES:

1. RUNWAY 14/32 TO BE REDESIGNATED 15/33 DUE TO CHANGE IN MAGNETIC DECLINATION.
2. EXISTING RWY 14 RPZ CONTROLLED THROUGH AVIGATION EASEMENT. FUTURE RPZ REQUIRES EXPANDED EASEMENT AND / OR PROPERTY ACQUISITION.
3. AIRPORT SERVICE ROAD, A VEHICLE GATE WILL BE INSTALLED RESTRICTING ACCESS TO TENANTS AND AIRPORT VEHICLES PRIOR TO THE CONSTRUCTION OF THE NEW TAXIWAY.
4. SOUTH MULINO ROAD REALIGNMENT IS CONCEPTUAL AND MAY POTENTIALLY AFFECT 3 PRIVATELY-OWNED PARCELS. THE R.O.W. DEPICTED FOR THE REALIGNMENT IS ALSO CONCEPTUAL AND INDIVIDUAL PROPERTY ASSESSMENTS WILL BE REQUIRED.
5. THE EXISTING RUNWAY-TAXIWAY SYSTEM WAS DESIGNED AND CONSTRUCTED TO MEET/ EXCEED ARC B-II DIMENSIONAL STANDARDS. B-II WAS LISTED AS EXISTING AND FUTURE ARC ON 2008 FAA-APPROVED ALP. THE UPDATED EXISTING CRITICAL AIRCRAFT (B-I SMALL) DESIGN STANDARDS ARE NOTED ON SHEET 2, BUT ARE NOT DEPICTED, FOR CLARITY.
6. RUNWAY WIDTH OF 100' AND TAXIWAY WIDTH OF 40' / 50' EXCEEDS STANDARD FOR B-I / B-II AIP. AIP ELIGIBILITY WILL BE DETERMINED AT THE TIME OF A FUTURE PROJECT.
7. FUTURE ALS TYPE AND CONFIGURATION (ODALS, MALSF, ETC.) TO BE DETERMINED BASED ON APPROACH REQUIREMENTS AND INSTALLATION FEASIBILITY, IN ACCORDANCE WITH FAA AC 150-5340-30J.

LEGEND

	EXISTING	FUTURE
BUILDINGS		
AIRFIELD PAVEMENT		
BUILDING RESTRICTION LINE (BRL)	BRL (E)	BRL (F)
AIRPORT PROPERTY LINE		
RUNWAY SAFETY AREA (RSA)		
OBJECT FREE AREA (OFA)		
OBSTACLE FREE ZONE (OFZ)		
TAXIWAY OBJECT FREE AREA (TOFA)		
TAXIWAY SAFETY AREA (TSA)		
RUNWAY PROTECTION ZONE (RPZ)		
GROUND CONTOURS	100'	SAME
AIRPORT REFERENCE POINT (ARP)		
VISUAL GUIDANCE INDICATORS (PAPI)		
WIND INDICATOR		
SEGMENTED CIRCLE WIND INDICATOR		
FENCE 4' EXISTING 6' FUTURE		
BEACON		
THRESHOLD LIGHTS		
REIL		
MEDIUM INTENSITY RUNWAY LIGHTS (MIRL)		N/A
ACCESS ROAD/VEHICLE PARKING	N/A	
AVIGATION EASEMENT		
AERONAUTICAL RESERVE	N/A	
TO BE REMOVED		N/A
WATER		SAME
TREES		SAME
SKYDIVE DROP ZONE		N/A
TURF TAXIWAY		
AUTOMATED AIRPORT WEATHER STATION (AWOS)	N/A	
APPROACH LIGHTING SYSTEM (ALS)	N/A	
HELICOPTER PARKING	N/A	H



NON STANDARD CONDITIONS

* SEE SHEET 4 FOR LANDSIDE ITEMS (1-3)

NO.	ITEM	DESCRIPTION	DISPOSITION
1	APRON TAXILANE OFA	TIEDOWNS *	RECONFIGURE
2	PARALLEL TAXIWAY OFA	FBO BUILDING *	RELOCATE/REMOVE PORTION OF BUILDING WITHIN ADG II TOFA
3	HANGAR TAXILANE OFA	T-HANGARS *	RECONFIGURE TAXILANE WHERE FEASIBLE & WHEN DEVELOPMENT IS AT END OF USEFUL LIFE.
4	RUNWAY 32	ALIGNED TAXIWAY	REMOVE PAVEMENT; CONSTRUCT NEW ACCESS TAXIWAY TO THRESHOLD
5	RUNWAY OFA	BERM	REMOVE

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NO.	DATE	BY	APPR	REVISIONS

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FEDERAL AVIATION ADMINISTRATION APPROVAL

APPROVAL DATE: 7/22/19

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OREGON DEPARTMENT OF AVIATION APPROVAL

APPROVAL DATE: 7/15/19

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DESIGNED BY: DM	DRAWN BY: JLS	CHECKED BY: WMR	SCALE: AS SHOWN
DATE: APRIL 2019		PROJECT NO: 4009705501	

MULINO STATE AIRPORT

AIRPORT LAYOUT PLAN

FIGURE NO. -

SHEET NO. 3 OF 10

BUILDING/FACILITY KEY

NO.	DESCRIPTION
1	AIRCRAFT APRON (EXISTING)
2	T-HANGAR (EXISTING)
3	T-HANGAR (FUTURE)
4	FBO (EXISTING)
5	FBO (FUTURE)
6	MAINTENANCE HANGAR (EXISTING)
7	MAINTENANCE HANGAR (FUTURE)
8	HANGARS (FUTURE)
9	EXPERIMENTAL AIRCRAFT ASSOCIATION
10	FUEL (EXISTING)

APRON DIMENSIONS

	SQUARE FOOTAGE APPROX.
APRON EXISTING	56,144
APRON FUTURE	176,987
APRON RESERVE	79,650

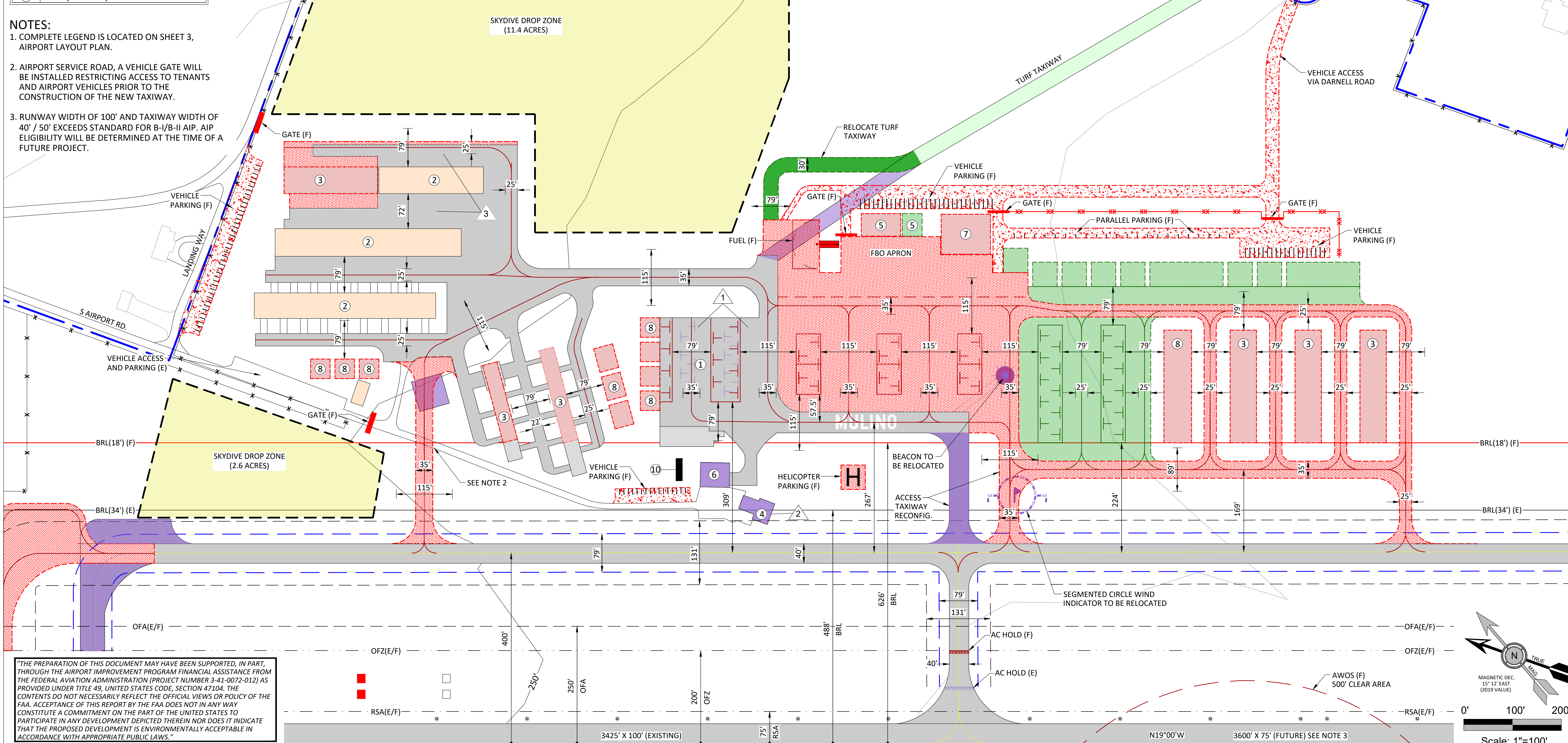
NON STANDARD CONDITIONS

* SEE SHEET 3 FOR AIRSIDE ITEMS (4-5)

NO.	ITEM	DESCRIPTION	DISPOSITION
1	APRON TAXILANE OFA	TIEDOWNS	RECONFIGURE
2	PARALLEL TAXIWAY OFA	FBO BUILDING	RELOCATE/REMOVE PORTION OF BUILDING WITHIN ADG II TOFA
3	HANGAR TAXILANE OFA	T-HANGARS	RECONFIGURE TAXILANE WHERE FEASIBLE & WHEN DEVELOPMENT IS AT END OF USEFUL LIFE.
4	RUNWAY 32	ALIGNED TAXIWAY *	REMOVE PAVEMENT; CONSTRUCT NEW ACCESS TAXIWAY TO THRESHOLD
5	RUNWAY OFA	BERM *	REMOVE

NOTES:

1. COMPLETE LEGEND IS LOCATED ON SHEET 3, AIRPORT LAYOUT PLAN.
2. AIRPORT SERVICE ROAD, A VEHICLE GATE WILL BE INSTALLED RESTRICTING ACCESS TO TENANTS AND AIRPORT VEHICLES PRIOR TO THE CONSTRUCTION OF THE NEW TAXIWAY.
3. RUNWAY WIDTH OF 100' AND TAXIWAY WIDTH OF 40' / 50' EXCEEDS STANDARD FOR B-I/B-II AIP. AIP ELIGIBILITY WILL BE DETERMINED AT THE TIME OF A FUTURE PROJECT.



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DESIGNED BY: DM | DRAWN BY: JLS | CHECKED BY: WMR | SCALE: AS SHOWN

DATE: APRIL 2019 | PROJECT NO: 4009705501

MULINO STATE AIRPORT

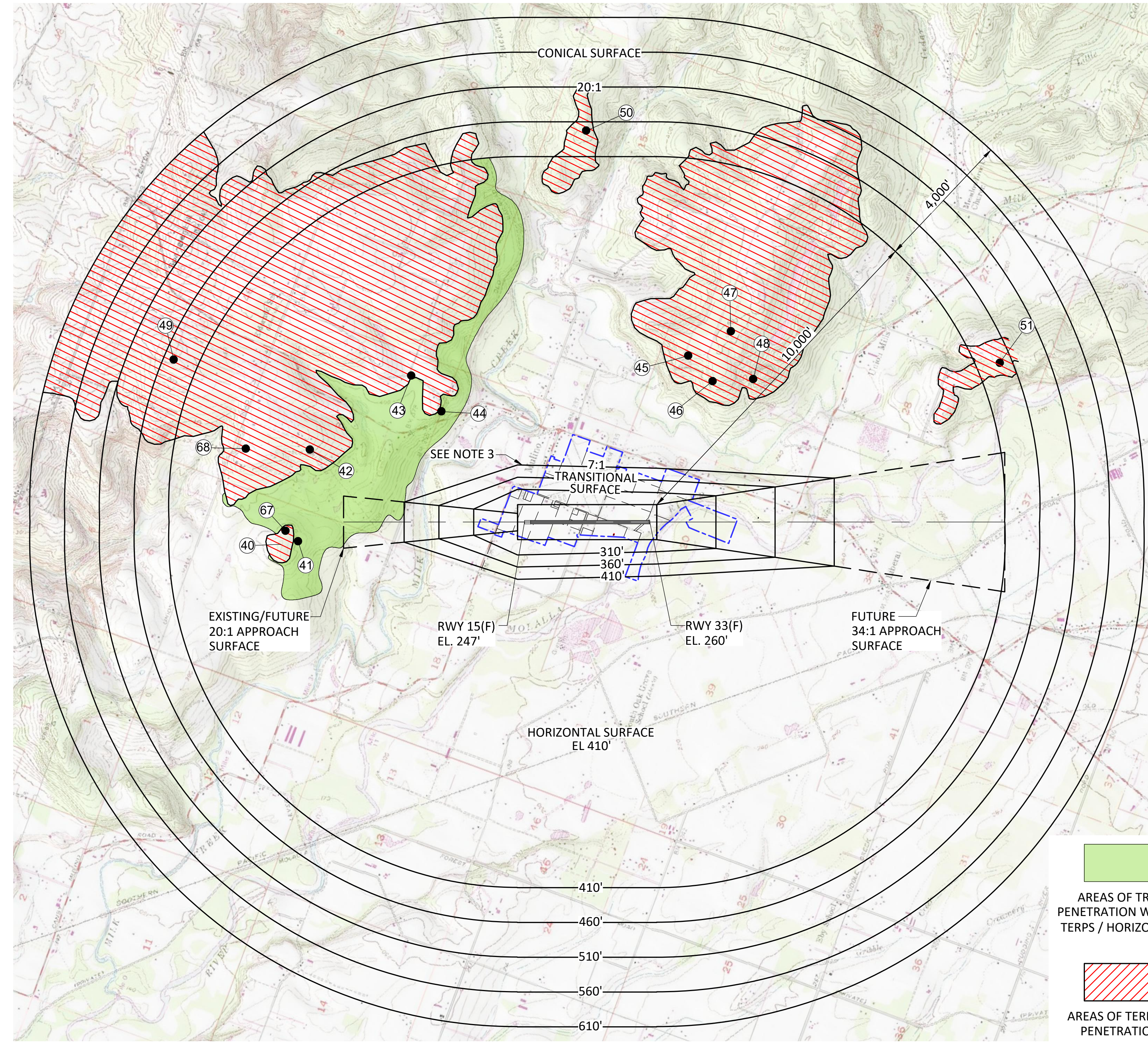
TERMINAL AREA PLAN

FIGURE NO. -

SHEET NO. 4 OF 10

OBSTRUCTION CHART

NO.	ITEM	TERPS / PART 77 SURFACES	TOP MSL ELEV (EST.)	DISTANCE FROM RWY CL	DISTANCE FROM RWY 14 END	DISTANCE FROM RWY 32 END	AMOUNT OF PENETRATION (ESTIMATED)	AIRPORT PROPERTY	DISPOSITION
1	TREE	TERPS SURFACE RWY 15	318'	442' R	880'	-4,480'	35.5'	NO	REMOVE
2	MULINO ROAD	TERPS SURFACE RWY 15	259'	335' R	875'	-4,475'	0'	NO	NO OBSTRUCTION, REFERENCE ONLY
3	TREE	APPROACH RWY 15 (VISUAL)	309'	240' R	858'	-4,458'	28.9'	YES	REMOVE
4	TREE	APPROACH RWY 15 (VISUAL)	290'	189' R	836'	-4,436'	10.9'	YES	REMOVE
5	MULINO ROAD	APPROACH RWY 15 (VISUAL)	259'	0'	725'	-4,325'	0'	NO	NO OBSTRUCTION, REFERENCE ONLY
6	MULINO ROAD	TRANSITIONAL	262'	310' L	625'	-4,225'	0'	NO	NO OBSTRUCTION, REFERENCE ONLY
7	TREE	TERPS SURFACE RWY 15	285'	443' R	498'	-4,098'	20.6'	NO	REMOVE
8	TREE	TERPS SURFACE RWY 15	293'	374' R	421'	-4,021'	28.5'	NO	REMOVE
9	TREE	TERPS SURFACE RWY 15	287'	525' R	393'	-3,993'	25'	NO	REMOVE
10	TREE	TERPS SURFACE RWY 15	289'	395' R	205'	-3,805'	32'	NO	REMOVE
11	TREE	TRANSITIONAL	262'	594' R	189'	-3,789'	2'	NO	REMOVE
12	TREE	PRIMARY	282'	440' R	-4'	-3,596'	35'	YES	REMOVE
13	TREE	TRANSITIONAL	310'	520' R	-190'	-3,410'	63	YES	REMOVE
14	ITEM OMITTED								
15	TREES	TRANSITIONAL	324'	620' R	-243'	-3,357'	59'	NO	REMOVE
16	WINDSOCK	PRIMARY	256'	212' L	-426'	-3,174'	8'	YES	LIGHT
17	PAPI	PRIMARY	253'	102' L	-925'	-2,675'	N/A	YES	NO OBSTRUCTION, REFERENCE ONLY
18	TREE	TRANSITIONAL	349'	1,354' R	-797'	-2,803'	0'	NO	NO OBSTRUCTION, REFERENCE ONLY
19	TREE	TRANSITIONAL	370'	637' R	-1045'	-2,555'	81'	NO	REMOVE
20	TREE	TRANSITIONAL	351'	588' R	-1,092'	-2,508'	52'	NO	REMOVE
21	PAPI	PRIMARY	260'	96' L	-2,925'	-675'	N/A	YES	NO OBSTRUCTION, REFERENCE ONLY
22	TREES	TRANSITIONAL	347'	586' L	-3,177'	-423'	39'	NO	REMOVE
23	TREE	APPROACH RWY 33 (NON-PREC)	274'	99' L	-4,270'	670'	.5'	NO	REMOVE
24	TREE	APPROACH RWY 33 (NON-PREC)	320'	505' L	-3,992	392'	54'	NO	REMOVE
25	TREE	APPROACH RWY 33 (NON-PREC)	303'	229' L	-4,350	750'	27'	NO	REMOVE
26	TREE	APPROACH RWY 33 (NON-PREC)	306'	84' L	-4,456'	856'	27'	NO	REMOVE
27	TREE	APPROACH RWY 33 (NON-PREC)	318'	289' L	-4,564'	964'	36'	NO	REMOVE
28	TREE	APPROACH RWY 33 (NON-PREC)	310'	149' L	-4,620'	1020'	26'	NO	REMOVE
29	TREE GROUP	APPROACH RWY 33	360'	589' R	-4,794'	1,194'	79'	NO	REMOVE
30	TREE	APPROACH RWY 33 (NON-PREC)	308'	201' L	-4,933'	1,333'	15'	YES	REMOVE
31	TREE GROUP	TRANSITIONAL	384'	787' R	-5,110'	1,510'	71'	NO	REMOVE
32	TREE	APPROACH RWY 33 (NON-PREC)	307'	272' R	-5,237	1,637'	5'	YES	REMOVE
33	TREE GROUP	APPROACH RWY 33 (NON-PREC)	406'	497' R	-6,073'	2,473'	78'	NO	REMOVE
34	TREE GROUP	APPROACH RWY 33 (NON-PREC)	423'	169' R	-6,672	3,072'	86'	NO	REMOVE
35	HIGHWAY 213	APPROACH RWY 33 (NON-PREC)	267'	210' R	-8,107'	4,507'	0'	NO	NO OBSTRUCTION, REFERENCE ONLY
36	TREE	APPROACH RWY 33 (NON-PREC)	359'	395' L	-6,536'	2,936'	19'	NO	REMOVE
37	TREE	APPROACH RWY 33 (NON-PREC)	427'	384' R	-6,509'	2,909'	88'	NO	REMOVE
38	TREE	TRANSITIONAL	347'	825' L	-2,897'	-703'	37'	NO	REMOVE
39	TREE	TRANSITIONAL	363'	954' R	-5,188'	1,588'	30'	NO	REMOVE
40	TERRAIN	TERPS SURFACE RWY 15/HORIZONTAL	440'	640' R	7,012'	-10,612'	30'	NO	LIGHT
41	TREE GROUP	TERPS SURFACE RWY 15/HORIZONTAL	550'	580'	6,505'	-10,105'	140'	NO	LIGHT
42	TREE GROUP	TERPS SURFACE RWY 15/HORIZONTAL	635'	2,080' L	6,165'	-9,765'	225'	NO	LIGHT
43	TREE GROUP	HORIZONTAL	620'	4,210' L	3,255'	-6,855'	210'	NO	LIGHT
44	TREE GROUP	HORIZONTAL	540'	3,180' L	2,385'	-5,985'	130'	NO	LIGHT
45	TREE GROUP	HORIZONTAL	620'	4,780' R	-4,705'	1,105'	210'	NO	LIGHT
46	TREE GROUP	HORIZONTAL	650'	4,050' R	-5,405'	1,805'	240'	NO	LIGHT
47	TERRAIN	HORIZONTAL	600'	5,484' R	-5,932'	2,332'	190'	NO	LIGHT
48	TREE GROUP	HORIZONTAL	670'	4,110' R	-6,575'	2,975'	260'	NO	LIGHT
49	TERRAIN	CONICAL	640'	4,667' L	10,076'	-13,676'	180'	NO	LIGHT
50	TERRAIN	CONICAL	500'	11,247' L	-1,774'	-1,826'	40'	NO	LIGHT
51	TERRAIN	CONICAL	480'	4,577' R	-13,656'	10,056'	20'	NO	LIGHT
52	TREE	APPROACH RWY 15 (VISUAL)	370'	306' R	2,449'	-6,049'	11'	NO	REMOVE
53	TREE	APPROACH RWY 15 (VISUAL)	370'	416' R	2,436'	-6,036'	12'	NO	REMOVE
54	TREE	APPROACH RWY 15 (VISUAL)	381'	386' R	2,564'	-6,164'	16'	NO	REMOVE
55	TREE	APPROACH RWY 15 (VISUAL)	372'	322' R	2,643'	-6,243'	3'	NO	REMOVE
56	TREE	APPROACH RWY 15 (VISUAL)	449'	462' L	4,146'	-7,746'	5'	NO	REMOVE
57	TREE	APPROACH RWY 15 (VISUAL)	483'	548' L	4,405'	-8,005'	25'	NO	REMOVE
58	TREE	APPROACH RWY 15 (VISUAL)	484'	334' L	4,498'	-8,098'	21'	NO	REMOVE
59	TREE	APPROACH RWY 15 (VISUAL)	498'	688' L	4,628'	-8,228'	30'	NO	REMOVE
60	TREE	APPROACH RWY 15 (VISUAL)	479'	100' L	4,732'	-8,332'	6'	NO	REMOVE
61	TREE	APPROACH RWY 15 (VISUAL)	494'	340' L	4,740'	-8,340'	20'	NO	REMOVE
62	POLE	APPROACH RWY 15 (VISUAL)	398'	434' L	4,740'	-8,340'	0'	NO	NO OBSTRUCTION, REFERENCE ONLY
63	POLE	APPROACH RWY 15 (VISUAL)	413'	530' L	4,799'	-8,399'	0'	NO	NO OBSTRUCTION, REFERENCE ONLY
64	TREE	APPROACH RWY 15 (VISUAL)	487'	372' L	4,949'	-8,549'	3'	NO	REMOVE
65	TREE	APPROACH RWY 15 (VISUAL)	492'	185' L	4,956'	-8,556'	8'	NO	REMOVE
66	TREE	APPROACH RWY 15 (VISUAL)	501'	676' L	4,995'	-8,595'	14'	NO	REMOVE
67	BUILDINGS	TERPS SURFACE RWY 15/HORIZONTAL	454'	249' R	6,863'	-10,463'	35'	NO	LIGHT
68	GROUND	TERPS SURFACE RWY 15/HORIZONTAL	532'	2,109' L	8,007'	-11,607'	85'	NO	LIGHT



FAR PART 77 PLAN VIEW

RUNWAY 15/33

FAR PART 77 DIMENSIONAL STANDARDS
RUNWAY ULTIMATE LENGTH = 3600'
RUNWAY TYPE = B-II

RUNWAY 15
PRIMARY SURFACE WIDTH = 1000'
APPROACH SURFACE INNER WIDTH = 500'
APPROACH SURFACE OUTER WIDTH = 1,500'
APPROACH SURFACE LENGTH = 5,000'
RADIUS OF HORIZONTAL SURFACE = 10,000'
APPROACH SLOPE = 20:1

RUNWAY 33
PRIMARY SURFACE WIDTH = 1000'
APPROACH SURFACE INNER WIDTH = 1,000'
APPROACH SURFACE OUTER WIDTH = 4,000'
APPROACH SURFACE LENGTH = 10,000'
RADIUS OF HORIZONTAL SURFACE = 10,000'
APPROACH SLOPE = 34:1

NOTES:

1. DISTANCES FOR NOTED OBSTRUCTIONS ARE BASED ON THE ULTIMATE RUNWAY CONFIGURATION. DIMENSIONS INCLUDE 200' DISTANCE FROM RUNWAY END TO BEGINNING OF APPROACH.
2. PART 77 SURFACES BASED ON ULTIMATE AIRSPACE SURFACES.
3. CLOSE IN OBSTRUCTIONS ARE NOT DEPICTED FOR CLARITY. SEE SHEET 6 OF 10 FOR OMITTED OBSTRUCTIONS.
4. DATE OF OBSTRUCTION SURVEY; 10/22/2015

N
TRUE
MAG
MAGNETIC DEC.
15° 12' EAST
(2019 VALUE)

0' 2000' 4000'
Scale: 1"=2000'

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OREGON DEPARTMENT OF AVIATION APPROVAL
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BEND, OR 97702
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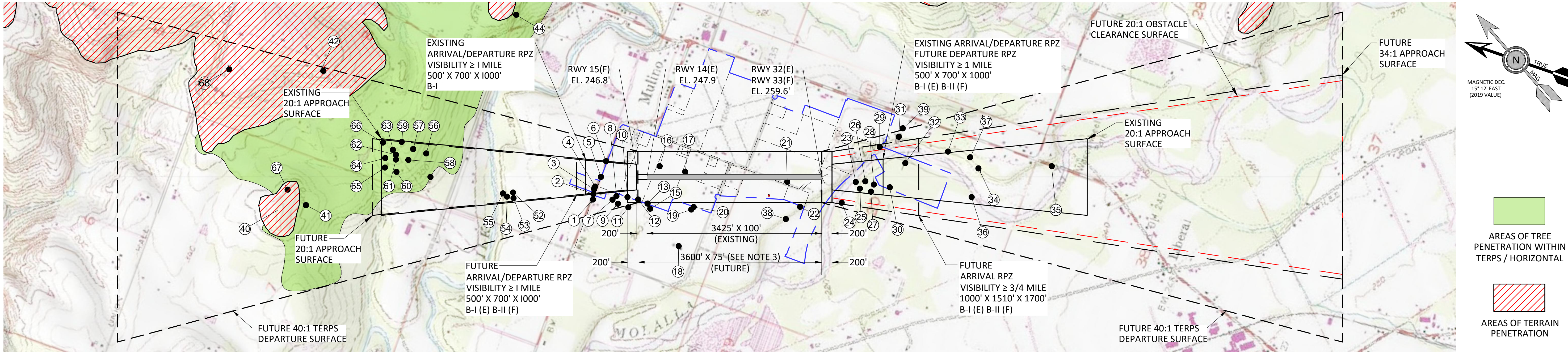
DATE: APRIL 2019		PROJECT NO: 4009705501	

MULINO STATE AIRPORT

AIRPORT AIRSPACE PLAN (FAR PART 77)

FIGURE NO.
-



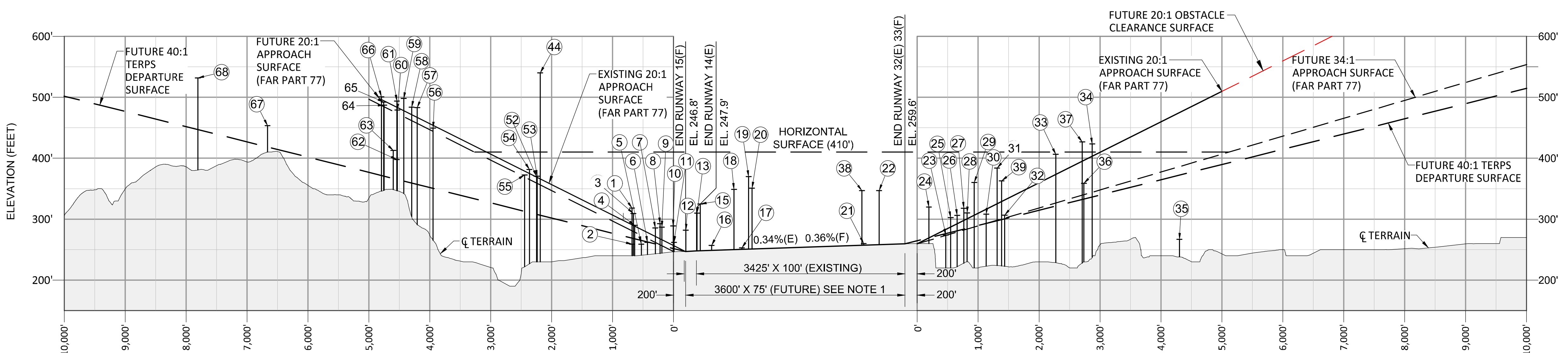
AREAS OF TREE PENETRATION WITHIN TERPS / HORIZONTAL

AREAS OF TERRAIN PENETRATION

RUNWAY 14-32(E) 15-33(F) PLAN VIEW

0' 1000' 2000'

Scale: 1"=1000'



RUNWAY 14-32(E) 15-33(F) PROFILE VIEW

0' 100' 200'

SCALE OF FEET
VERTICAL SCALE 1"=100'

0' 1000' 2000'

SCALE OF FEET
HORIZONTAL SCALE 1"=1000'

NOTES:

1. COMPLETE OBSTRUCTION CHART IS LOCATED ON SHEET 5, AIRPORT AIRSPACE PLAN (FAR PART 77).
2. DISTANCES FOR NOTED OBSTRUCTIONS ARE BASED ON THE ULTIMATE RUNWAY CONFIGURATION. DIMENSIONS INCLUDE 200' DISTANCE FROM RUNWAY END TO BEGINNING OF APPROACH.
3. RUNWAY WIDTH OF 100' AND TAXIWAY WIDTH OF 40' / 50' EXCEEDS STANDARD FOR B-I / B-II AIP. AIP ELIGIBILITY WILL BE DETERMINED AT THE TIME OF A FUTURE PROJECT.

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541.382.2423 FAX

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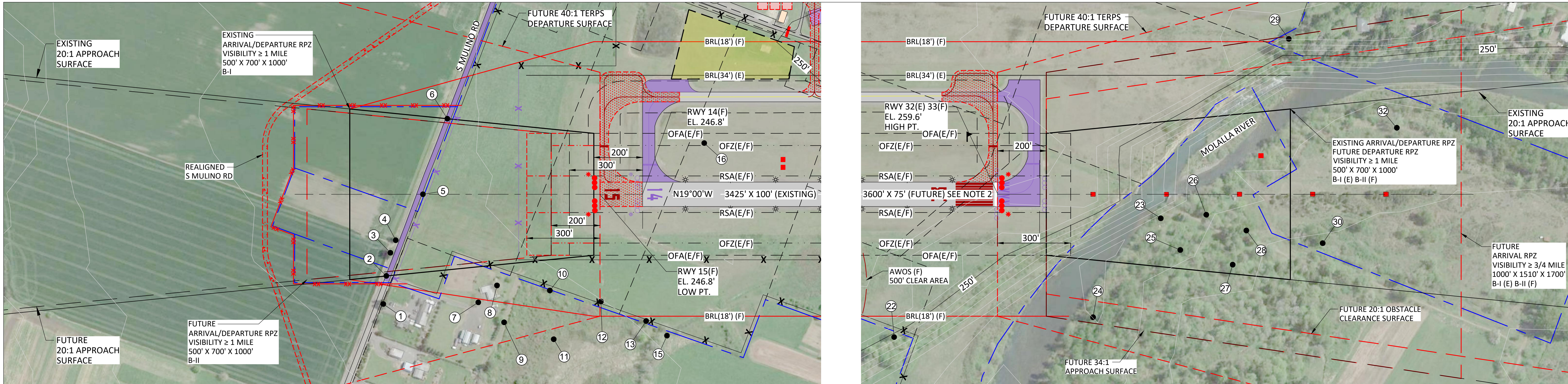
DATE: APRIL 2019		PROJECT NO: 4009705501	

MULINO STATE AIRPORT

AIRPORT AIRSPACE PLAN (FAR PART 77)

FIGURE NO.
-

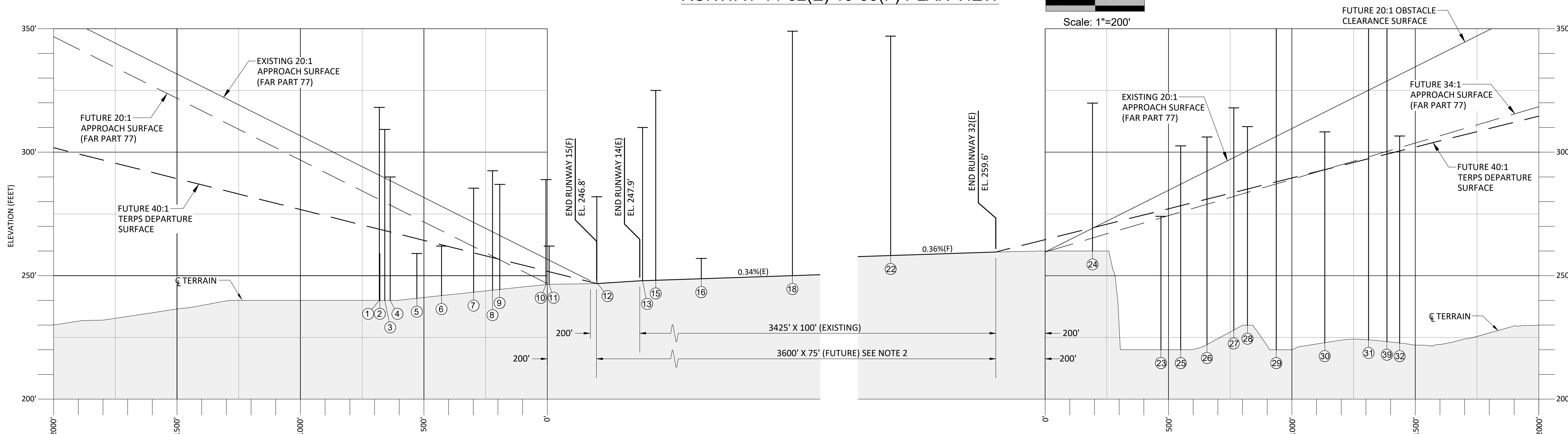
SHEET NO.
6 OF 10



RUNWAY 14-32(E) 15-33(F) PLAN VIEW

0' 200' 400'

Scale: 1"=200'



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NOTES:

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2. RUNWAY WIDTH OF 100' AND TAXIWAY WIDTH OF 40' / 50' EXCEEDS STANDARDS FOR B-I / B-II AIP. AIP ELIGIBILITY WILL BE DETERMINED AT THE TIME OF A FUTURE PROJECT.

0' 20' 40'

Vertical Scale: 1"=20'

RUNWAY 14-32(E) 15-33(F) PROFILE VIEW

0' 200' 400'

Horizontal Scale: 1"=200'

MAGNETIC DEC. 15° 12' EAST (2019 VALUE)

NO.	DATE	BY	APPR	REVISIONS

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MULINO STATE AIRPORT

RUNWAY 14-32(E) 15-33(F) INNER APPROACH SURFACE / RPZ

FIGURE NO. -

SHEET NO. 7 OF 10

LEGEND

(line)	ZONING BOUNDARY
(line)	RUNWAY PROTECTION ZONE (EXISTING)
(line)	RUNWAY PROTECTION ZONE (FUTURE)
(line)	APPROACH SURFACE (EXISTING)
(line)	APPROACH SURFACE (FUTURE)
(line)	AIRPORT PROPERTY LINE (EXISTING)
(line)	AIRPORT PROPERTY LINE (FUTURE)
(line)	FLIGHT TRACKS
(area)	SKYDIVE DROP ZONE

CLACKAMAS COUNTY ZONING

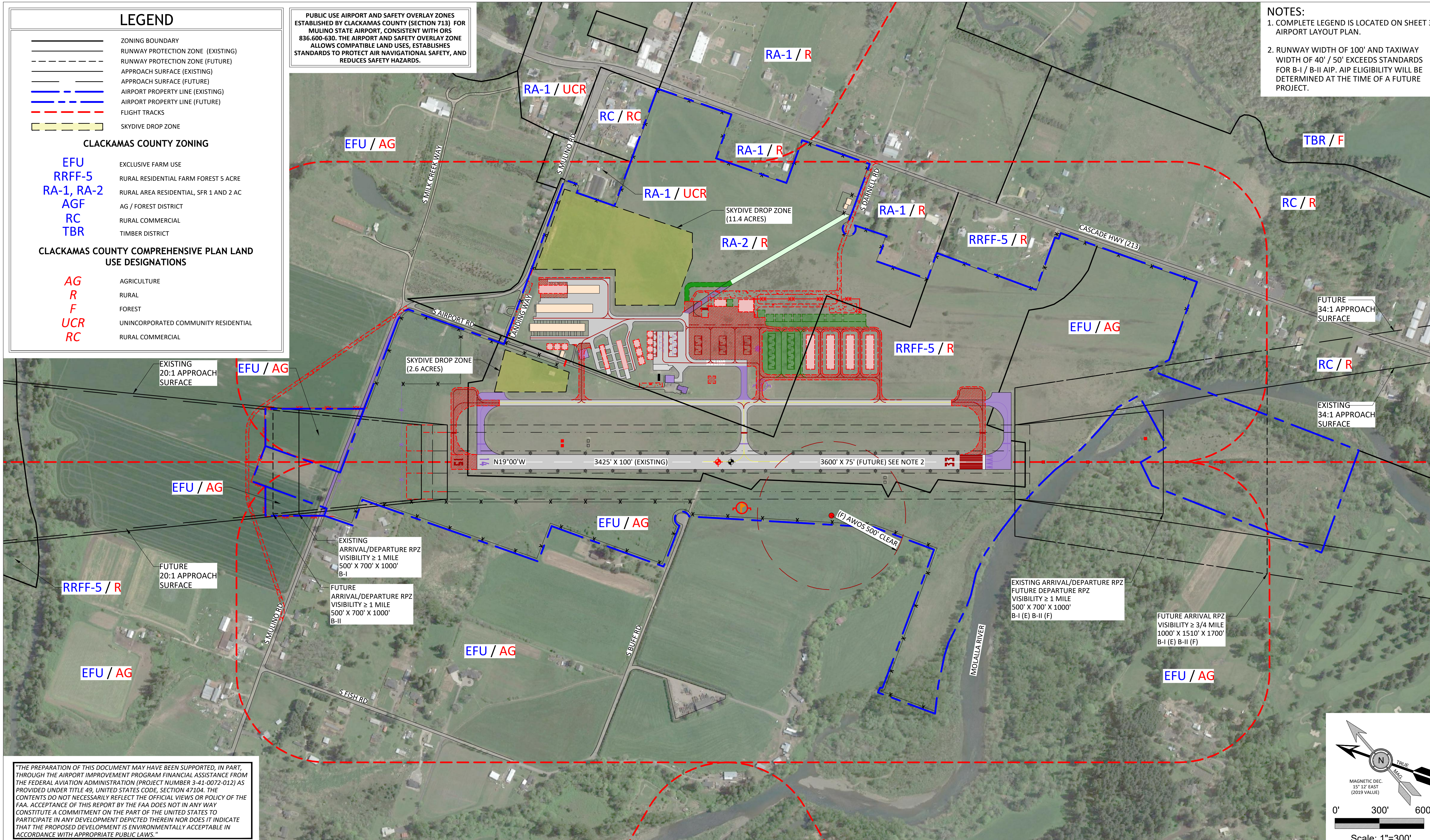
EFU	EXCLUSIVE FARM USE
RRFF-5	RURAL RESIDENTIAL FARM FOREST 5 ACRE
RA-1, RA-2	RURAL AREA RESIDENTIAL, SFR 1 AND 2 AC
AGF	AG / FOREST DISTRICT
RC	RURAL COMMERCIAL
TBR	TIMBER DISTRICT

CLACKAMAS COUNTY COMPREHENSIVE PLAN LAND USE DESIGNATIONS

AG	AGRICULTURE
R	RURAL
F	FOREST
UCR	UNINCORPORATED COMMUNITY RESIDENTIAL
RC	RURAL COMMERCIAL

PUBLIC USE AIRPORT AND SAFETY OVERLAY ZONES ESTABLISHED BY CLACKAMAS COUNTY (SECTION 713) FOR MULINO STATE AIRPORT, CONSISTENT WITH ORS 836.600-630. THE AIRPORT AND SAFETY OVERLAY ZONE ALLOWS COMPATIBLE LAND USES, ESTABLISHES STANDARDS TO PROTECT AIR NAVIGATIONAL SAFETY, AND REDUCES SAFETY HAZARDS.

NOTES:
1. COMPLETE LEGEND IS LOCATED ON SHEET 3, AIRPORT LAYOUT PLAN.
2. RUNWAY WIDTH OF 100' AND TAXIWAY WIDTH OF 40' / 50' EXCEEDS STANDARDS FOR B-I / B-II AIP. AIP ELIGIBILITY WILL BE DETERMINED AT THE TIME OF A FUTURE PROJECT.



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MULINO STATE AIRPORT

OFF-AIRPORT LAND USE PLAN

FIGURE NO. -

SHEET NO. 8 OF 10

LEGEND

ZONING BOUNDARY	SKYDIVE DROP ZONE
RUNWAY PROTECTION ZONE (EXISTING)	AERONAUTICAL OPERATIONS
RUNWAY PROTECTION ZONE (FUTURE)	* AERONAUTICAL SUPPORT (AIRCRAFT HANGARS, PARKING, FUELING, VEHICLE PARKING, ETC.) AND ADDITIONAL LAND AREAS CAPABLE OF ACCOMMODATING AIRPORT-COMPATIBLE NON-AERONAUTICAL USES.
APPROACH SURFACE (EXISTING)	
APPROACH SURFACE (FUTURE)	
AIRPORT PROPERTY LINE (EXISTING)	
AIRPORT PROPERTY LINE (FUTURE)	
FLIGHT TRACKS	

CLACKAMAS COUNTY ZONING

EFU	EXCLUSIVE FARM USE
RRFF-5	RURAL RESIDENTIAL FARM FOREST 5 ACRE
RA-1	RURAL AREA RESIDENTIAL, SFR 1

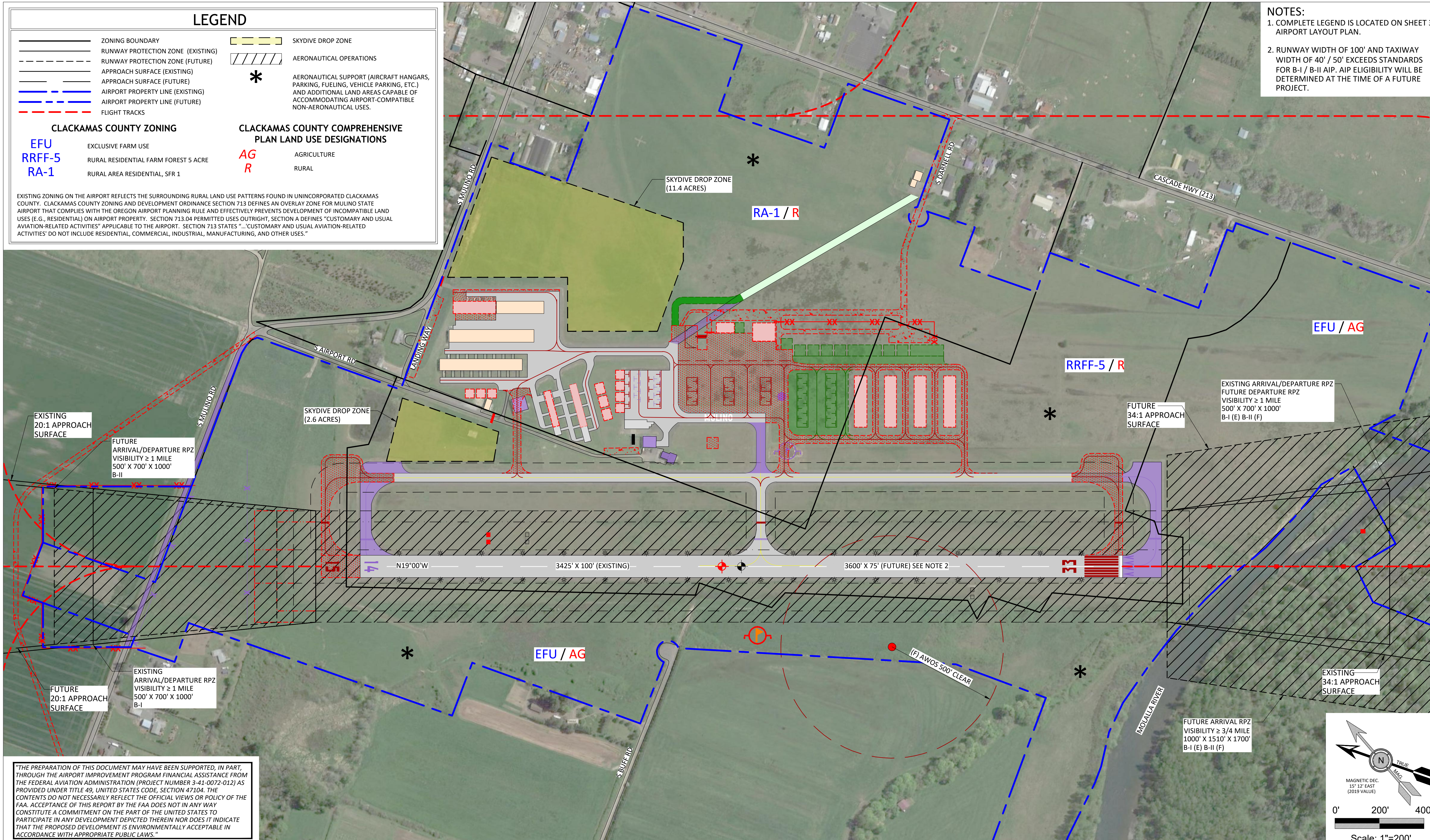
CLACKAMAS COUNTY COMPREHENSIVE PLAN LAND USE DESIGNATIONS

AG	AGRICULTURE
R	RURAL

EXISTING ZONING ON THE AIRPORT REFLECTS THE SURROUNDING RURAL LAND USE PATTERNS FOUND IN UNINCORPORATED CLACKAMAS COUNTY. CLACKAMAS COUNTY ZONING AND DEVELOPMENT ORDINANCE SECTION 713 DEFINES AN OVERLAY ZONE FOR MULINO STATE AIRPORT THAT COMPLIES WITH THE OREGON AIRPORT PLANNING RULE AND EFFECTIVELY PREVENTS DEVELOPMENT OF INCOMPATIBLE LAND USES (E.G., RESIDENTIAL) ON AIRPORT PROPERTY. SECTION 713.04 PERMITTED USES OUTRIGHT, SECTION A DEFINES "CUSTOMARY AND USUAL AVIATION-RELATED ACTIVITIES" APPLICABLE TO THE AIRPORT. SECTION 713 STATES "...'CUSTOMARY AND USUAL AVIATION-RELATED ACTIVITIES' DO NOT INCLUDE RESIDENTIAL, COMMERCIAL, INDUSTRIAL, MANUFACTURING, AND OTHER USES."

NOTES:

1. COMPLETE LEGEND IS LOCATED ON SHEET 3, AIRPORT LAYOUT PLAN.
2. RUNWAY WIDTH OF 100' AND TAXIWAY WIDTH OF 40' / 50' EXCEEDS STANDARDS FOR B-I / B-II AIP. AIP ELIGIBILITY WILL BE DETERMINED AT THE TIME OF A FUTURE PROJECT.



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DATE: APRIL 2019		PROJECT NO: 4009705501	

MULINO STATE AIRPORT

ON-AIRPORT LAND USE PLAN

FIGURE NO. -

LEGEND

- AIRPORT PROPERTY LINE (EXISTING)
- AIRPORT PROPERTY LINE (FUTURE),
- SECTION SUBDIVISION LINE
- SECTION LINE
- RUNWAY PROTECTION ZONE (EXISTING)
- RUNWAY PROTECTION ZONE (FUTURE)
- RUNWAY PROTECTION ZONE (FUTURE)
- LAND OWNED, FEDERAL PARTICIPATION AIP PROJECT NO. 3-41-0072-01
- LAND OWNED, FEDERAL PARTICIPATION AIP PROJECT NO. 3-41-0072-02
- LAND OWNED, FEDERAL PARTICIPATION AIP PROJECT NO. 3-41-0072-04
- LAND OWNED, FEDERAL PARTICIPATION AIP PROJECT NO. 3-41-0072-05 (1991)
- AVIGATION EASEMENTS, FEDERAL PARTICIPATION AIP PROJECT NO. 3-41-0072-05
- LAND TO BE ACQUIRED
- AVIGATION EASEMENT (FUTURE)

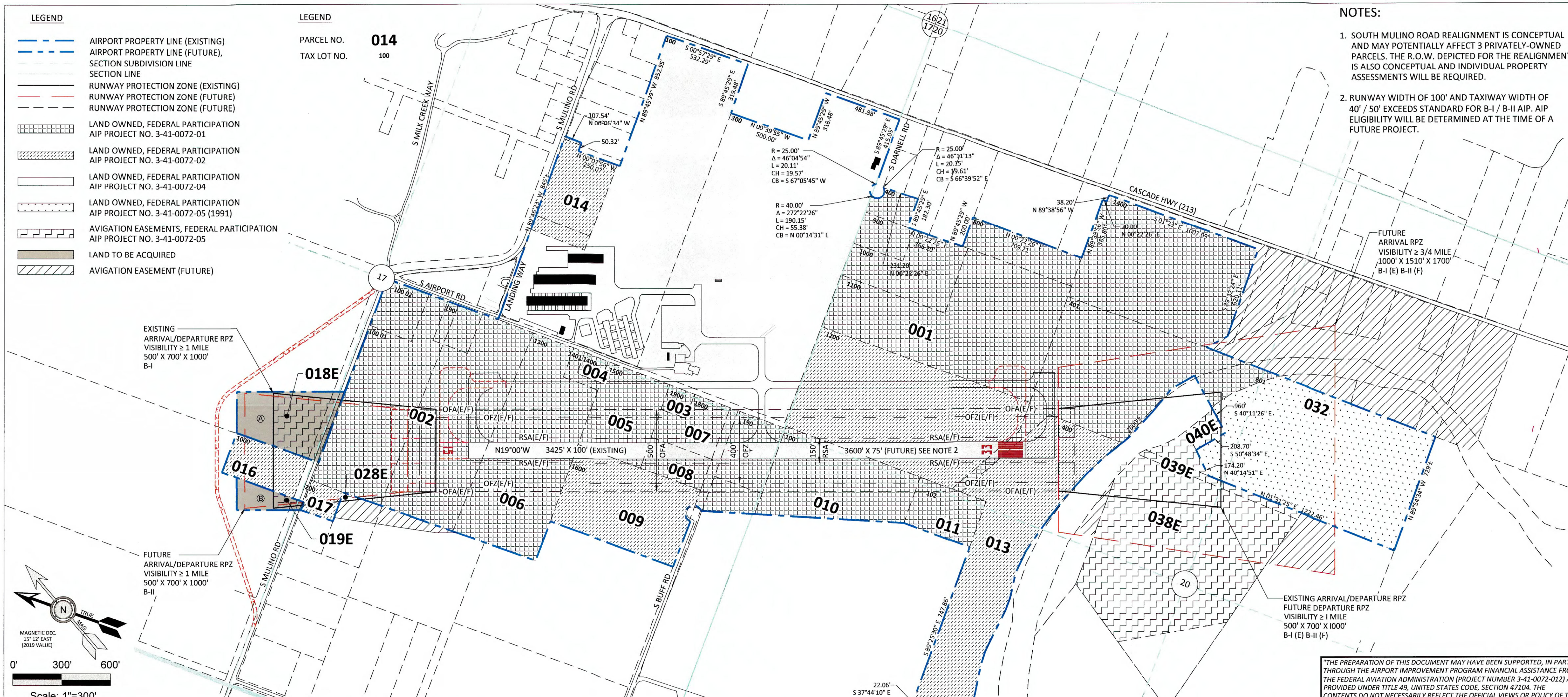
LEGEND

PARCEL NO. 014

TAX LOT NO. 100

NOTES:

1. SOUTH MULINO ROAD REALIGNMENT IS CONCEPTUAL AND MAY POTENTIALLY AFFECT 3 PRIVATELY-OWNED PARCELS. THE R.O.W. DEPICTED FOR THE REALIGNMENT IS ALSO CONCEPTUAL AND INDIVIDUAL PROPERTY ASSESSMENTS WILL BE REQUIRED.
2. RUNWAY WIDTH OF 100' AND TAXIWAY WIDTH OF 40' / 50' EXCEEDS STANDARD FOR B-I / B-II AIP. AIP ELIGIBILITY WILL BE DETERMINED AT THE TIME OF A FUTURE PROJECT.



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LAND DATA TABLE

PARCEL	GRANTOR	GRANTEE	ACRES	TAX LOT NO.	RECORDING INFORMATION				INTEREST	AIP GRANT NO.		NOTES
					DATE	BOOK	PAGE	FEE NO.		NUMBER	YEAR	
001	KAPPLER	PORT OF PORTLAND	114.94	100, 300, 301, 302 400, 401, 801, 900 1000, 1100, 1400	3/28/88	-	-	87-1-153	FEE SIMPLE	01, 04	1984/1988	FOR DEVELOPMENT
002	ORRELL	PORT OF PORTLAND	28.77	100, 190	6/16/88	-	-	88-24125	FEE SIMPLE	01	1984	FOR DEVELOPMENT
003	PIPER, M.	PORT OF PORTLAND	0.45	1900	8/14/86	-	-	86-30599	FEE SIMPLE	01	1984	FOR DEVELOPMENT
004	NIMROD	PORT OF PORTLAND	1.50	1400	6/25/86	-	-	86-25660	FEE SIMPLE	01	1984	FOR DEVELOPMENT
005	DIETZ	PORT OF PORTLAND	4.80	1500	3/3/87	-	-	87-09292	FEE SIMPLE	01, 04	1984/1988	FOR DEVELOPMENT
006	PIPER, A	PORT OF PORTLAND	14.32	1300, 1401	9/11/87	-	-	87-1-183	FEE SIMPLE	01	1984	FOR DEVELOPMENT
007	LUTES	PORT OF PORTLAND	2.33	1800	1/23/87	-	-	87-03390	FEE SIMPLE	01	1984	FOR DEVELOPMENT
008	GAMBELL	PORT OF PORTLAND	1.83	1700	2/2/87	-	-	87-04654	FEE SIMPLE	01	1984	FOR DEVELOPMENT
009	LeBARRON	PORT OF PORTLAND	9.76	1600	4/10/87	-	-	57-15902	FEE SIMPLE	02	1985	FOR DEVELOPMENT / APPROACHES
010	DAVIS	PORT OF PORTLAND	13.50	100, 190	1/6/87	-	-	87-00397	FEE SIMPLE	01	1984	FOR DEVELOPMENT
011	LEHL	PORT OF PORTLAND	3.00	102	3/12/87	-	-	87-10706	FEE SIMPLE	01	1984	FOR DEVELOPMENT
012	HAAK	PORT OF PORTLAND	17.63	1200	12/30/86	-	-	86-52724	FEE SIMPLE	02	1985	FOR DEVELOPMENT / APPROACHES
013	GORDON	PORT OF PORTLAND	17.58	400	3/3/87	-	-	87-10238	FEE SIMPLE	02	1985	FOR DEVELOPMENT / APPROACHES
014	HUDSON	PORT OF PORTLAND	4.08	800, 900	3/5/86	-	-	86-10319	FEE SIMPLE	02	1985	FOR DEVELOPMENT / APPROACHES
015	ANDERSON	PORT OF PORTLAND	0.52	1000	5/12/86	-	-	86-22147	FEE SIMPLE	02	1985	FOR DEVELOPMENT / APPROACHES
016	MABEN	PORT OF PORTLAND	3.00	1000	11/19/86	-	-	86-46421	FEE SIMPLE	02	1985	FOR DEVELOPMENT / APPROACHES
017	HOCKADAY	PORT OF PORTLAND	0.88	200	1/15/87	-	-	87-02218	FEE SIMPLE	02	1985	FOR DEVELOPMENT / APPROACHES
032	LARSON	PORT OF PORTLAND	18.30	801	12/8/88	-	-	88-51220	FEE SIMPLE	02	1985	FOR DEVELOPMENT / APPROACHES
		TOTAL AIRPORT ACREAGE	257.19									
-	PORT OF PORTLAND	OREGON DEPT. OF AVIATION	257.19	ALL TAXLOTS ABOVE	7/10/09	-	-	09-057789	FEE SIMPLE	N/A		BARGAIN & SALE DEED

PROPERTY TO BE ACQUIRED

PARCEL	OWNER	ACRES	TAX LOT NO.	RECORDING INFORMATION				INTEREST	AIP GRANT NO.		NOTES
				DATE	BOOK	PAGE	FEE NO.		NUMBER	YEAR	
Ⓐ	M&H FARMS LLC	-	-	8-03-2006	-	-	-	-	-		
Ⓑ	JOANNE GRUEN	-	-	2-16-2016	-	-	-	-	-		

AVIGATION EASEMENT

PARCEL	OWNER	ACRES	TAX LOT NO.	RECORDING INFORMATION				INTEREST	AIP GRANT NO.		NOTES
				DATE	BOOK	PAGE	FEE NO.		NUMBER	YEAR	
038E	KIRK	- -	600 600	2/14/92 9/19/96	- -	- -	92-08435 96-069349	-	05	1991	FOR APPROCHES
039E	BAURER	-	802	2/14/92	-	-	92-08436	-	05	1991	FOR APPROCHES
040E	GRUEN	-	700	3/30/92	-	-	92-18059	-	05	1991	FOR APPROCHES
018E	GINGERICH	-	400	10/14/96	-	-	96-076270	-	05	1991	FOR APPROCHES
019E	GINGERICH	-	900	10/14/96	-	-	96-076270	-	05	1991	FOR APPROCHES
028E	ANDERSON	-	203	11/8/93	-	-	93-83331	-	05	1991	FOR APPROCHES

NO.	DATE	BY	APPR	REVISIONS

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APPROVAL DATE: 7/15/15

SIGNATURE

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541.382.2423 FAX

DESIGNED BY: DM | DRAWN BY: JLS | CHECKED BY: WMR | SCALE: AS SHOWN

DATE: APRIL 2019 | PROJECT NO: 4009705501

MULINO STATE AIRPORT

EXHIBIT "A" AIRPORT PROPERTY PLAN

FIGURE NO. -

SHEET NO. 10 OF 10

Chapter 8 – Airport Land Use Compatibility

Chapter 8 – Airport Land Use Compatibility

Introduction

This chapter describes the land use associated with Mulino State Airport and its surroundings. This includes existing local land use controls, Oregon State guidance for land use compatibility planning and the protection of airports, and jurisdictional responsibilities.

Government Roles in Airport Land Use

FEDERAL

The Federal Aviation Administration (FAA) does not have authority to regulate off airport land use, or the construction of built items. Land use regulation is a local responsibility and FAA has a technical advisory role based on its interest in protecting the airport's airspace as part of the national airspace system. The FAA has a role in regulating on-airport land use through approval of the Airport Layout Plan (ALP) and airport sponsor compliance with FAA Airport Improvement Program (AIP) grant assurances, which include measures to maintain airport land use compatibility and protect the aeronautical function of an airport by restricting the location of incompatible non-aviation land uses.

Under **14 Code of Federal Regulations (CFR), Part 77,** the FAA has the authority to review proposed construction through its 7460-1 (Notice of Proposed Construction or Alteration) process. The FAA review addresses compatibility for both on and off airport land use based on the potential for creating a "hazard to air navigation" associated with obstructions/penetrations in defined airspace. FAA airspace reviews include

FAR Part 77 surfaces; Terminal Instrument Procedures (TERPS) surfaces, visual runway traffic patterns, and visual navigation aid (e.g., VASI, PAPI, etc.) protected airspace. When a proposed structure penetrates navigable airspace, the FAA will issue a letter objecting to the proposed action (determination of presumed hazard to air navigation) for the consideration of local authorities. When proposed actions do not present a hazard to air navigation, a "no objection" finding is issued. It is important to note that this analysis is based on an obstruction evaluation and is not intended to address land use compatibility in terms of noise exposure or proximity to an airport or runway.

The FAA recommends that local jurisdictions include the following language in their development codes: "Nothing in this chapter shall diminish the responsibility of project proponents to submit a Notice of Construction or Alteration to the Federal Aviation Administration if required in accordance with **FAR Part 77**, Objects Affecting Navigable Airspace."

FAR Part 150, Airport Noise Compatibility Planning also provides guidance for land use compatibility around airports. The 1990 Airport Noise and Capacity Act (ANCA), defines the federal policy on the regulation of airport noise (operating curfews, aircraft restrictions, etc.), with the intent of standardizing noise controls throughout the national system.

STATE

The State of Oregon developed the **Oregon Administrative Rules (OAR),** contained in **Chapter 660, Department of Land Conservation and Development; Division 12, Transportation Planning_and Division 13, Airport Planning** to address airport protection and function**.** Local government are required to follow State rules as described in **OAR 660** for planning and managing public-use airports. Division 12 states that local governments shall participate and develop a Transportation System Plan with "measures to protect public use airports by controlling land uses within airport noise corridors and imaginary surfaces, and by limiting physical hazards to air navigation." **Division 13** states, "The policy of the State of Oregon is to encourage and support the continued operation and vitality of Oregon's airports." It includes "rules that are intended to promote a convenient and economic system of airports in the State and for land use planning to reduce risks to aircraft operations and nearby land uses." A summary of these requirements is provided below:

- **660-013-0030 Preparation and Coordination of Aviation Plans** states "A city or county with planning authority for one or more airports, or areas within safety zones or compatibility zones described in this division, shall adopt comprehensive plan and land use regulations for airports consistent with the requirements of this division and ORS 836.600 through 836.630."

- **660-013-0040 Aviation Facility Planning Requirements** provides a list of planning requirements including a map showing location of airport boundary, a map or description of existing and planned facilities, a projection of future aeronautical needs, etc.

- **660-013-0070 Local Government Safety Zones for Imaginary Surfaces** specifies that "local governments shall adopt an Airport Safety Overlay Zone to promote aviation safety by prohibiting structures, trees and other objects of natural growth from penetrating airport imaginary surfaces."

- **660-13-0080 Local Government Land Use Compatibility Requirements for Public Use** Airports provides a list of requirements including prohibiting new residential development and public assemble uses within the Runway Protection Zone (RPZ) and limits establishment of uses within the noise impact boundary.

- **660-013-0100 Airport Uses at Non-Towered Airports** requires local government to adopt land use regulations that authorize a range of defined airport uses within the airport boundary of non-towered airports.

- **660-013-0140 Safe Harbors** defines "safe harbor" requirements that maybe used by local government to rely of existing comprehensive plans land use regulations, Airport Master Plans and Airport Layout Plans.

- **660-013-155 Planning Requirements for Small Airports** specifies that airports are to be subject to the planning and zoning requirements within ORS 836.

Division 13 implements **Oregon Revised Statutes (ORS) 836.600** through **836.630**, which promotes land use planning to reduce unnecessary risk to aircraft operations. Several key statutes that are important in land use planning are summarized below:

- **836.608 Airport operation as matter of state concern (local planning documents to recognize airport location, limitations on use and expansion of facility)** requires local governments to recognize airport locations within planning documents. It also establishes limitations on use and a process in which airports can add new land uses on their property.

- **836.610 Local government land use plans and regulations to accommodate airport zone and uses (funding; rules)** requires local governments to amend their land use regulations and comprehensive plans in accordance to 836.616 and 836.619.

- **836.616 Rules for airport uses and activities** identifies types of permitted land uses and activities on airport property and requires local government to meet standards for safe land uses near airports.

- **836.623 Local compatibility and safety requirements more stringent than state requirements (criteria, water impoundments, report to federal agency, and application to certain activities)** allows local governments to adopt land use compatibility and safety requirements that are more stringent than the minimum required by Land Conservation and Development Commission rules. It provides rules, which limit the size of water impoundments near airports in an effort to reduce wildlife attractants.

LOCAL

Establishing compatible land uses around airports is the responsibility of local governing agencies with planning and zoning authority. The FAA and airport management (ODA) may provide recommendations on land use issues while discouraging incompatible land uses around airports. Clackamas County has land use authority for Mulino State Airport and its immediate surroundings. The airport is located within the boundary of the Hamlet of Mulino, although the hamlet imposes no additional land use regulations.

Comprehensive Plan

The comprehensive plan is a guidance document that expresses the way in which a city or county seeks to grow and develop. The county's comprehensive plan was developed "to organize and coordinate the complex interrelationships among people, land, resources, and facilities in such a way as to protect the future health, safety, quality of life and welfare of Clackamas County residents".

The Comprehensive Plan established the following overall goals:

- Balance public and private interests and adopt a coordinated set of goals and policies to guide future development in Clackamas County.
- Identify the most appropriate land uses for individual sites by evaluating site characteristics in light of market demand, human needs, technology, and state, regional, and county goals.
- Provide for growth in areas where public facilities can economically be provided to support growth.
- Create development opportunities most compatible with the fiscal and financial capacity of the county and its residents.
- Implement the policies of this Plan by adopting a zoning map and set of regulations, and by guiding public investments to support anticipated growth.

- Establish a system whereby individual interests may be compared to stated county policy, and provide a process for review and amendment of those policies as expressed in this comprehensive plan.

Included within the comprehensive plan is a transportation system plan component that addresses the airports within the county, including the Mulino State Airport. Ultimately, the comprehensive plan establishes the basis for all zoning and land use within Clackamas County. **Figure 8-1** depicts the county land use and zoning map.

LAND USE

Clackamas County's land use designation for the land underlying the Mulino State Airport is "Rural". *"Rural lands are exception lands, as defined in Oregon Administrative Rules 660-004-005(1), that are outside urban growth boundaries and Unincorporated Communities and are suitable for sparse settlement, such as small farms, woodlots, or acreage home sites. They lack public facilities or have limited facilities and are not suitable, necessary, or intended for urban, agricultural, or forest use."*

Rural Goals

- *To provide a buffer between urban and agricultural or forest uses.*
- *To perpetuate the rural atmosphere while maintaining and improving the quality of air, water, and land resources.*
- *To conserve open space and protect wildlife habitat.*

TRANSPORTATION PLAN

Clackamas County's Transportation System Plan (TSP) identifies the county's transportation needs and priorities within unincorporated Clackamas County over a twenty-year period (2013-2033).

Clackamas County's transportation goals include:

- Goal 1 – *Provide a transportation system that optimizes benefits to the environment, the economy, and the community;*
- Goal 2 – *Plan the transportation system to create a prosperous and adaptable economy and further the economic well-being of businesses and residents of the County;*
- Goal 3 – *Tailor transportation solutions to suit the delivery of local communities;*
- Goal 4 – *Promote a transportation system that maintains or improves our safety, health, and security;*
- Goal 5 – *Provide an equitable transportation system;*

- Goal 6 – *Promote a fiscally responsible approach to protect and improve the existing transportation system and implement a cost effective system to meet future needs.*

Airport Policies

- *Coordinate with the Port of Portland, the Oregon Department of Aviation, and other affected agencies to implement the Mulino Airport Plan.*
- *Coordinate with Marion County, the City of Wilsonville, the Oregon Department of Aviation, and other affected agencies to develop and implement the Aurora Airport Plan.*
- *Allow new airports as conditional uses in appropriate zoning districts. Require new public use airports to be relocated within:*
    - *One mile of an arterial roadway, and*
    - *At least one mile from urban residential areas.*
- *Coordinate with the Oregon Department of Environmental Quality, Oregon Department of Aviation and Federal Aviation Administration to minimize conflicts between airports and uses of surrounding lands.*
- *Require that new airports, airport expansions, or expansions of airport boundaries, expect [SIC] those limited to use by ultra-lights and helicopters, have a runway at least 1,800 feet long and control at least enough property at the end of each runway through ownership, aviation easement, or long-term lease to protect their approach surfaces until the approach surfaces are 50 feet above the terrain. Require the runway to be located so as to achieve at least 20-foot clearance of approach surface over a county, city, or public road.*
- *Apply a Public-Use Airport and Safety overlay zoning district to public-use airports, consistent with ORS 836.600 through 836.630, and as shown on Map 5*-10 (of the TSP).
- *Recognize privately-owned, public-use airports that served as the base for one or two aircraft on December 31, 1994, as shown in the records of the Oregon Department of Transportation and as shown on Map 5-10* (of the TSP).
- *Encourage establishment of heliports in industrial areas in conjunction with state and federal standards for heliport design and location.*
- *Support the role Clackamas County airports serve in supporting emergency response and disaster assistance.*

AIRPORT PLAN

The Clackamas County Airport Plan, adopted in 2001 is included in Appendix A of the county comprehensive plan. The Airport Plan documents the existing public and private-use airports in Clackamas County with airport boundary maps. The plan provides the "airport uses that existed at any time during 1996," established by Oregon Revised Statutes.

ZONING

Clackamas County zoning applies to Mulino State Airport and the surrounding area. The underlying zoning for Mulino State Airport consists of three zones:

- Exclusive Farm Use (EFU)
    - On the north, south, and west sides of the airport, beyond the runway, taxiways, and landside development area is zoned EFU. Public-use airports are not included in this zone; however, "personal-use airports for airplanes and helicopter pads, including associated hangar, maintenance, and service facilities" are allowed with a conditional use permit.
- Rural Residential Farm Forest on 5 acres (RRFF-5)
    - The runway and the majority of the taxiway system is zoned RRFF-5. Aircraft land uses are allowed with a conditional use permit and aircraft landing areas are prohibited within this zone.
- Rural Area Residential on 2 acres (RA-2)
    - A portion of the taxiway system and the existing landside development area is zoned RA-2. Aircraft land uses are prohibited in this zone and aircraft landing areas are allowed with a conditional use permit.

The existing zoning on the airport reflects the surrounding rural land use patterns found in unincorporated Clackamas County. In general, Oregon land use law restricts the development of higher density land uses in rural areas. As such, changes to the existing "rural" zoning for the Airport would require a significant local planning exercise.

The existing airport zoning has been in place since the numerous land parcels were acquired and airport facilities were subsequently developed. ODA, and the previous airport owner (Port of Portland), have indicated that all desired airport improvements been accommodated within the existing zoning. ODA indicates that the airport overlay zoning effectively protects airport from incompatible land uses, and as the owner of a public facility, has no intention of allowing any incompatible land uses to be sited on airport property.

Clackamas County Zoning and Development Ordinance (Section 713) defines an overlay zone for Mulino State Airport that complies with the Oregon Airport Planning Rule and effectively prevents development of incompatible land uses (e.g., residential) on airport property. Section 713.04 Permitted Uses Outright, Section A defines *"customary and usual aviation-related activities"* applicable to the Airport. Section 713 states *"…'customary and usual aviation-related activities' do not include residential, commercial, industrial, manufacturing, and other uses."* Additional details for Clackamas County airport overlay zoning is provided below.

OVERLAY ZONING

Clackamas County has created the "Public Use Airport and Safety Overlay Zones," in Section 713 of the comprehensive plan. The purpose of this overlay zone is to "implement Oregon Revised Statues [SIC] 836.600 through 836.630 and policies of the comprehensive plan as they relate to public use airports. When applied, it provides for their continued operation and vitality consistent with state law by allowing certain compatible airport related commercial and recreational uses. It also provides for safety standards to promote air navigational safety at such public use airports and to reduce the potential for safety hazards for property and for persons living, working, or recreating on lands near such airports".

The overlay zone provides a list of uses permitted outright, uses permitted subject to review, and nonconforming uses. Applications for land use or building permits within the boundaries of the overlay zone must comply with Section 713.

A copy of Clackamas County's Public Use Airport and Safety Overlay Zones is included in **Appendix E**.

Table 8-1 compares Clackamas County's Airport Overlay Zone imaginary surface dimensions with FAR Part 77 standards for the existing "Larger than Utility" Visual runway and future "Larger than Utility" Non-Precision runway.

TABLE 8-1: AIRPORT OVERLAY ZONE AND FAR PART 77 IMAGINARY SURFACES COMPARISON

IMAGINARY SURFACES	CLACKAMAS COUNTY LARGER THAN UTILITY VISUAL	FAR PART 77 LARGER THAN UTILITY VISUAL	CLACKAMAS COUNTY LARGER THAN UTILITY NON-PRECISION	FAR PART 77 LARGER THAN UTILITY NON-PRECISION
Horizontal Surface	5,000 feet	5,000 feet	10,000 feet	10,000 feet
Conical Surface • Slope • Horizontal Distance	20:1 4,000 feet	20:1 4,000 feet	20:1 4,000 feet	20:1 4,000 feet
Primary Surface	500 feet	500 feet	1,000 feet	1,000 feet
Approach Surface • Slope • Width • Horizontal Distance	20:1 1,250 feet 5,000 feet	20:1 1,500 feet 5,000 feet	34:1 3,500 feet 10,000 feet	34:1 3,500 feet 10,000 feet
Transitional Surface • Slope • Horizontal Distance	7:1 5,000 feet	7:1 5,000 feet	7:1 10,000 feet	7:1 10,000 feet

AIRPORT VICINITY ZONING

Clackamas County has jurisdiction over the land immediately surrounding the airport. North, west, and south of the airport land is zoned EFU. East of the airport the land is zoned RA-2, RRFF-5, and a Rural Residential classification applies to 2 acres with an Historic Landmark (RA2/HL) designation. A mix of Rural Residential and Rural Commercial zoning is located northeast of the airport, in the Mulino urban area.

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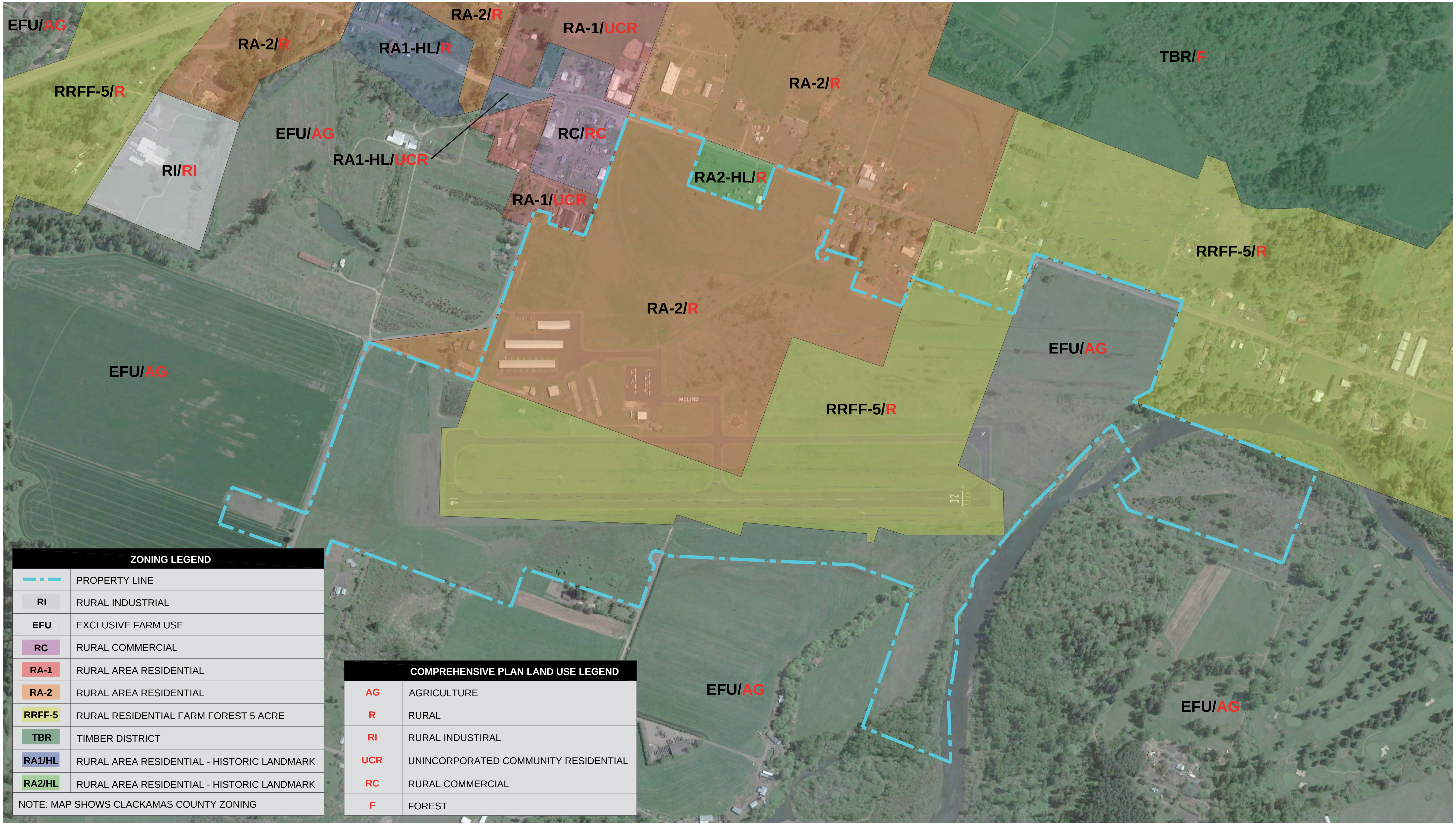

ZONING LEGEND	
(dashed line)	PROPERTY LINE
RI	RURAL INDUSTRIAL
EFU	EXCLUSIVE FARM USE
RC	RURAL COMMERCIAL
RA-1	RURAL AREA RESIDENTIAL
RA-2	RURAL AREA RESIDENTIAL
RRFF-5	RURAL RESIDENTIAL FARM FOREST 5 ACRE
TBR	TIMBER DISTRICT
RA1/HL	RURAL AREA RESIDENTIAL - HISTORIC LANDMARK
RA2/HL	RURAL AREA RESIDENTIAL - HISTORIC LANDMARK

NOTE: MAP SHOWS CLACKAMAS COUNTY ZONING

COMPREHENSIVE PLAN LAND USE LEGEND	
AG	AGRICULTURE
R	RURAL
RI	RURAL INDUSTRIAL
UCR	UNINCORPORATED COMMUNITY RESIDENTIAL
RC	RURAL COMMERCIAL
F	FOREST

MULINO STATE AIRPORT | AIRPORT MASTER PLAN

LAND USE & ZONING MAP | **FIG. 8-1**

Chapter 9 – Financial and Development Program

Chapter 9 – Financial and Development Program

Introduction

This chapter presents the projects identified in the Airport Capital Improvement Program (ACIP) that have been developed and assembled based on the analysis conducted in the Facility Requirements and Development Alternatives chapters (Chapters Four and Six). The ACIP projects are summarized in **Table 9-1** later in the chapter. The ACIP is organized in short, intermediate, and long-term periods that reflect both project prioritization and financial capabilities. Several factors were considered in determining project prioritization, including safety, forecast demand, the need to maintain or replace existing airfield facilities, and financial capabilities of both ODA and FAA to support the development program based on existing funding mechanisms.

The master plan preferred alternative includes airside and landside elements. Minor pavement maintenance items such as periodic vegetation removal and crack filling are not included in the ACIP, but will need to be conducted by ODA on an annual or semi-annual basis.

A brief environmental review was prepared and is presented in Chapter 5. The review provides an overview of areas of potential concern related to proposed development. All federally funded projects will require some level of project-specific environmental study, as determined by FAA.

The ACIP lists all major projects included in the twenty-year planning period addressed in the Master Plan. Individual projects for the first five years of the planning period are listed in order of priority by year. Projects for the intermediate and long-term phases of the planning period (years 6-20) are listed in order of priority but have not been assigned a year. Each project's eligibility for FAA funding is noted, based on current federal legislation and funding formulas. Specific project details are depicted on the updated airport layout plan and terminal area plan drawings contained in Chapter 7.

A primary source of potential funding identified in this plan is the FAA's Airport Improvement Program (AIP). As proposed, approximately 90 percent of the airport's twenty-year ACIP will be eligible for federal funding. Funds from this program are derived from the Aviation Trust Fund, which is the depository for all federal aviation taxes collected on such items as airline tickets, aviation fuel, lubricants, tires, aircraft registrations, and other aviation related fees. These funds are distributed by the FAA under appropriations set by Congress to all airports in the United States that are included in the federal airport system (National Plan of Integrated Airport Systems – NPIAS).

However, as noted in **Table 9-1**, the projected twenty-year total for FAA eligible projects in the ACIP significantly exceeds current FAA funding levels through the non-primary entitlement program (currently set at $150,000 per year). While other types of FAA funding may be available for some projects, it is reasonable to assume that despite establishing eligibility for FAA funding, not all eligible projects are likely to be funded by FAA in the timeline defined. As ODA manages its ACIP, maximizing the use of available FAA and other outside sources of funding is assumed. However, in some cases, the limited availability of outside funds may require projects to be deferred, or funded with increased levels of State or private funding.

Airport Development Schedule and Cost Estimates

Cost estimates for each project were developed in 2016 dollars based on typical construction costs associated with the specific type of project. The project costs listed in the ACIP represent order-of-magnitude estimates that approximate design engineering, environmental, other related costs, and contingencies. The estimates are intended only for preliminary planning and programming purposes. Specific project analysis and detailed engineering design will be required at the time of project inception to provide more refined and detailed estimates of the development costs.

As the plan is carried out in future years, these cost estimates can continue to assist management by adjusting the 2016 base year figures for subsequent inflation. This may be accomplished by converting the interim change in the United States Consumer Price Index (USCPI) into a multiplier ratio through the following formula:

$$\frac{X}{I} = Y$$

Where:
X = USCPI in any given future year
Y = Change Ratio

I = Current Index (USCPI)[1]

USCPI-U
241.038 **(1982-1984 = 100)** **June 2016**

Multiplying the change ratio (Y) times any 2016 based cost figures presented in this study will yield the adjusted dollar amounts appropriate in any future year evaluation. Several different CPI-based indices are available for use and any applicable index may be substituted by ODA in its financial management program.

The following sections outline the recommended development program and funding assumptions. The scheduling has been prepared according to the facility requirements determined through the master plan evaluation. The projected staging of development projects is based on anticipated needs and investment priorities. Actual activity levels may vary from projected levels; therefore, the staging of development in this section should be viewed as a general guide. When activity does vary from projected levels, implementation of development projects should occur when demand warrants, rather than according to the estimated staging presented in this chapter. In addition to major projects, the airport will continue to require regular facility maintenance such as pavement maintenance, vegetation control, sweeping, and lighting repair.

The first phase of the capital improvement program includes the highest priority projects recommended during the first five years of the planning period. Intermediate and long-term projects are anticipated to occur in the 6 to 20-year period, although changes in demand or other conditions could accelerate or slow demand for some improvements.

SHORT-TERM PROJECTS

The short-term program contains work items of the highest priority. Priority items include improvements related to safety and preservation of existing pavement. Because of their priority, these items will need to be incorporated into the State Capital Improvement Program (SCIP) managed by the FAA Seattle Airport District Office (ADO) and ODA. To assist with this process, the short-term projects are scheduled in specific calendar years for the first five years of the planning period (2016-2020).

The main focus in the short-term development period is to address major pavement improvements and pavement preservation including sealcoats, crack filling, and repainting markings.

[1] U.S. Consumer Price Index for All Urban Consumers (USCPI-U)

Short-Term Projects (1-5 years):

- Avigation Easement Acquisition;
- Obstruction removal;
- Fire flow improvements;
- Perimeter fencing;
- Airfield Pavement Maintenance (PMP) - sealcoats & markings;
- Runway Magnetic Variation (MAGVAR) change; and
- Apron expansion (design/environmental);

INTERMEDIATE & LONG-TERM PROJECTS

Several intermediate or long-term projects are considered to be current needs. However, based on the limited funding resources available, it was necessary to shift some projects to the longer-term timeline. However, projects may be completed sooner in the event that additional funding can be generated.

The most significant long-term project identified is the shift of the runway and parallel taxiway to the north and the realignment of a section of South Mulino Road outside the future runway protection zone (RPZ) for Runway 14 (15). The project requires property acquisition for the new road right-of-way (ROW) and a portion of the future RPZ.

Intermediate-Term Projects (6-10 years)

- Relocate segmented circle;
- Relocate airport rotating beacon;
- Apron expansion (construction);
- Relocate taxilane between apron and Taxiway A;
- Fuel tank relocation;
- Vehicle access road and parking;
- Install AWOS;
- Displaced/Threshold relocation project (new NPI markings and threshold lights);
- Construct helicopter parking position;
- Apron and taxilane overlay;
- Construct taxilane between Taxiway A and T-hangars;
- Airfield Pavement Maintenance (PMP) - sealcoats & markings;

Long-Term Projects (11-20 years)

- Realign S. Mulino Road; Acquire ROW
- Shift, Overlay Runway 14/32 (15/33)
- MIRL replacement;

- Overlay taxiways and construct aircraft holding bays;
- Install Approach Lighting System (ALS) – Rwy 32 (33);
- Airfield Pavement Maintenance (PMP) – sealcoats & markings;
- Construct taxilane between Taxiway A and T-hangars;
- Construct T-hangar Access Road and Parking; and
- Update Airport Master Plan.

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Mulino State Airport
20-YEAR CAPITAL IMPROVEMENT PROGRAM
2016-2035

Current NPE $ Accumulation: $535,630 (FY 2016)

Short-Term	Yr	Project		Project Category	Unit	Quantity	Unit Cost	Subtotal Cost	Total Cost	FAA GA Entitlement	Local Costs		
2016	1	None									$0	NPE Accumulation	$535,630
											$0	FY 2017 NPE	$150,000
											$0	Donate	$85,630
Subtotal - Year 1								$0	$0	$0	$0	Total Available (NPE)	$600,000
2017	2	Acquire Easements for Approach and Obstruction Removal		Property Acquisition	LS			$0	$412,500	$371,250	$41,250		
								$0	$0	$0	$0	NPE Accumulation	$228,750
								$0	$0	$0	$0	FY 2018 NPE	$150,000
Subtotal - Year 2								$0	$412,500	$371,250	$41,250	Total Available (NPE)	$378,750
2018	3	Fire Flow Improvement Project		Other	LS			$0	$600,000	$378,750	$60,000		
								$0	$0	$0	$0	NPE Accumulation	$0
								$0	$0	$0	$0	FY 2019 NPE	$150,000
Subtotal - Year 3								$0	$600,000	$378,750	$60,000	Total Available (NPE)	$150,000
2019	4	Perimeter Fencing Project (Phase 1)		Security	LS			$0	$100,000	$90,000	$10,000		
		PMP - RWY 14/32 Sealcoat and New Markings (MAG VAR Change - RWY 15/33)		Maintenance	LS			$0	$600,000	$60,000	$60,000		
		PMP - TWY A and Connectors Sealcoat and New Markings		Maintenance	LS			$0	$300,000	$0	$30,000		
		PMP - Taxilanes and Main Apron Sealcoat and New Markings		Maintenance	LS			$0	$325,000	$0	$32,500	NPE Accumulation	$0
		RWY 32 (33) - Obstruction Removal (Trees)		Other	LS			$0	$400,000	$0	$40,000	FY 2020 NPE	$150,000
Subtotal - Year 4								$0	$1,725,000	$150,000	$172,500	Total Available (NPE)	$150,000
2020	5	Perimeter Fencing Project (Phase 2)		Security	LS			$0	$583,130	$150,000	$58,313		
		Apron Expansion Project		Environmental	LS			$0	$300,000	$0	$30,000	NPE Accumulation	$0
								$0	$0	$0	$0	FY 2021 NPE	$150,000
Subtotal - Year 5								$0	$883,130	$150,000	$363,313	Total Available (NPE)	$150,000
							0-5	**$0**	**$3,620,630**	**$1,050,000**	**$637,063**		

* Other FAA Funding Total listed for reference only based on general project eligibility; FAA funding levels are expected to be below projected needs.

Unit: LS=Lump Sum, LF=Linear Foot, SY=Square Yard, EA=Each

Mulino State Airport
20-YEAR CAPITAL IMPROVEMENT PROGRAM
2016-2035

Current NPE $ Accumulation: $535,630 (FY 2016)

Intermediate-Term	6--10	Project		Project Category	Unit	Quantity	Unit Cost	Subtotal Cost	Total Cost	FAA GA Entitlement	Local Costs
Non-Primary Entitlements Accumulation Total (5-Years)										$750,000	
2021-2025		Relocate Segmented Circle		Other	LS			$0	$75,000	$0	$7,500
		Relocate Beacon		Other	LS			$0	$100,000	$0	$10,000
		Apron Expansion Project & Relocation of Taxilane Connector (Between Apron & TWY A) & Fuel Tank Relocation		Design/Construction	LS			$0	$2,500,000	$0	$250,000
		Paved Vehicle Access Road and Parking Project (S. Darnell Rd to Extended Main Apron)		Construction	LS			$0	$675,000	$0	$67,500
		Install AWOS		Other	LS			$0	$400,000	$0	$40,000
		Construct Helicopter Parking Pad		Construction	LS			$0	$100,000	$0	$10,000
		Existing Apron, T-hangar Taxilanes, and Taxilane Between Apron and T-hangars - Overlay		Rehabilitation	LS			$0	$825,000	$0	$82,500
		Construct Taxilane Between TWY A and Existing T-hangars (north of main apron)		Construction	LS			$0	$400,000	$0	$40,000
		PMP -TWY A and Connectors Sealcoat and New Markings		Maintenance	LS			$0	$300,000	$0	$30,000
Subtotal - Year 6-10								**$0**	**$5,375,000**	**$750,000**	**$537,500**

Long-Term	11--20	Project		Project Category	Unit	Quantity	Unit Cost	Subtotal Cost	Total Cost	FAA GA Entitlement	Local Costs
Non-Primary Entitlements Accumulation Total (10-Years)										$1,500,000	
2026-2035		RWY 14 (15) RPZ - Property Acquisition & S. Mulino Road Realignment		Construction	LS			$0	$1,000,000	$0	$100,000
		RWY 14/32 (15/33) - Shift, Overlay, & Lighting Project		Construction	LS			$0	$3,600,000	$0	$360,000
		TWY A, A1, A2, A3 - Overlay & Construct AC Holding Bays & Replace MITL		Rehab/Construction	LS			$0	$3,300,000	$0	$330,000
		Construct Taxilane to serve future T-hangars (south of main apron)		Construction	LS			$0	$1,250,000	$0	$125,000
		Construct New Paved T-Hangar Access Road & Vehicle Parking		Construction	LS			$0	$185,000	$0	$18,500
		RWY 32 (33) - Install ODALS/MALS		Lighting	LS			$0	$850,000	$0	$85,000
		PMP - RWY 14/32 (15/33) Sealcoat and New Markings		Maintenance	LS			$0	$600,000	$0	$60,000
		PMP - TWY A and Connectors Sealcoat and New Markings		Maintenance	LS			$0	$300,000	$0	$30,000
		PMP - Taxilanes and Main Apron Sealcoat and New Markings		Maintenance	LS			$0	$325,000	$0	$32,500
		Airport Master Plan Update		Planning	LS			$0	$300,000	$0	$30,000
Subtotal Year 11-20								**$0**	**$11,710,000**	**$1,500,000**	**$1,171,000**
							20 Yr Total	$0	$20,705,630	$1,500,000	$2,345,563

** Other FAA Funding Total listed for reference only based on general project eligibility; FAA funding levels are expected to be below projected needs.

Unit: LS=Lump Sum, LF=Linear Foot, SY=Square Yard, EA=Each

Capital Funding Sources

FEDERAL GRANTS

Federal funding is provided through the Federal Airport Improvement Program (AIP). This reauthorization is the latest evolution of a funding program originally authorized by Congress in 1946 as the Federal Aid to Airports Program (FAAP). The program provides grant funding for airports listed in the National Plan of Integrated Airport Systems (NPIAS). Under current legislation, eligible general aviation airports can receive up to $150,000 per year in general aviation "non-primary entitlement" grants. If a project is anticipated to cost in excess of $150,000, the participating airport can roll over the funding allocations for up to four years, at which time the accumulated total of funds can be used for larger projects. Any unused funds that remain beyond the maximum allowable roll over period revert to the FAA for use at other airports. These funds may only be used for eligible capital improvement projects and may not support airport operation and maintenance costs. Current FAA funding levels are 90 percent with a 10 percent local match.

FAA funding is limited to projects that have clearly defined need that has been identified through preparation of an FAA approved Airport Layout Plan (ALP). Periodic updates of the ALP are required when new or unanticipated project needs or opportunities exist that require use of FAA funds. The FAA will not generally participate in vehicle parking, utilities, building renovations, or projects associated with non-aviation developments.

Projects such as hangar construction are eligible for funding, although the FAA indicates that this category of project would be considered to be a much lower priority than other airfield needs.

The FAA also provides discretionary grants to airports. The dollar amounts of individual grants vary and can be significantly larger than the primary entitlements. Discretionary grants are awarded at the FAA's sole discretion. Discretionary funds are distributed after all entitlement funds have been allocated. For larger projects requiring substantially larger amounts of funding, non-primary entitlements, state apportionment, and discretionary grants are often combined. Other types of FAA funding include facilities & equipment (F&E) projects and Congressionally-appropriated dollars for specific projects.

STATE FUNDING

Local funding (non-FAA) for the Mulino Airport as a state owned airport is provided by ODA and is included in the CIP presented in **Table 9-1**. In addition, ODA offers a variety of programs for funding airport projects that are outlined in this section.

Pavement Maintenance Program

The Pavement Management Program (PMP) programs airfield pavement maintenance funds on established multi-year cycles. The PMP is funded by a portion of the fuel tax revenues. Forty-five percent of the original fuel taxes collected ($0.01/gallon on Jet-A and $0.09/gallon on AVGAS) are used to fund the PMP. (It should be noted that the remainder of the revenues collected from the original $0.01/gallon Jet-A and $0.09/gallon AVGAS fuel taxes equaling 55 percent are used to fund the operation of Oregon's 28 state owned airports and ODA administrative costs.) This program is intended to preserve and maintain existing airfield pavements in order to maximize their useful lives and the economic value of the pavement. As noted earlier, several short-term pavement maintenance projects are identified for Mulino State Airport in the most recent PMP. The program funds pavement maintenance and associated improvements (crack filling, repair, sealcoats, etc.), including some items which have not traditionally been eligible for FAA funding.

Funding for the PMP is generated through collection of aviation fuel taxes. ODA manages the PMP through an annual consultant services contract and work is programmed on a 3-year regional rotation. The program includes a regular schedule of inspection and subsequent fieldwork. Benefits from the PMP include:

- Economy of scale in bidding contracts;
- Federal/State/Local partnerships that maximize airport improvement funds;
- PMP is not a grant program and local match is on a sliding scale (50% - 5% required).

The PMP includes the following features:

- Review prior year's Pavement Condition Index (PCI) reports;
- Only consider PCI's above 70;
- Apply budget;
- Limit work to patching, crack sealing, fog sealing, and slurry sealing;
- Add allowance for striping;
- Program to include approximately 20 airports per year, depending on funding levels.

Financial Aid to Municipalities (FAM) Grants

ODA's Financial Aid to Municipalities (FAM) grant program has been suspended in recent years due to a lack of funding. House Bill 2075 (discussed later in this chapter) established a new source of funding revenue for aviation programs within the state. This bill resulted in the creation of three new programs that have essentially replaced FAM Grants. In order to facilitate these new programs, the rules used to administer funds under FAM have been amended to incorporate the language of House Bill 2075 and serve as the funding mechanism for these new programs.

Connect Oregon Program

In 2005, the Legislature created Connect Oregon, which used proceeds from lottery-backed bonds to provide grants and loans to fund non-highway transportation projects. In 2014, after the fifth installment of funding, the Legislature had provided $382 million to the program. Connect Oregon grants fund up to 80-percent of project costs with a 20-percent sponsor match and loans up to 100-percent of project costs.

House Bill 2075

House Bill 2075 (HR 2075) increased the tax on aircraft fuels, providing new revenues for the State Aviation Account. HR 2075 increased the fuel tax on both Jet-A and AVGAS by $0.02/gallon resulting in a new tax on Jet-A of $0.03 per gallon and AVGAS of $0.11 per gallon. The additional $0.02/gallon in revenues on Jet-A and AVGAS generated by HR 2075will be distributed to fund a variety of aviation needs through ODA's new Aviation System Action Program (ASAP) fund.

ASAP allocates and distributes the additional $0.02/gallon revenues generated by HR 2075 among three new programs: COAR - Critical Oregon Airport Relief Program; ROAR – Rural Oregon Aviation Relief Program; and SOAR – State Owned Airports Reserve Program. The specific programs are outlined below.

COAR - Fifty percent of the revenues from the $0.02/gallon fuel tax increase will be distributed as follows:

(A) To assist airports in Oregon with match requirements for Federal Aviation Administration (FAA) Airport Improvement Program grants;

(B) To make grants for emergency preparedness and infrastructure projects, in accordance with the Oregon Resilience Plan, including seismic studies, emergency generators, etc;

(C) To make grants for:

1. Services critical or essential to aviation including, but not limited to, fuel, sewer, water and weather equipment.
2. Aviation-related business development including, but not limited to, hangars, parking for business aircraft and related facilities.
3. Airport development for local economic benefit including, but not limited to, signs and marketing.

ROAR – Twenty-five percent of the revenues from the $0.02/gallon fuel tax increase will be distributed to assist commercial air service to rural Oregon.

SOAR – Twenty-five percent of the revenues from the $0.02/gallon fuel tax increase will be distributed to state owned airports for:

(A) Safety improvements recommended by the Oregon State Aviation Board and local community airports;
(B) Infrastructure projects at public use airports.

State Capital Improvement Program (SCIP)

The FAA's Seattle Airport District Office (ADO) in conjunction with state aviation agencies in Oregon, Washington, and Idaho have developed a coordinated "state" capital improvement program, known as the SCIP. The SCIP is the primary tool used by FAA, state aviation agencies, and local airport sponsors to prioritize funding. Airport sponsors are required to provide annual updates to the short-term project lists annually in order to maintain a current system of defined project needs. The short-term priorities identified in the master plan CIP will be imported into the SCIP and will be subject to additional prioritization for funding in competitive statewide evaluations.

LOCAL FUNDING

The locally funded (ODA/tenant) portion of the project costs during the twenty-year planning period is estimated to be just over $2.3 million as currently defined. Hangar construction costs and building maintenance have not been included in the CIP, since no FAA funding is assumed.

Portions of local matching funds are generated through airport revenues, including land leases and hangar rentals. Airport sponsors occasionally fund infrastructure and revenue-generating development such as hangars, either through an inter fund loan or the issuance of long-term debt (bonds).

Chapter 10 – Planning for Compliance & Solid Waste Recycling Plan

Chapter 10 – Planning for Compliance & Solid Waste Recycling Plan

Introduction

This chapter discusses the elements associated with the operation and management of Mulino State Airport, as a federally-obligated airport. The Federal Aviation Administration (FAA) encourages airport sponsors to establish and implement programs that promote sound operating practices while maintaining ongoing compliance with regulatory requirements. The FAA currently recommends that compliance be addressed during the airport planning process through the review of airport plans and documents including: the approved Airport Layout Plan, Exhibit "A"Property Map, any airport ordinance, any applicable zoning ordinance, airport rules and regulations, airport minimum standards, airport budgets, leases, easements, permits, and other applicable documents.

Oregon Department of Aviation Compliance

Oregon Department of Aviation (ODA) maintains a high degree of control over the operation of Mulino State Airport. ODA meets all applicable financial reporting and record keeping requirements. They employ a variety of "best practices" summarized in the following section, including: periodic review of market rates and fees, land appraisals, formal procurement and contracting practices, coordination with adjacent land owners (Avigation easements), local government (land use planning, zoning), and other state government agencies (airport overlay zoning, environmental agencies, etc.).

FAA Compliance Summary

A management program based on the FAA's "Planning for Compliance" guidelines and the adoption of airport management "Best Practices is recommended to address FAA compliance requirements and avoid noncompliance, which could have significant consequences.

Airport management "Best Practices" are developed to provide timely information and guidance related to good management practices and safe airport operations for airport managers and sponsors. The practices outlined herein are designed for use by ODA for evaluating and improving their current and future operation and management program.

Airport sponsors must comply with various federal obligations through agreements and/or property conveyances, outlined in **FAA Order 5190.6B,** Airport Compliance Manual. The contractual federal obligations that a sponsor accepts when receiving federal grant funds or transfer of federal property can be found in a variety of documents including:

- Grant agreements issued under the Federal Airport Act of 1946, the Airport and Airway Development Act of 1970, and Airport lmprovement Act of 1982. Included in these agreements are the requirement for airport sponsors to comply with:
    - Grant Assurances
    - Advisory Circulars
    - Application commitments
    - FAR procedures and submittals
    - Special conditions
- Surplus airport property instruments of transfer;
- Deeds of conveyance;
- Commitments in environmental documents prepared in accordance with FAA requirements;
- Separate written requirements between a sponsor and the FAA.

Land use compliance and compatible land use planning is often a significant compliance issue for airports. Compliance and suggested best practices are discussed under the following subheadings in this chapter:

- Airport Compliance with Federal and State Grant Assurances
- Environmental Compliance
- Airport User Compliance
- Other Airport Operational Policies and Procedures

AIRPORT COMPLIANCE WITH GRANT ASSURANCES

The Oregon Department of Aviation, as a recipient of federal airport improvement grant funds is contractually bound to various sponsor obligations referred to as "Grant Assurances" that have been compiled by the FAA. These obligations, presented in detail in federal grants and state statutes and administrative codes, document the commitments made by the Oregon Department of Aviation to fulfill the intent of the grantor (FAA) resulting from acceptance of federal funding for airport improvements. Failure to comply with the grant assurances may result in a finding of noncompliance and/or forfeiture of future funding. Grant assurances and their associated requirements are intended to protect the significant investment made by the FAA to preserve and maintain the nation's airports as a valuable national transportation asset, as mandated by Congress.

FAA GRANT ASSURANCES

The FAA's Airport Compliance Program defines the interpretation, administration, and oversight of federal sponsor obligations contained in grant assurances. Currently **FAA Order 5190.6B,** Airport Compliance Manual, defines policies and procedures for the Airport Compliance Program. Although it is not regulatory or controlling with regard to airport sponsor conduct, it establishes the policies and procedures for FAA personnel to follow in carrying out the FAA's responsibilities for ensuring compliance by the sponsor.

Order 5190.6B states: the FAA Airport Compliance Program is, "…designed to monitor and enforce obligations agreed to by airport sponsors in exchange for valuable benefits and rights granted by the United States in return for substantial direct grants of funds and for conveyances of federal property for airport purposes. The Airport Compliance Program is designed to protect the public interest in civil aviation. Grants and property conveyances are made in exchange for binding commitments (federal obligations) designed to ensure that the public interest in civil aviation will be served. The FAA bears the important responsibility of seeing that these commitments are met. This order addresses the types of commitments, how they apply to airports, and what FAA personnel are required to do to enforce them."

To better understand the intent of the FAA Compliance Program, it is important to understand the FAA's goals for a national airport system. The national airport system is currently known as the National Plan of Integrated Airport Systems (NPIAS), which has historic origins dating back to the 1946 Federal Airports Act. The airport system has evolved through several legislative updates in concert with changes in the organization and scope of the FAA. The NPIAS was adopted as part of the Airport and Airway Development Act of 1982, replacing the National Airspace System Plan (NASP), created by earlier legislation. There are approximately 2,500 general aviation airports and 800 commercial service airports in the NPIAS.

According to the FAA, cooperation between the FAA, state, and local agencies should result in an airport system with the following attributes:

- Airports should be safe and efficient, located at optimum sites, and be developed and maintained to appropriate standards;
- Airports should be operated efficiently both for aeronautical users and the government, relying primarily on user fees and placing minimal burden on the general revenues of the local, state, and federal governments;
- Airports should be flexible and expandable, able to meet increased demand and accommodate new aircraft types;
- Airports should be permanent, with assurance that they will remain open for aeronautical use over the long-term;
- Airports should be compatible with surrounding communities, maintaining a balance between the needs of aviation and the requirements of residents in neighboring areas;
- Airports should be developed in concert with improvements to the air traffic control system;
- The airport system should support national objectives for defense, emergency readiness, and postal delivery;
- The airport system should be extensive, providing as many people as possible with convenient access to air transportation, typically not more than 20 miles of travel to the nearest NPIAS airport; and
- The airport system should help air transportation contribute to a productive national economy and international competitiveness.

FAA Airport Improvement Program (AIP) grant assurances are summarized and categorized in **Table 10-1**.

TABLE 10-1: SUMMARY OF FAA AIP GRANT ASSURANCES (AIRPORT SPONSOR ASSURANCES 3/2014)

GRANT ASSURANCE NO.	GENERAL AIRPORT	PROJECT PLANNING / DESIGN & CONTRACTING	AIRPORT OPERATIONS AND LAND USE	DAY TO DAY AIRPORT MANAGEMENT	PROJECT CONSTRUCTION	LEASES & FINANCIAL	OTHER
1. General Federal Requirements							
2. Responsibility and Authority of the Sponsor							
3. Sponsor Fund Availability							
4. Good Title							
5. Preserving Rights and Powers							
6. Consistency with Local Plans							
7. Consideration of Local Interest							
8. Consultation with Users							
9. Public Hearings							
10. Metropolitan Planning Organization							
11. Pavement Preventative Maintenance							
12. Terminal Development Prerequisites							
13. Accounting System, Audit, and Record Keeping Requirements							
14. Minimum Wage Rates							
15. Veteran's Preference							

GRANT ASSURANCE NO.	GENERAL AIRPORT	PROJECT PLANNING / DESIGN & CONTRACTING	AIRPORT OPERATIONS AND LAND USE	DAY TO DAY AIRPORT MANAGEMENT	PROJECT CONSTRUCTION	LEASES & FINANCIAL	OTHER
16. Conformity to Plans and Specifications							
17. Construction Inspection and Approval							
18. Planning Projects							
19. Operations and Maintenance							
20. Hazard Removal and Mitigation							
21. Compatible Land Use							
22. Economic Nondiscrimination							
23. Exclusive Rights							
24. Fee and Rental Structure							
25. Airport Revenues							
26. Reports and Inspections							
27. Use by Government Aircraft							
28. Land for Federal Facilities							
29. Airport Layout Plans							
30. Civil Rights							
31. Disposal of Land							
32. Engineering and Design Services							

GRANT ASSURANCE NO.	GENERAL AIRPORT	PROJECT PLANNING / DESIGN & CONTRACTING	AIRPORT OPERATIONS AND LAND USE	DAY TO DAY AIRPORT MANAGEMENT	PROJECT CONSTRUCTION	LEASES & FINANCIAL	OTHER
33. Foreign Market Restrictions							
34. Policies, Standards and Specifications							
35. Relocation and Real Property Acquisition							
36. Access by Intercity Bus							
37. Disadvantaged Business Enterprises							
38. Hangar Construction							
39. Competitive Access							

While sponsors should understand and comply with all grant assurances, there are several assurances that are common and recurring issues for airport sponsors throughout the country. These are summarized in more detail below. A complete description of current AIP grant assurances is provided in **Appendix F**. It is important to note that the assurances (and corresponding numbers) are applied to non-airport sponsors undertaking noise compatibility program projects and planning agency sponsors. These can also be found in the Airport Improvement Program (AIP) under Grant Assurances.

ODA, as the Mulino State Airport sponsor, is responsible for the direct control and operation of the airport. Familiarity with proper monitoring and implementation of sponsor obligations and FAA grant assurances, in particular, are keys to maintaining compliance. FAA Order 5190.6B and ongoing communication with the FAA Northwest Mountain Region Compliance Office are both excellent resources when addressing policy and compliance.

DURATION

The terms, conditions, and assurance of a grant agreement with the FAA remain in effect for the useful life of a development project, which is typically 20 years from the receipt of the last grant. However, terms, conditions, and assurances associated with land purchased with federal funds do not expire.

The airport sponsor should have a clear understanding of and comply with all assurances. The following sections were excerpted (without revision) from published FAA guidance for more detail.

Project Planning, Design and Contracting

Sponsor Fund Availability (Assurance #3)

Once a grant is given to an airport sponsor, the receiving sponsor commits to providing the funding to cover their portion of the total project cost. Currently this amount is ten percent of the total eligible project cost, although it may be higher depending on the particular project components or makeup. Once the project has been completed, the receiving airport also commits to having adequate funds to maintain and operate the airport in the appropriate manner to protect the investment in accordance with the terms of the assurances attached to and made a part of the grant agreement.

Consistency with Local Plans (Assurance #6)

All projects must be consistent with city and county comprehensive plans, transportation plans, zoning ordinances, development codes, and hazard mitigation plans. The airport sponsor and planners should familiarize themselves with local planning documents before a project is considered to ensure that all projects follow local plans and ordinances.

In addition to understanding local plans, airport sponsors should be proactive in order to prevent noncompliance with this assurance. The airport sponsor should assist in the development of local plans that incorporate the airport and consider its unique aviation related needs. Sponsor efforts should include the development of goals, policies, and implementation strategies to protect the airport as part of local plans and ordinances.

Accounting System Audit and Record Keeping (Assurance #13)

All project accounts and records must be made available at any time. Records should include documentation of cost, how monies were actually spent, funds paid by other sources, and any other financial records associated with the project at hand. Any books, records, documents, or papers that pertain to the project should be available at all times for an audit or examination.

General Airport

Good title (Assurance #4)

ODA, as the airport owner must have a Good Title to affected property when considering projects associated with land, buildings, or equipment. Good Title means the sponsor can show complete ownership of the property without any legal questions, or show it will soon be acquired.

Preserving Rights and Powers (Assurance #5)

No actions are allowed, which might take away any rights or powers from ODA, which are necessary for ODA as the sponsor to perform or fulfill any conditions set forth by the assurance included as part of the grant agreement. If there is an action taken or activity permitted that might hinder any of those rights or powers it should be discontinued. An example of an action that can adversely affect the rights and powers, of the airport is a Through-the-Fence (TTF) activity. TTF activities allow access to airport facilities from off-airport users. In many instances, the airport sponsor cannot control the activities of those operating off the airport resulting in less sponsor control. This loss of control can potentially have an adverse impact to airport users. For example, TTF activities often do not pay the same rates and charges as on-airport users, resulting in an unfair competitive advantage for businesses and users located off-airport. There are no existing TTF activities at the Mulino State Airport.

Airport Layout Plan (ALP) (Assurance #29)

The airport should at all times keep an up-to-date ALP, which should include current and future boundaries, facilities/structures, locations of non-aviation areas, and existing improvements. No changes should be made at the airport to hinder the safety of operations; also no changes should be made to the airport that are not in conformity with the ALP. Any changes of this nature could adversely affect the safety, utility, or efficiency of the airport. If any changes are made to the airport without authorization the alteration must be changed back to its original condition or ODA will have to bear all costs associated with moving or changing the alteration to an acceptable design or location. Additionally, no federal participation will occur for improvement projects not shown on an approved ALP.

Disposal of Land (Assurance #31)

Land purchased with the financial participation of an FAA Grant cannot be sold or disposed of by the ODA at their sole discretion. Disposal of such lands are subject to FAA approval and a definitive process established by the FAA. If airport land is no longer considered necessary for airport purposes, and the sale is authorized by the FAA, the land must be sold at fair market value. Proceeds from the sale of the land must either be repaid to the FAA or reinvested into another eligible airport improvement or noise compatibility project. Land disposal requirements typically arise when a community is building a new airport and the land on which the original airport was located is sold with the proceeds used to offset costs of the new airport. In general, land purchased with FAA funds is rarely sold by a sponsor.

Airport Operations and Land Use

Pavement Preventative Maintenance (Assurance #11)

Since January 1995, the FAA has mandated that it will only give a grant for airport pavement replacement or reconstruction projects if an effective airport pavement maintenance-management program is in place. The program should identify the maintenance of all pavements funded with federal financial assistance. The pavement maintenance-management program report provides a pavement condition index (PCl) rating (0 to 100) for various sections of aprons, runways, and taxiways; including, a score for overall airport pavements.

Operations and Maintenance (Assurance #19)

All federally funded airport facilities must operate at all times in a safe and serviceable manner. ODA should not allow for any activities that inhibit or prevent a safe and serviceable operation. ODA must always promptly mark and light any hazards on the airport, and promptly issue Notices to Airmen (NOTAMs) to advise of any conditions that could affect safe aeronautical use. Exceptions to this assurance include when temporary weather conditions make it unreasonable to maintain the airport. Further, this assurance does not require ODA to repair conditions that have happened because of a situation beyond their control.

Compatible Land Use (Assurance #21)

Land uses around the airport should be planned and implemented in a manner that ensures surrounding development and activities are compatible with the airport. To ensure compatibility, ODA is expected to take appropriate action, to the extent reasonable, including encouraging the adoption of zoning laws to guide land use in the vicinity of airports under their jurisdiction. Incompatible land use around airports represents one of the greatest threats to the airport's future viability.

Day to Day Airport Management

Economic Non-Discrimination (Assurance #22)

Any reasonable aeronautical activity offering service to the public should be permitted to operate at the airport as long as the activity complies with airport established standards for that activity. Any contractor agreement made with the airport will have provisions making certain the person, firm, or corporation will not be discriminatory when it comes to services rendered as well as rates or prices charged to customers. Provisions include:

- All FBOs on the airport should be subject to the same rate fees, rentals, and other charges.
- All persons, firms, or corporations operating aircraft can work on their own aircraft with their own employees.

- If the airport sponsor at any time exercises the rights and privileges of this assurance, they will be under all of the same conditions as any other airport user would be.
- ODA can establish fair conditions, which need to be met by all airport users to make the airport safer and more efficient.

ODA can prohibit any type, kind, or class of aeronautical activity if it is for the safety of the airport. An example of an activity that may be considered for prohibition is sky diving. The existing sky diving activity at the Mulino State Airport has been evaluated by ODA and the FAA, and has been deemed to be safe. It is important to point out that the FAA will review such prohibitions and make the final determination as to whether or not a particular activity type is deemed unsafe based on current operational factors.

Exclusive Rights (Assurance #23)

Exclusive rights at an airport are often a complicated subject usually specific to individual airport situations. The assurance states the sponsor "will permit no exclusive right for the use of the airport by any person providing, or intending to provide, aeronautical services to the public..." However, there are exceptions to this rule. If ODA can prove that permitting a similar business would be unreasonably costly, impractical, or result in a safety concern, they may consider granting an exclusive right. To deny a business opportunity because of safety, ODA must demonstrate how that particular business will compromise safety at the airport. Exclusive rights are very often found in airport relationships with fixed base operators (FBO), but exclusive rights can also be established with any other business at the airport. If an unapproved exclusive rights agreement exists, it must be dissolved before a future federal grant can be awarded to the airport.

If, as the sponsor ODA is contemplating denial of a business use at Mulino, it is strongly encouraged that they contact the FAA Airports District Office (ADO) in order to ensure they have all necessary information and that denial of access is not going to be seen as unjust discrimination. For more in depth information on exclusive rights reference **Advisory Circular 150/5190-6**, "Exclusive Rights at Federally Obligated Airports."

Leases and Finances

Fee and Rental Structure (Assurance #24)

Simply put, the fee and rental structure at the Mulino airport must be implemented with the goal of generating enough revenue from airport related fees and rents to become self-sufficient in funding day to day operational needs. ODA should routinely monitor its fee and rental structure to ensure reasonable fees are being charged to meet this goal. Common fees charged by airports include fuel flowage, tie-down, landing fees, and hangar rent.

Airport Revenue (Assurance #25)

All airport revenue and local taxes on aviation fuel should be used toward the operating costs of the airport, the local airport system, or other local facilities that are owned by the same owner of the airport, which will directly affect air transportation passengers or property, or for noise mitigation on or off airport property. In other words, revenue generated by airport activities must be used to support the continued operation and maintenance of the airport. Use of airport revenue to support or subsidize other non-aviation activities or functions of the sponsor, is not allowed and is considered revenue diversion. Revenue diversion is a significant compliance issue subject to cause scrutiny by the FAA.

Other FAA Compliance Requirements

OTHER FEDERAL CONTRACTING AND PROCUREMENT DOCUMENTS

When an airport sponsor accepts an FAA Airport Improvement Program (AIP) grant, they agree to adhere to all applicable federal contracting and procurement requirements. Advisory circulars are required for use in AIP funded projects. Included in each grant request is a federal funding checklist that identifies the requirements an airport should consider before accepting the grant. The following items are noted in the checklist:

- ALPs should be up to date
- Exhibit A Property Map may need to be updated if acquiring additional property
- Land Inventory may need to be updated if you have recently acquired land with federal assistance
- Airports must hold good title to the airport landing area
- Appropriate signage and markings must be in place
- Runway Protection Zone and approach surface deficiencies must be identified and steps to address deficiencies must be noted
- Runway Safety Areas must meet FAA standards if planning a runway project
- Disadvantaged Business Enterprise program goals must be met on projects of more than $250,000
- Procedures should be in place to handle bid protests
- Open AIP grant projects need to be identified
- Project closeout forms must be submitted within 90 days of work completion
- A “Certification of Economic Justification” must be included for routine pavement maintenance projects

- A "Revenue Generating Facility Eligibility Evaluation" must be completed for hangar construction or fueling facilities
- A "Reimbursable Agreement" and "Non-Fed Coordination" must be completed for navigational aid projects
- A "Relocation Plan" must be completed if a project requires residences or businesses to be relocated

SPECIAL CONDITIONS

In addition to the standard grant assurances discussed above, the state or the FAA may require "Special Conditions" to individual grants that supplement or expand the standard grant assurances. Special Conditions are unique to an individual airport and can be project or administrative in nature. Airport sponsors needs to be aware of such conditions that may be applied to their airport.

MULTIJURISDICTIONAL CHALLENGES

In some instances, airports are jointly owned and operated by more than one airport sponsor. In other instances, airports may be located within multiple jurisdictions. While ODA is ultimately responsible for adherence with the grant assurance at Mulino, the actions, or inactions, of surrounding jurisdictions can and do affect the ODA's ability in meeting its obligations. This is particularly true with land use compatibility issues around airports. As a result, it is important in either circumstance that all jurisdictions affected by the airport understand the operational needs and complexities of having an airport within its jurisdiction. Mutual agreements addressing airport operational or land use protection needs, or other cooperative measures, are recommended for all jurisdictions to both protect the functionality of the airport and the safety and well-being of airport users and neighbors.

FAA THROUGH-THE-FENCE (TTF)

Through-the-Fence access is discouraged by the FAA due to concerns over land use compatibility, security, safety, and economic inequity (economic discrimination) between on- and off-airport users. Economic discrimination is *"an unjust economic advantage or disadvantage for one airport user versus another by charging one more or less than another, and therefore creating an advantage or disadvantage."* However, when Through-the-Fence use exists or is proposed, the FAA requires airport sponsors to develop access plans and establish agreements consistent with FAA grant assurances. To maintain economic parity within the agreements, Through-the-Fence users are typically required to compensate the airport owner for the access in a way that is comparable to an equivalent on-airport user.

Mulino State Airport has no active Through-the-Fence users.

FAA Through-the-Fence Policies

"On March 14, 2011, the FAA amended Grant Assurance 5, Preserving Rights and Powers, to prohibit new residential through-the-fence access arrangements and published an interim policy to address existing residential through-the-fence access. The interim policy required all AIP grant-eligible airport sponsors to certify their status. Those sponsors with existing access agreements were directed to depict their residential through-the-fence access points on their airport layout plan (ALP) and develop access plans to address[1]:

- General Authority for Control of Airport Land and Access;
- Safety of Airport Operations;
- Recovery of Costs of Operating the Airport;
- Protection of Airport Airspace; and
- Compatible Land Uses Around the Airport."

"On February 14, 2012, the FAA Modernization and Reform Act of 2012 was signed into law (P.L. 112-95), Section 136 of this law states:

> …a sponsor of a general aviation airport shall not be considered to be in violation of this subtitle, or to be in violation of a grant assurance made under this section or under any other provisions of law as a condition for the receipt of Federal financial assistance for airport development, solely because the sponsor enters into an agreement that grants to a person that owns residential real property adjacent to or near the airport access to the airfield of the airport for the following:
>
> (A) Aircraft of person
>
> (B) Aircraft authorized by the person

In addition, this law outlines specific conditions and limitations that must be in the access agreement. Beginning on October 1, 2014, an airport sponsor with an existing residential through-the-fence access agreement will be required to demonstrate evidence of compliance with this law. Specifically, these airport sponsors are required to update their airport layout plans to depict points of residential through-the-fence access and provide a copy or copies of their access agreements to demonstrate the sponsor's compliance with the law."

In conclusion, ODA is obligated to report to the FAA Airports Division any existing arrangements that grant access to the Mulino airport from off-airport areas, including a description of the circumstances. It is then up to the Northwest Mountain Region Airports Division to determine if the agreement is accepted or in violation of federal regulations.

[1] FAA Compliance Guidance Letter 2013-01-FAA Review of Existing and Proposed Residential Through-the-Fence Access Agreements (July 16, 2013)

Solid Waste and Recycling Plan

INTRODUCTION

This section of the chapter discusses the airport's solid waste generation and what recycling options are used. The layout of this section is outlined as follows:

Waste Audit

- Recycling Feasibility
- Plan to Minimize Solid Waste Generation
- Operational and Maintenance Requirements
- Waste Management Contracts
- Potential for Cost Savings or Revenue Generation
- Future Development and Recommendations

Waste Audit

Due to the size of the Mulino State Airport minimal waste is generated on site. Specific sources of waste on site include private hangars, Infinite Air Center the FBO, Mix Aircraft Solutions (aircraft repair), and Pacific Northwest Skydivers. The tenants are individually responsible for waste generated by their operations. Molalla Sanitary Service currently provides trash and recycling hauling service in the Mulino State Airport service area. At the present time, none of the existing airport tenants have contracts with Molalla Sanitary Services for waste disposal or recycling.

WASTE DISPOSAL

Each individual tenant is also responsible for disposal and recycling of his or her own waste. Molalla Sanitary Service services the airport area and would be the contractor each tenant would contract with for waste and recycling hauling to the North Marion Recycling and Transfer Station located about 21 miles west of the airport. No State or Federal requirements apply to any airport generated waste. Molalla Sanitary Service provides commingled recycling including metal cans, plastic bottles, tubs, buckets and nursery pots, paper, and cardboard. They do not provide glass recycling or other non-standard recyclables. These items would need to be transported by individual tenants to the North Marion Recycling and Transfer Station, which accepts glass and non-standard recyclables such as oil, batteries, phones electronic waste, and paint. The only items not accepted at the North Marion Recycling and Transfer Station are household hazardous wastes including antifreeze.

CONSTRUCTION WASTE

Construction waste is the responsibility of the Contractor for each specific project. Projects identified on the 20-year CIP are listed in **Table 10-2** below.

TABLE 10-2: SUMMARY OF FUTURE PROJECTS

SHORT-TERM	PROJECT
2016	None
2017	Acquire Easements for Approach and Obstruction Removal
2018	Fire Flow Improvement Project
2019	Perimeter Fencing Project (Phase 1)
	PMP
	RWY 32 - Obstruction Removal (Trees)
2020	Perimeter Fencing Project (Phase 2)
INTERMEDIATE TERM	**PROJECT**
2021-2025	Relocate Segmented Circle
	Relocate Beacon
	Apron Expansion Project & Relocation of Taxilane Connector (Between Apron & TWY A) & Fuel Tank Relocation
	Paved Vehicle Access Road and Parking Project (S. Darnell Rd to Extended Main Apron)
	Install AWOS
	Construct Helicopter Parking Position
	Existing Apron, T-hangar Taxilanes, and Taxilane Between Apron and T-hangars - Overlay
	Construct Taxilane Between TWY A and Existing T-hangars (north of main apron)
	Slurry Seal Parallel and Access Taxiways
LONG TERM	**PROJECT**
2026-2035	RWY 14/32 – Runway Shift, Overlay & MIRL Replacement
	TWY A, A1, A2, A3 - Rehabilitation & Construct AC Holding Bays & Replace MITL
	Construct Taxilane to serve future T-hangars (south of main apron)
	Construct Future Paved T-Hangar Access Road Connection & Parking Lot
	Airport Master Plan Update

Recycling Feasibility

No recycling services are currently available at the airport. Molalla Sanitary Services, the Metro South County Transfer Station & the North Marion Recycling and Transfer Station, can accommodate services not provided at the airport. The list below outlines material and recycling locations for the Molalla area.

TABLE 10-3: RECYCLABLE OPTIONS

MATERIAL	RECYCLE LOCATION
Aluminum	Molalla Sanitary Services, Metro South County Transfer Station & North Marion Recycling and Transfer Station
Glass Bottles	
Plastic Containers	
Paper	
Tin Cans	
Vehicle Batteries	Metro South County Transfer Station & North Marion Recycling and Transfer Station
Cell Phone, Rechargeable Batteries, and Chargers	
Electronic Waste	

CURRENT PRACTICES

According to OAR 340-090-0040, cities with a population greater than 4,000 residents must maintain some sort of recycling option. The population of the Hamlet of Mulino was estimated to be 2,650, as referenced on the Clackamas County website. The U.S. Census Bureau lists the official 2010 population of Mulino as 2,103. With a population below the 4,000 resident threshold, Mulino is not required to provide receptacles, weekly collection service, or an education and promotion program to its residents. It is the responsibility of individual residents to dispose of recyclable waste.

Airport hangar tenants are individually responsible for waste disposal and recycling for their hangars and have the opportunity to take advantage of recycling services offered by Molalla Sanitary Service. Disposal of glass or any non-standard recyclables (vehicle batteries, cell phones, rechargeable batteries, chargers, and other electronic waste) is the responsibility of the individual tenants. These non-standard recyclables can be delivered to the appropriate locations listed in Table 10-3 above.

Plan to Minimize Solid Waste Generation

Clackamas County is included in the Portland Tri-County Metro area, which includes Clackamas, Multnomah, and Washington counties and is designated as the Metro waste shed. The waste shed can implement programs to reduce solid waste generation and earn "credits" toward recovery rates mandated by the state of Oregon. In 1997, House Bill 3456 created three programs that a waste shed can choose to implement:

- Waste Prevention Program
- Reuse Program
- Residential Composting Program

A two percent "credit" can be obtained for each program by creating an education or promotional campaign and adhering to at least two components listed by the Oregon Department of Environmental Quality (ODEQ). Credits of up to six percent can be deducted from the waste shed's state mandated material recovery and waste generation rate if the waste shed participates in all three programs – resulting in a two percent credit for each program implemented. The Metro waste shed has implemented all three of these programs and therefore receives a six percent recovery credit.

The Metro waste shed is required to maintain a 64 percent recovery rate as set forth in Oregon Chapter 459A – Reuse and Recycling, 2013 Edition. During the most recent year for which DEQ has compiled waste shed recovery rates - 2014, the Metro waste shed achieved a calculated 59.8% waste recovery rate (2014 Oregon Material Recovery and Waste Generation Rates Report), which includes the six percent credit.

METHODS TO REDUCE SOLID WASTE

There are very limited opportunities to reduce solid waste generation because little waste is produced at the Mulino State Airport. However, the airport should still establish a goal to reduce the amount of solid waste generated. While the airport is not responsible for waste generated by airport tenants, informational brochures on recycling opportunities developed by the Metro waste shed could be distributed to all the hangar tenants to encourage them to recycle their waste.

PHYSICAL CONSTRAINTS

The Mulino and Molalla areas consist of a relatively rural population and the current option of contracting with Molalla Sanitary Service is the most effective choice. The Portland Tri-County area waste shed encourages and promotes recycling for businesses (SWMP 2008).

Operational and Maintenance Requirements

Operational and maintenance requirements at the airport are minimal. The Oregon Department of Aviation is responsible for mowing the grass. ODA mows all movement, safety, and RPZ areas adjacent to the runway and taxiway. The infield lawn is not watered and the grass is typically mowed as needed. The Experimental Aircraft Association (EAA) chapter at the airport mows around all of the buildings and the taxiway leading from the apron to the Darnell House. The remainder of the airport is mowed by a local farmer for the airport hay crop.

When the grass is mowed, the clippings are left in place. Grass clippings typically provide approximately 25% of the lawn's total fertilizer needs and create a healthy turf environment (Starbuck 1999). The Metro area Solid Waste Management Plan recommends promotion of programs that encourage "grass cycling" which means leaving grass clippings generated by lawn mowing on-site rather than bagging the clippings for disposal or composting. The current practice is consistent with this recommendation.

Waste Management Contracts

Janitorial and hangar leases provided by ODA were reviewed for information regarding waste and recycling. No hauling or landfill contracts are available.

The hangar lease dictates that tenants "shall maintain the grounds and premises in and around the rental area in a reasonably neat, clean, and orderly condition." Although tenants are responsible for their own waste from the hangar, no mention of the opportunity for recycling is included in the lease. Proceeds from rent are used for general airport maintenance and cleaning services.

To promote additional recycling opportunities, language could be added to the hangar leases that encourages tenants to use Molalla Sanitary Service, the Metro South County Transfer Station or the North Marion Recycling and Transfer Station and to be conscientious of any waste generated in the hangar.

Potential for Cost Savings or Revenue Generation

The potential for cost savings is limited since individual tenants are responsible for costs associated with solid waste disposal and recycling.

Revenue generation is also limited due to the small amount of waste generated. Any potential for additional revenue would accrue to the individual tenants since they would contract with the waste disposal and recycling provider.

Future Development and Recommendations

FUTURE DEVELOPMENT

Future development projects at the Airport include tenant improvements, landside and airside facility development, and rehabilitation projects. The demolition and waste associated with each of these projects would be the responsibility of the Contractor performing the work. It is assumed that the demolition waste would be taken to either the Metro South County Transfer Station or the North Marion Recycling and Transfer Station.

A periodic review of the Airport's solid waste plan needs to be implemented to allow for any unforeseen future development. For example, if glass recycling would become available and feasible for the Airport, then the Airport would need to reevaluate that option based on current practices.

RECOMMENDATIONS

Immediate

An immediate recommendation would be to continue with the existing practice of leaving lawn clippings. This practice saves money on disposal fees while preserving the aesthetics of the infield area and providing needed nutrients to the turf.

Short-Term

A short-term recommendation would be to add a statement into hangar leases advising tenants of the recycling options available through Molalla Sanitary Service, the Metro South County Transfer Station, or the North Marion Recycling and Transfer Station and to encourage tenants to recycle and minimize waste. Additionally, informational brochures on recycling opportunities developed by the Metro Area Waste shed could be distributed to all of the hangar tenants to encourage them to recycle their waste.

Ongoing

An ongoing recommendation would be to reevaluate the Airport's solid waste plan, especially after development has occurred. Any increase in hangars and additional businesses at the Airport may increase the amount of waste generated.

Modifications to Specifications

Language in construction contract documents could be added that encourages Contractors to recycle waste at the Metro South County Transfer Station or North Marion Recycling and Transfer Station and to minimize waste caused by construction activities as much as practical.

References

Portland Tri County. No date. "Solid Waste" Website: http://www.oregonmetro.gov/tools-living/garbage-and-recycling/garbage-recycling-hazardous-waste-disposal-portland http://www.oregonmetro.gov/regional-solid-waste-management-plan

Clackamas County Solid Waste Ordinance (Solid Waste Ordinance). Title 10: Chapter 10.03 Solid Waste and Wastes Management

Oregon Department of Environmental Quality (ODEQ). No date. "Waste Prevention and Reduction." Website: http://www.deq.state.or.us/lq/sw/twopercent/index.htm

Wilson, John P., Airport Operations Specialist, Oregon Department of Aviation. E-mail. 29 June 2016

Starbuck, Christopher J. Department of Horticulture. University of Missouri-Columbia. 1999. "Grass Clippings, Compost and Mulch: Questions and Answers." Website. http://extension.missouri.edu/explorepdf/agguides/hort/g06958.pdf

RECYCLING OPTIONS

http://www.clackamas.us/recycling/transferstation.html

http://www.oregonmetro.gov/tools-living/garbage-and-recycling

POPULATION

http://factfinder.census.gov/bkmk/table/1.0/en/DEC/10_DP/DPDP1/1600000US4150450

WASTE REDUCTION AND REUSE

http://www.oregonmetro.gov/regional-solid-waste-management-plan

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Appendix A

Mulino State Airport – Pilot Survey Responses

There were 39 pilot surveys received between August 10, 2015 and January 6, 2016. The survey link was sent to the pilot chapter presidents in the Portland area for member dispersal, published in the OPA "Propwash" newsletter, mailed to airport tenants at Aurora State Airport, and mailed to 59 aircraft owners included on Mulino's basedaircraft.com website.

Q1: At which airport is your aircraft stored?

Answer Choices	Responses
Mulino State Airport	18.42%
Aurora State Airport	5.26%
Lenhardt Airpark	2.63%
Troutdale Airport	36.84%
Hillsboro Airport	0%
Pearson Airfield	2.63%
Starks Twin Oaks Airpark	2.63%
Chehalem Airpark	0%
Grove Field	0%
Scappoose Industrial Airpark	0%
Valley View Airport	5.26%
Country Squire Airport	0%
Sportsman Airpark	0%
Other (Sandy River, Dietz Airport, Beck Field)	26.32%

Q2: If you base your aircraft at Aurora State Airport, do you foresee the new Air Traffic Control Tower affecting your operations at the airport?

Answer Choices	Responses
N/A (My aircraft is not based at Aurora)	84.85%
Yes	9.09%
No	6.06%

Q3: If your aircraft is not currently based at Mulino State Airport, would you consider relocating to Mulino State Airport?

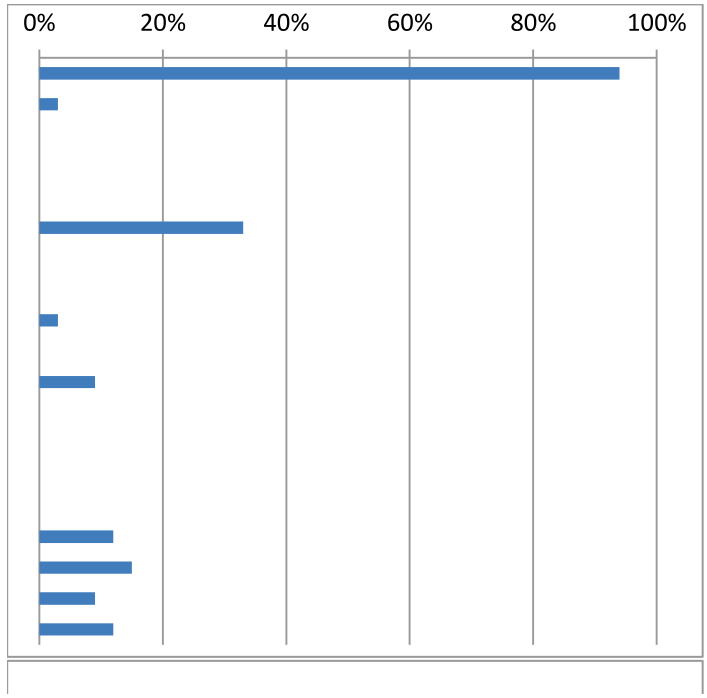
Answer Choices	Responses
N/A (My aircraft is based at Mulino)	15.79%
Yes	21.05%
No	63.16%

Q4: If you answered YES to the previous question, please tell us how you plan to store your aircraft at Mulino?

Answer Choices	Responses
Tiedown Apron	22.22%
Rent Existing Hangar	44.44%
Build New Hangar	22.22%
Rent existing hangar (if available), but if not available then I plan to build a new hangar	22.22%
Other	11.11%

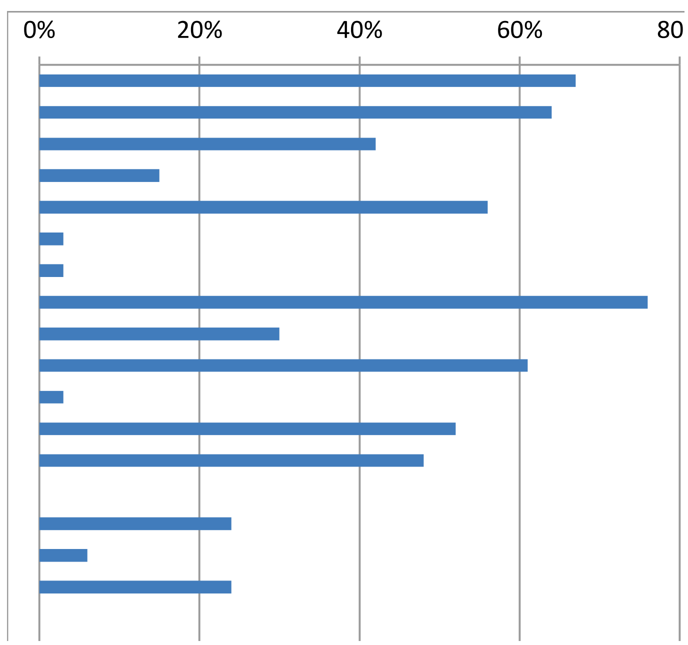
Q5: Which of the following aviation activities do you perform? Check all that apply.

Answer Choices	Responses
Recreational Flying	94.87%
Glider	2.56%
Ultralight	0%
Helicopter	0%
Balloons	0%
Turf Runway Operations	33.33%
Parachute/Skydiving	0%
Aerial Applicators (Agriculture)	0%
Emergency Medical Flights	2.56%
Aerial Advertising (Banner Towing)	0%
Aerial Photography	7.69%
Law Enforcement Flights	0%
Aerial Fire Response	0%
Air Cargo	0%
Aircraft Charters	0%
Flight Training	10.26%
Corporate/Business Flights	15.38%
Tourism (Scenic Flights for Hire)	7.69%
Other (Including Aircraft Ferry)	10.26%



Q6: Which facilities are important to support your operations at an airport? Check all that apply.

Answer Choices	Responses
Runway (Length/Surface)	69.23%
Hangars (Rental)	66.67%
Instrument Approach Capabilities	35.9%
Terminal Area (Apron)	12.82%
On-Field Weather	48.72%
Fuel Jet-A (Self-Serve)	2.56%
Fuel Jet-A (Full Service)	2.56%
Fuel AVGAS (Self-Serve)	76.92%
Fuel MOGAS (Self-Serve)	35.90%
Airfield Lighting	58.97%
Helicopter Parking	2.56%
Aircraft Parking/Tiedowns	52%
FBO Services	48.72%
Aerial Applicator (Loading Area)	0%
Fencing/Security	35.90%
Air Traffic Control Tower	5.13%
Other (Including Turf RWY, etc.)	23.08%



Appendix B

MEMO

To: Oregon Department of Aviation

CC: Jim Pex, Greg Reince, Matt Rogers

From: Century West Engineering

Date: January 6, 2016

Re: Mulino State Airport Water Improvements

The purpose of this memo is to describe the existing waterline conditions at the Mulino State Airport and provide potential solutions to increase fire flow for future development.

Water Constraints at the Airport

It has been noted by the Fire Marshal[1], the airport has limited hydrant flow. Notably, the hydrant flows are below state standards for capacity of 1,500 gallons per minutes at 20 PSI. The only possible development is the replacement of the T-hangars that were previously demolished. No additional future development is currently permitted. Expansion of the airport facilities would further strain the fire flow capacity and would not be supported by the state Fire Marshal if no improvements were proposed to the water system.

Existing Conditions

An overview of existing conditions at the Airport is shown in Figure 2-2 for reference.

After review of the existing water system maps and a technical memorandum (attached) prepared by Pietrok Engineering and Resources, LLC to update the Mulino Water District's water master plan, Century West Engineering (CWE) has compiled a short list of projects that would be needed to provide adequate fire protection for growth at the airport. Notably, the proposed projects by CWE were also identified within the technical memorandum prepared by Pietrok Engineering. Construction costs have been updated by CWE to reflect current market values.

The Mulino Water District's inventory map (see attached Drawing Sheet 1) showed a specific constraint on both sides of the airport waterline loop. On the north end starting at the intersection of Mulino Road and Highway 213, an 8" waterline is stubbed to the west (along Mulino Road) that is then downsized to 6" and eventually 4" at the intersection of Landing Way. This 4" line feeds the north end of the Airport facilities and several fire hydrants in the vicinity.

The waterline transitions from a 4" line to and 8" on airport property, travels south, and eventually ties back into a 4" waterline at Darnell Road. This 4" section then ties back into the main 8-inch line located in Highway 213.

[1] M. Penunuri (personal communication, October 26, 2015)

Review of Improvements

Upon review, it is evident that the issues with the existing fire flows are a direct result of constrained smaller pipe diameters that make up the loop in the water system at the Airport. The larger 8” water lines on Airport property are fed by 4” water lines at the north and south end of the loop. The 4” water lines do not have the capacity to provide adequate fire protection to meet minimum state standards. The minimum pipe size to supply fire flow is 6” in most cases but should be standardized to an 8” pipe to provide capacity for future growth.

The three options presented below have been identified to improve the fire flow capacity at the Airport. Refer to Figure 1 for a depiction of each of the options.

Project Option 1 – Replace Pipe along Mulino Road and Land Way

This option would install approximately 2,400’ of undersize waterline pipe along Mulino Road and Land Way with a minimum 8” pipe. The existing pipe varies between 6” and 4”. Because the waterline appears to be located outside of the existing pavement, the cost of replacement would be reduced significantly compared to if the water line was within the pavement section. The project would create an immediate improvement in water flow and fire suppression capability for the Airport due compared with the current pipe configuration.

This option is similar to Pipe Upgrade 3 of the Capital Improvement Projects described in the technical memorandum prepared by Pietrok Engineering. However, the project described in the technical memorandum only takes into account domestic use and fire suppression without consideration of growth at the Airport. The proposed Option 1, however, will install 8” pipe from Highway 213 to the existing 8” line on the north end of the Airport near valve M21 shown on Drawing Sheet 1.

- *Pro: Solves an immediate need with flow restrictions in the 4” and 6” waterlines that feed the north end of the Airport. The Airport would not maintain the waterline in the future.*
- *Con: Does not complete the loop in the 4” section that ties to Darnell Road. Because the waterline is looped, it will continue to have reduced flow ability due to the 4” line connection at Darnell Road. However, the losses would be minimal in comparison to Option 2 alone described below. The ideal situation would be to replace both locations of 4”.*
- ***Estimated project cost: $250,000-$350,000***

Project Option 2 – Replace Pipe along Darnell Road

This option would install approximately 1,400’ of undersize waterline pipe along Darnell Road with a minimum 8” pipe. The existing pipe is only 4”. The majority of the waterline is located outside of the roadway pavement, thus reducing costs to replace it with an 8” waterline.

This option is similar to Pipe Upgrade 4 of the Capital Improvements Project described in the technical memorandum prepared by Pietrok Engineering. However, the project described in the technical memorandum only takes into account upgrading the pipe in Darnell Road and not the extension onto Airport property. The proposed Option 2, however, will install 8” pipe from Highway 213 to the existing 8” line on the south end of the Airport.

- *Pro: Helps increase the fire flows for the southern portion of the Airport. The Airport would not maintain the waterline in the future.*
- *Con: Does not solve the restricted fire flows at the north end of the Airport and hangar facilities. Replacement of the section on Darnell Road in Option 2 would minimally increase fire flow for the Airport due to the current configuration.*
- ***Estimated project cost: $150,000-$250,000***

Project Option 3 – Construct a New Well on Airport Property

This option would install a new well on Airport Property capable of supplying water for domestic use and fire suppression. The location of the well would be determined at a later date if the option was selected. This project would also need to place new pipe for the Airport to use because the water district will not allow cross-connection to their facilities from a private source.

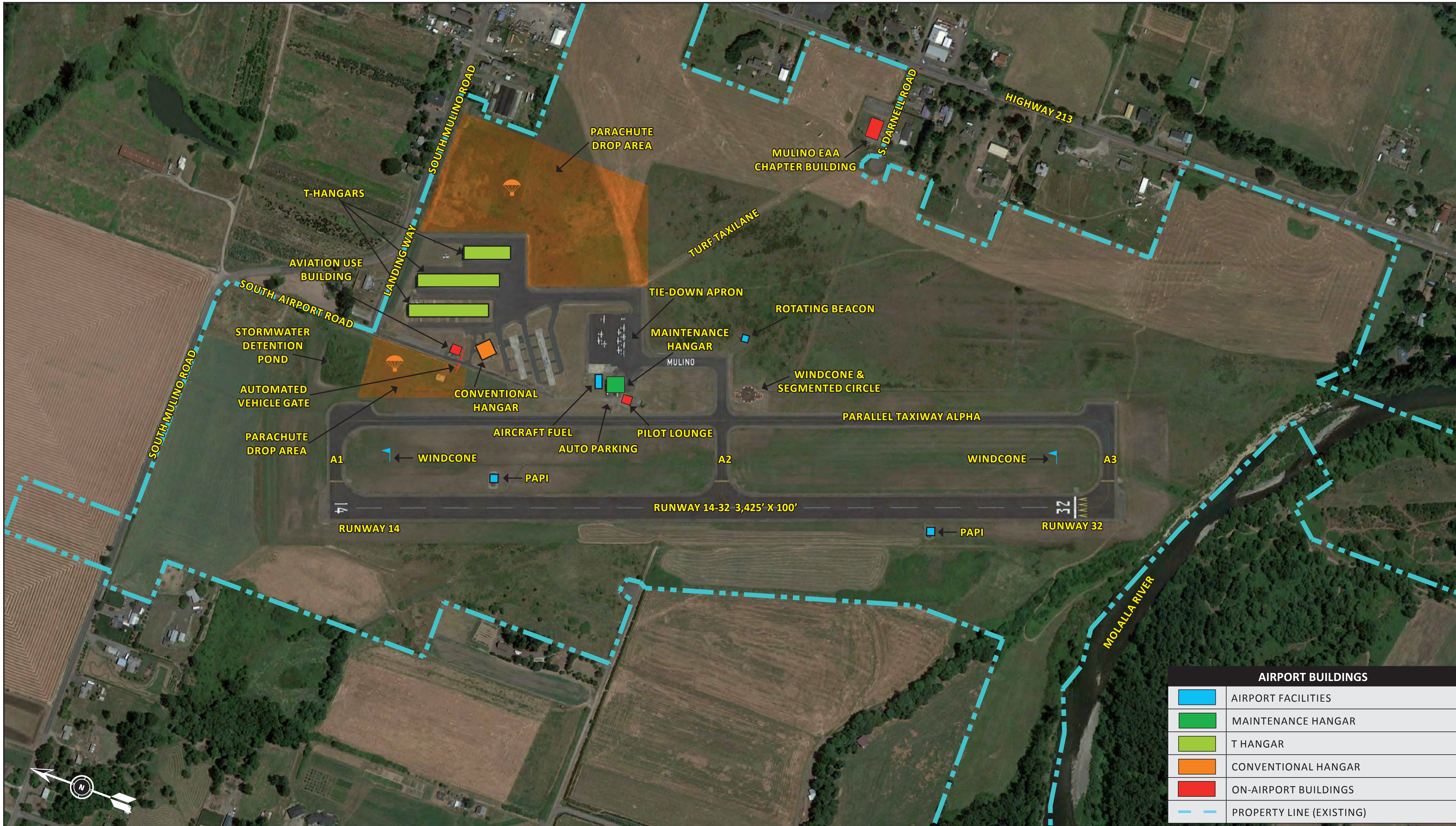
This option is similar to Item 5 of the Capital Improvement Projects described in the technical memorandum prepared by Pietrok Engineering. However, the project described in the technical memorandum accounts for installing a new well for water district use only and does not include additional pipe for airport needs if the well was placed on Airport property. The proposed Option 3, however, will install a new well capable of supplying water for Airport needs.

- *Pro: This would solve the water supply because the well could be sized to provide as much water as required.*
- *Con: Providing wells that supply both domestic and fire flow are expensive and must be maintained continuously. Per code, fire flow pumps must be redundant. As a result, at least (2)-20hp variable frequency pumps would be required to provide adequate fire suppression. An additional 3 hp domestic pump would be required, and the costs would further increase. The supply line would also need to be separate from the existing facility because the water district will not allow a private source to be combined to their system due to cross-contamination concerns. Maintenance costs will also be recurring for the pumps, well, and piping in the future.*
- ***Estimated project cost: $450,000-$500,000***

Recommendation

Combing Option 1 and Option 2 would completely solve any issues in the future growth of the Airport and could be phased as separate projects in the future as demand requires.

Option 1 presents to the best alternative to the immediate issues of fire flow at the Airport. The project cost is medium-high in relation to Options 2 and 3; however, no further maintenance would be required once the project is complete. The existing pipe configuration would provide 8" piping for over 75% of the Airport region. The upgrade would increase capacity at or near the minimum state requirements. Option 2 could be constructed as funding is available.

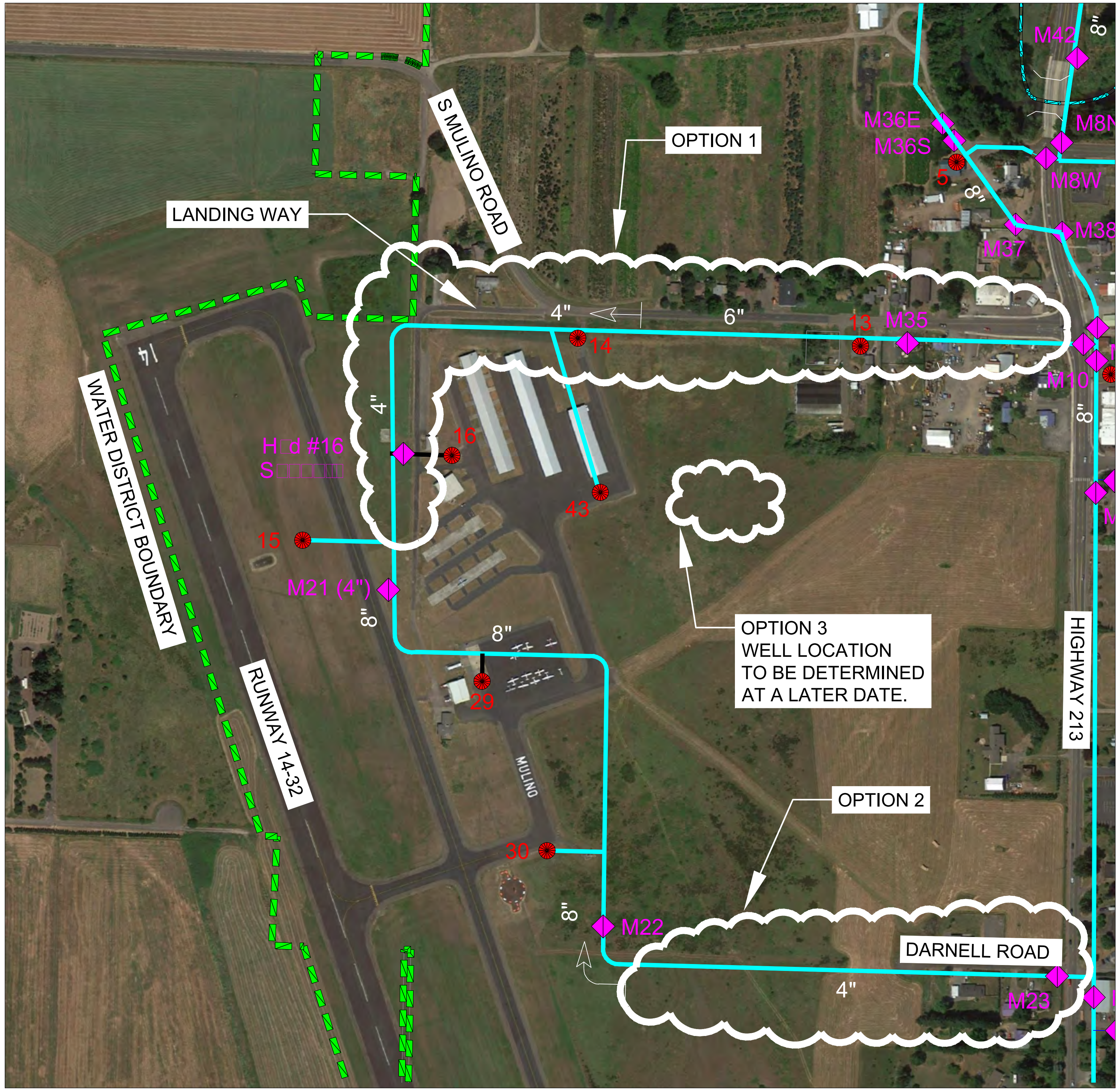


MULINO STATE AIRPORT | AIRPORT MASTER PLAN

OREGON AVIATION

EXISTING CONDITIONS | **FIG. 2-2**

CENTURY WEST ENGINEERING CORPORATION



SOURCE: MULINO WATER DISTRICT, MARCH 2015

PLAN
NO SCALE

1
1

LEGEND:

(green dashed line)	WATER DISTRICT BOUNDARY
6"	WATER LINE
13	FIRE HYDRANT
M21 (4")	MAIN LINE VALVE

NOTES:

1. INFORMATION SHOWN BASED ON APPROXIMATE LOCATIONS PROVIDED BY THE MULINO WATER DISTRICT. NOT SURVEYED.

N

OREGON DEPARTMENT OF AVIATION

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING.
0" 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

NO.	DATE	BY	APPR	REVISIONS

CENTURY WEST ENGINEERING
BEND OFFICE
1020 SW EMKAY DRIVE, #100
BEND, OR 97702
541.322.8962
541.382.2423 FAX

DESIGNED BY: GJR
DRAWN BY: GJR
CHECKED BY: WMR
DATE: JANUARY 2016
PROJECT NO: 40097.055.01
SCALE: AS NOTED

OREGON DEPARTMENT OF AVIATION
MULINO STATE AIRPORT
AIRPORT MASTER PLAN

FACILITY REQUIREMENTS
WATER IMPROVEMENT OPTIONS

DRAWING NO. 1

SHEET NO. 1 of 1

DRAFT TECHNICAL MEMORANDUM

TO: Mulino Water District board

FROM: Neil Pietrok, PE

DATE: July 15, 2013

RE: Update of the Mulino Water District Master Plan and Capital Improvement Plan

CC: Yogi Trogden, Water District Superintendent

Introduction

The Mulino Water District is a small community water system in Clackamas County Oregon. The District serves approximately 210 customers. A Master Plan for the District was prepared by JMS Engineering in October, 1999. This technical memorandum will provide an update to that master plan. At the end of this Memorandum a list of proposed capital improvement projects will be presented in a 5-year, ten-year, and 15-year plan.

Chapter 1 Update

Chapter 1 of the existing Master Plan describes the District Background and the time span of the study (20 years). There are no updates to this chapter at this time.

Chapter 2 Update

Chapter 2 discusses the District formation, location, water supply sources, water rights, distribution system, water treatment, system operation, and storage facilities.

The Mulino Water District is still classified as a "Community Water System". An updated OAR 333-61-025, rules for community water systems, is attached to this Memorandum.

The water supply sources have not changed since the 1999 report. However, the report discusses Well #1 which was abandoned in 1973. It does not discuss whether the District still owns the water rights for this well. This should be investigated in case the District needs water rights in the future or needs another well.

The District Map has been updated recently to reflect construction changes and updated information. A reduced size version of this map is attached to this Memorandum.

Chapter 2 notes that the current water usage of 540 gallons-per-minute exceeds the permitted quantity of 235 gpm. It is not clear if this discrepancy was ever addressed by the District with State Water Resource Department.

The District Map has been updated recently to reflect construction changes and updated information for the water distribution system. A reduced size version of this map is attached to this Memorandum.

Chapter 2 discussed the need to upgrade 4” water mains to a minimum size of 6” diameter for fire flow. This will be a factor in assigning projects to the Capital Improvements Project Plan (CIP). This chapter also discusses a fire hydrant replacement program. That program is currently be implemented by the Water District Superintendent. Replacing the hydrants in the system should be considered a maintenance project for the district. Maintenance Projects are differentiated from CIP projects by their size and frequency and should have a different budget line item.

Treatment and system operations have not changed since the 1999 Master Plan.

Maintenance work on the storage reservoirs is ongoing with an annual program initiated by the District Superintendent.

Chapter 3 Update

Chapter 3 discusses land use and population projections. The original report projected a 2013 population (based on 3.5 people per household x number of system connections) of 906. Actual population is 735. This is consistent with the lower than expected water usage in Chapter 4 Update below.

Chapter 4 Update

Chapter 4 discusses water use, system water loss, metering and rates, future water requirements, and fire flows. The largest water users (V&V, Electronic Control Design, and the school) has not changed. Water production has remained consistent with the 1999 numbers of approximately 32 million gallons a year. This is due to the slower population growth than expected and system improvements which have reduced water loss.

The District Superintendent noted that the system water loss was checked several year ago and was around 5%. This is a good number compared to an average of 10-20% for most community systems.

At the time of this draft Memorandum, an update for the metering rates was not available. The final Memorandum will have the updated rates for the District.

The 1999 fire flows showed that the Fire Hydrant at Highway 213 and Passmore Road did not meet requirements. There have been substantial upgrades to the water system in this area since 1999. Data for fire flows from the Molalla Fire District was not available at the time of this draft Memorandum. Updated information will be included in the final Memorandum. Also the report notes that the spacing of hydrants in the District is farther than 500 feet apart. This affects the insurance requirements of the residents in the District. A separate study should be conducted to assess the cost versus benefit ratio of adding fire hydrants to the District's system in order to lower the district's population insurance rates.

The projected water demands in the original Report overestimate needed flows because of the slow population growth.

Chapter 5 Update

Chapter 5 discusses future water needs. As discussed previously the slow population growth has stunted the need for more water. However, the district has very little water reserve for emergencies, such as loss of power due to a storm.

The Report recommends adding another well to the District's water system as a back-up well. The costs for the proposed well in the report have approximately tripled based on Means cost estimating software. This would mean and new well for the district would cost about $300,000.

Chapter 6 Update

Chapter 6 discusses water quality, regulations, testing, well head protection, and aesthetic concerns. The District's current testing program is showing very little contaminants in the water. Disinfection and treatment have not changed since the 1999 report nor have the regulations. There have been complaints about milky or dirty water at times but these issues have resolved themselves and are usually due to system flushing. This is consistent with other water districts' flushing programs.

Chapter 7 Update

Chapter 7 discusses water storage requirements. The water storage deficit was 127,000 gallons in 1999 and that has not changed much over the years. As a result, the District has very little emergency storage. The projections in the report were that the deficit would grow to approximately 320,000 gallons by 2020. At that time the deficit would affect emergency storage and fire reserve storage. This deficit has been delayed due to the slower than expected population growth. However, the storage expansion options should be considered.

Another discussion in this chapter concerned an emergency plan. Currently the two wells do not have a method for connecting a generator in the event of a power outage.

Chapter 8 Update

This chapter discusses the system hydraulic analysis. The system hydraulic model needs to be updated, but it is not considered a priority at this time. The update for the proposed system improvements discussed in this chapter will be addressed below in the Capital Improvements Plan.

Chapter 9 Update

This chapter addressed financial planning. Financial planning is not a part of the scope of work for this Technical Memorandum.

District Plan for Improvements

Maintenance Improvements

The District should continue the current maintenance programs of fire hydrant replacement and service upgrades as required. The fire hydrant replacement program replaces hydrants that are deficient in either age of the hydrant or water service to the hydrant. The water service upgrades general happens when a line break is reported or noticed by the District Superintendent. Typically, the repairs for the line breaks reveal other system repairs that are completed at the same time to save money. Also an adjacent service to the break may be upgraded at the same time to save future construction and permitting costs.

Another maintenance program the District has is storage tank inspection and cleaning. This program should continue.

Capital Improvements Projects

The noted projects in the 1999 Report that have not been completed to date include upgrading all 4” water mains to 6” or 8” water mains, adding a new well to the water system, and upgrading or adding storage.

Pipe Upgrades

1. Upgrade Graves Road Near Milk Creek Circle from 4” to 6” Pipe ~ $120,000
2. Upgrade Graves Road Near Howards End from 4” to 6” ~ $150,000
3. Upgrade Mulino Road from 4” to 6” ~ $90,000
4. Upgrade Darnell Road from 4” to 8” ~ $100,000

   The upgrades for Graves road help complete a loop in the distribution system and provide better fire flow in the area. Item 1 connects past upgrade work from Passmore Road, Highway 213, and the Milk Creek Bridge Project.

The upgrades for Mulino Road and Darnell Road complete a water system loop around the airport and provide better fire flows at the airport property. These upgrades may be able to be partially paid for by SDC fees from future airport work.

New Well

5. Install new 300’ Deep Well ~ $300,000

   This well was discussed in the original 1999 report. This is an updated cost estimate based on 2013 prices.

New Storage Reservoir

6. Construct New 250,000 gallon reservoir ~ $750,000

   This project would add water storage to the District system. This estimate does not include real property costs nor any demolition costs. As an alternative, the existing 100,000 gallon reservoir could be demolished and replaced with a 200,000 or 300,000 gallon reservoir. This would save property costs, but it is not clear at this time if a larger reservoir would fit on the existing property.

Well Upgrades

7. Add an Automatic Transfer Switch to the Well #3 ~ $40,000

   This project was discussed in the 1999 report. Only costs for Well #3 are included here.

<u>Implementation Plan</u>

The following is a 5-year, 10-year, 15-year, and 20-year plan for capital improvements projects in the district. Projects were prioritized based on factors of greatest impact to the District and safety improvements. Based on immediate past projects in the District (Passmore Road, Highway 213 bridge, and Graves Road Bridge), it was assumed that the District has funds for about $100,000 per year for Capital Improvements. The 5-year incremental plans assumes about two-thirds of this budget is available and the remaining third would be used to cover projects that are unforeseen at this time (for example: Highway 213 Improvements).

5-year Plan

UPGRADE MULINO ROAD NEAR MILK CREEK CIRCLE – As mentioned this would complete a loop of prior improvements to Passmore Road, Highway 213, and Milk Creek Bridge. This would improve water service to more than 30 properties and seven fire hydrants.

UPGRADE GRAVES ROAD NEAR HOWARDS END – This project would complete a critical back up Milk Creek Crossing Loop (Main Crossing is on Highway 213 Bridge). An upgraded line would improve water service to more than 15 properties and 3 fire hydrants.

10-year Plan

REPLACE EXISTING 100,000 GALLON RESERVOIR WITH 250,000 GALLON RESERVOIR – This project would add security to the District system by providing reserve water in case of an emergency. The existing property for the 100,000 gallon reservoir is already owned by the District and at the correct elevation. This project would take up the entire 10-year plan capital improvement monies unless other fund sources are found.

15-Year Plan

ADD AN AUTOMATIC TRANSFER SWITCH TO THE WELL #3 – This project would add an additional layer of security to the District's water system in the event of a power outage.

IDENTIFY PROPERTY FOR NEW WELL AND SECURE THE WATER RIGHTS – Installing a new well on the District's water system will be a two-step process by identifying the preliminary steps in the 15-year plan and constructing the well in the 20-year plan.

20-year Plan

CONSTRUCT NEW WELL – A new well will provide a back-up for the District in case regulations change, the water table changes, or if there is an issue with the existing wells.

NOTE: The Mulino and Darnell Road upgrades were not included in the Capital Improvements Plan at this time. The District should build these projects when development at the airport results in SDC fees that can supplement the costs of these projects.

APPENDIX

D

FEDERAL AND STATE MANDATES RELATED TO GROUNDWATER

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Table D-1: Federal and State Mandates Related to Groundwater

Program/Agency	Federal Law/Regulations	State Law/Rules
Drinking Water/OHD	*Safe Drinking Water Act* (SDWA) 42 USC 1417 40 CFR 141, 142, 143	ORS 448.273 ORS 448.277 ORS 285.757 OAR 333
Coliform Monitoring/OHD	40 CFR 141.21, 141.63	OAR 333-651-032 OAR 333-61-036
Disinfection/OHD	40 CFR 141.72	OAR 333-61-032
IOCs/OHD	40 CFR 141.11, 141.23, 141.62	OAR 333-61-030 OAR 333-61-036
SOCs/OHD	40 CFR 141.12,131.24, 141.61	OAR 333-61-030 OAR 333-61-036
VOCs/OHD	40 CFR 141.24, 141.61, 141.62	OAR 333-61-030 OAR 333-61-036
Surface Water/OHD	40 CFR 141.71(b)	OAR 333-61-032
		OAR 333-61-030

Fluorides/OHD	40 CFR 141.11, 141.23, 141.62, 143.3	OAR 333-61-036
Lead Material Ban/OHD	SDWA 1417(a)(1) & (2), 42 USC 1417(a)(1) & (2)	OAR 333-61-034(5) OAR 333-61-036
Pb & Cu Rules/OHD	-	OAR 333-61-034
Radionuclides/OHD	40 CFR 141.16, 141.23, 141.62	OAR 333-61-036
Asbestos/OHD	40 CFR 141.23(b), 141.62(b)(2), OSHA 29 CFR 1910 & 1926	OAR 333-61-030 OAR 333-61-036
Public Notification/OHD	40 CFR 141, 142, & 143	OAR 333-61-025 OAR 333-61-042
Operator Certification/OHD	-	ORS 448.405-470 OAR 333-61-065
Plan Review/OHD	-	ORS 448.131 OAR 333-61-060
PWS Permits/OHD	-	ORS 448.140 & .145 OAR 333-61-046
PWS Construction Standards/OHD	-	ORS 448.131 OAR 333-61-050
Area of Groundwater Concern/OHD	-	ORS 448.268 OAR 333-61-032
Water Quality Standards/DEQ	*Federal Water Pollution Control Act* of 1972 - Renamed the *Clean Water Act* (CWA) - and Amendments; 33 USC 1251 through 1376	ORS 468B ORS 454 OAR 340-41 OAR 340-48
Injection Wells/DEQ	CWA	ORS 468B.005-035 OAR 340-44-005
Septic Systems/DEQ	CWA	ORS 454.010-805 OAR 340-71-100
National Pollutant Discharge Elimination System (NPDES) Permitting/DEQ	40 CFR 122, 123, 123, 125, 129-131	ORS 466B.050 OAR 340-14

		OAR 340-45
Groundwater Quality Protection/DEQ	-	ORS 568.900-923 OAR 603-90
Hazardous Waste Storage, Treatment, Disposal DEQ	*Resource Conservation and Recovery Act* of 1976 (RCRA) 40 CFR 260-272	ORS 465 ORS 466 OAR 340-100
Solid Waste - Treatment Disposal/DEQ	RCRA	ORS 469 OAR 340-61 OAR 340-64 (tires) OAR 340-102
Underground Storage Tanks (USTs) Permitting & Cleanup/DEQ	RCRA 40 CFR 280 (FR 2-18-93)	OAR 340-122 OAR 340-150
Hazardous Waste Cleanup/EPA & DEQ	*Comprehensive Environmental Response Compensation and Liability Act* (CERCLA); *Superfund Amendments and Reauthorization Act* (SARA); *Emergency Planning and Community Right-to-Know Act* (Title III)	ORS 485 OAR 340-122
Manufactures Chemicals - Regulations/DEQ	Toxic Substances Control Act (TSCA)	ORS 465 OAR 340-135 ORS 634
Pesticides - Regulations/ODA & DEQ	*Federal Insecticide, Fungicide, and Roenticide Act* (FIFRA)	ORS 466.005(7) OAR 340-109
Spill Reporting and Response/DEQ	-	ORS 466.605 OAR 340-108-001
Enforcement and Civil Penalties/DEQ	-	ORS 468.090-140 OAR 340-12-026
Pollution Prevention Requirements/EPA & DEQ	*Federal Pollution Prevention Act* of 1990 (Implemented through Toxic Release Inventory Reporting Requirements)	-
Toxic Use Reduction and Hazardous Waste Reduction/DEQ	-	ORS 466.003 OAR 340-135

LEDGEND:

USC - ODA - Oregon Department of Agriculture

CFR - Code of Federal Regulations DLCD - Department of Land Conservation and Development

PWS - Public Water System ORS - Oregon Revised Statutes

OHD - Oregon Health Division OAR - Oregon Administrative Rules

DEQ - Department of Environmental Quality

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Appendix C

ESA

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memorandum

date February 24, 2016

to Matt Rogers and Greg Reince, Century West Engineering

from Ava Laszlo and Susan Cunningham, ESA

subject **Environmental Documentation: Mulino State Airport Master Plan Updates**

The Oregon Department of Aviation (ODA) is developing a 2015-2035 Airport Master Plan update for the Mulino State Airport. The Master Plan will address the development needs at the airport over a 20-year planning horizon (2015-2035) and develop a realistic program for implementation within known funding constraints. This memorandum documents the existing conditions of wetlands and other waterbodies, floodplains, air quality, stormwater and water quality, compatible land use and Section 4(f), and species protected under the Endangered Species Act that could potentially occur within the project area for the Mulino State Airport. This memorandum identifies existing conditions and lists potential effects to these resources from the proposed development.

PROJECT LOCATION

The Mulino State Airport is located within the hamlet of Mulino, Oregon (Township 4 East, Range 3 East, Sections 17 and 20) approximately 25 miles south of the Portland, Oregon City Center. It has been in operation since 1949 and lies on tax lots: 42E20 00700, 42E20 00600, 42E20 00801, 42E20A 01200, 42E17D 00300, 42E17D 00100, 42E17DB 00900, 42E17C 01390, 42E17B 01000, 42E17C 01300, 42E20 00195, 42E20 00105, 42E20 00102, 42E20 00400, 42E20 00490, 42E20 00401 (WH Pacific 2008, Clackamas County 2016b). Mulino is one of four hamlets in Clackamas County, a largely rural county with dominant agriculture and timber industries (Clackamas County 2016a).

The Airport is bounded to the south by forest land, scrub/shrub vegetation and the Molalla River; to the west by farmland, single-family residential housing, and scrub/shrub vegetation; to the north by farmland and South Mulino Road; and to the east by Cascade Highway 213, farmland, and single-family residential housing. Development activities are is set to occur within Airport property. Some objects (i.e., trees) may need to be removed or topped outside airport project if they are found to penetrate the object free zone of the runways.

Mulino is within the Willamette Valley ecoregion, which extends from the eastern flanks of the Coast Range to the western flanks of the Cascade Mountains, from St. Helens, Washington south to Drain, Oregon. Over seventy-five percent of this ecoregion's land use is agriculture, forest, and woodland. This ecoregion has a mild climate with wet winters and warm, dry summers (ODFW 2016b). Mulino receives on average about 46 inches of precipitation annually (NRCS 2016). The project area is within a mixed-use environment with agricultural, commercial, and residential uses.

WETLANDS AND WATER RESOURCES

Wetlands are under the jurisdiction of the US Army Corps of Engineers (Corps). The Corps uses the *Corps of Engineers Wetland Delineation Manual* (Experimental Laboratory 1987) and the *Western Mountains, Valleys, and Coast Wetland Delineation Regional Supplement Manual* (Corps of Engineers 2010) for determining what a wetland is and the extent of a wetland. An area is determined to be a wetland if it has a dominance of hydrophytic vegetation (plants that grow in wet conditions), hydric soils, and positive wetland hydrology.

The National Wetlands Inventory (NWI) shows six wetlands within the Airport property (4 Freshwater Forested/Shrub, 1 Freshwater Emergent, and 1 Riverine). None of these occur within the study area. Table 1 lists the soils mapped to occur at the Airport by the Natural Resources Conservation Service (NRCS). Three of these soil series (Concord silt loam, Dayton silt loam, Riverwash) are considered to be hydric, and seven of the remaining eight soil types have hydric inclusions (Aloha silt loam, 0 to 3 percent slopes; Amity silt loam; Camas gravelly sandy loam; Cloquato silt loam; Newberg fine sandy loam; Newberg loam; and Woodburn silt loam, 3 to 8 percent slopes) (USDA 2016).

Table 1: Mapped Soil Units within the Study Area

Soil map symbol	Map unit name	Hydric?	Hydric inclusions?
1a	Aloha silt loam, 0 to 3 percent slopes	No	Huberly in swales on terraces, 3% Dayton on terraces, 2%
3	Amity silt loam	No	Dayton on terraces, 3% Huberly in swales on terraces, 2%
11	Camas gravelly sandy loam	No	Wapato on floodplains, 2%
19	Cloquato silt loam	No	Wapato on floodplains, 2%
21	Concord silt loam	Yes	NA
29	Dayton silt loam	Yes	NA
67	Newberg fine sandy loam	No	Wapato on floodplains, 2%
68	Newberg loam	No	Wapato on floodplains, 2%
73	Riverwash	Yes	NA
91b	Woodburn silt loam, 3 to 8 percent slopes	No	Huberly in swales on terraces, 2% Aquolls on floodplains, 1% Dayton on terraces, 1%
92F	Xerochrepts and Haploxerolls, very steep	No	No

Source: NRCS, 2016.

An on-site wetland reconnaissance was performed for the project on January 27, 2016, by John Vlastelicia and Ava Laszlo (environmental scientists). Only airport property was reviewed. Due to access, a site reconnaissance was not performed in the area south of the Molalla River. Several potential wetlands were found during the reconnaissance within areas of hydric soils or non-hydric soils with hydric inclusions. The wetlands were grouped into three areas by location and each area was assigned a letter of A (north), B (northeast), or C (southeast), described below (Figure 2).

Potential Wetland Area A

Area A is located north and of Runway 14/32 and the parallel Taxiway A, bounded by South Mulino Road to the north and South Airport Road to the east (Figure 2). A stormwater detention pond ranging in depth from 1 to greater than 8 inches is present near the eastern border, and outflows into a roadside ditch of South Airport Road. Vegetation observed within the detention pond area included cattail (*Typha latifolia*), reed canarygrass (*Phalaris arundinacea*), black cottonwood seedlings (*Populus trichocarpa*), fescue (*Festuca sp.),* Queen Anne's Lace (*Daucus carota*), and mixed weedy pasture grasses. Ponded water was observed at shallower depths in the majority of the area outside of the detention pond, ranging in depth from 0.5 – 5 inches. Vegetation between the north runway and South Mulino Road consisted primarily of weedy pasture grasses with patches of reed canarygrass. Two drainage channels were observed flowing north out of Area A into a roadside ditch of South Mulino Road. This ditch contained common rush (*Juncus effusus*), Armenian blackberry (*Rubus armeniacus*), reed canarygrass, and rose (*Malus sp.*) among other unidentified grass species.

Three soil types are mapped within Area A (Concord silt loam, Amity silt loam, and Amity silt loam, 0 to 3 percent slopes). The detention pond, part of the South Airport Road roadside ditch, and closely neighboring soils are mapped in hydric soil (Concord silt loam). The area north of the runway and the roadside ditch of South Mulino Road are mapped in non-hydric soils with hydric inclusions (Amity silt loam, 0 to 3 percent slopes and Amity silt loam).

Potential Wetland Area B

Area B is a small potential wetland located east of South Airport Road and the Airport T-hangars, west of Oregon State Highway 213, and south of South Mulino Road adjacent to a single-family residential home and Hillsview Gardens Orchids. Pockets of ponded water with algal mats and one drainage channel were observed within a fescue/blackberry/common rush dominated vegetation community (Photo 1). The drainage channel extends through a berm separating the Airport property from the South Mulino Road right-of-way, and into a roadside ditch (Photo 2). The entirety of Area B is mapped in hydric soil (Concord silt loam).

Photo 1. View of Potential Wetland Area B, facing southwest. Bottom right shows water flowing north through a drainage channel through a roadside berm.

Photo 2. Facing north toward South Mulino Road while standing in drainage channel of Potential Wetland Area B.

Potential Wetland Area C

Area C is located east, southeast, and south of the Airport taxiway. It contains several depressional strips and pockets of inundated land, with water depths ranging from 0.5 inches to 3 inches deep in addition to saturated gently sloping areas (Photos 3-5). Common rush, Armenian blackberry, fescue, weedy pasture grasses, and smatterings of Scotch broom (*Cytisus scoparius*) were commonly seen across Area C. Oregon grape (*Mahonia aquifolium*), sticky willy (*Galium aparine*), and conifers were seen only near the right bank edge of the Molalla River (Photo 5).

Photo 3. Standing in Potential Wetland Area C facing south looking into an inundated strip of land parallel to the taxiway. Pockets of common rush can be seen in the center of the photo.

Photo 4. Standing in Potential Wetland Area C facing north looking into an inundated portion of the Airport. Pockets of common rush can be seen at the bottom and near the center of the photo.

Photo 5. Facing south while standing approximately 30 feet from the edge of the Molalla River right bank.

Several catchbasins were seen in wet areas parallel to the taxiway, and southeast of the taxiway. A wet depressional area with algal mat growth was seen south of the runway where a remnant railroad crossing of Willamette Valley Southern in the early 1900's once occurred (Photo 6). This area was thick with blackberry and weeds with many boulders strewn throughout.

Soils in Area C are generally mapped as hydric (Dayton silt loam) and non-hydric with hydric inclusions (Aloha silt loam, 0 to 3 percent slopes). A small sliver of non-hydric soil without hydric inclusions is mapped along the Molalla River right bank (Xerochrepts and Haploxerolls, very steep).

Photo 6. Facing south while standing in historic railroad bed.

South of the Molalla River

The area south of the Molalla River was inaccessible during the field survey and the presence of wetlands in this area was not evaluated (Figure 2, Photo 7). This area contains hydric soil (Riverwash) and non-hydric soils with hydric inclusions (Camas gravelly sandy loam, Cloquato silt loam, and Newberg fine sandy loam).

Photo 7. Standing at edge of Molalla River right bank, facing south toward area not accessed.

Recommendations

There is the potential for jurisdictional wetlands to occur where development is proposed. It is recommended that further evaluation and a formal wetland delineation with concurrence from DSL and the Corps be conducted in these areas.

MOLALLA RIVER

The Molalla River flows east to west through the study area, beginning in the Table Rock Wilderness and running for nearly 50 miles through Clackamas County before entering the Willamette River (USGS 2016). This river is the largest tributary of the Willamette River that is undammed, and its waters support a number of fish species including salmonids, lamprey, and trout (Native Fish Society 2016). Any development below the Ordinary High Water mark of the river would require a Joint Removal-Fill Permit from both the Corps and DSL. The river is also designated as Critical Habitat for both Upper Willamette River steelhead ESU and Upper Willamette River Chinook Salmon ESU. Alteration of riparian habitat or stormwater discharge could trigger review by the National Marine Fisheries Services (NOAA Fisheries).

FLOODPLAINS

The Federal Emergency Management Agency (FEMA) administers the National Flood Insurance Program (NFIP) for the purpose of reducing the impact of flooding on private and public structures. A FEMA FIRM (Flood Rate Insurance Map) of Clackamas County, Oregon and incorporated areas was referenced. This FIRM shows portions of the Molalla River floodway, 100-year floodplain, and 500-year floodplain to be within parts of Airport property or areas containing an avigation easement (Appendix A – FEMA FIRM Panel [FEMA 2008], and Figure 1). The nearly vertical right bank of the Molalla River within airport property is mapped concurrently as the floodway boundary, 100-year flood boundary, and 500-year flood boundary (Figure 1, FEMA 2008). Portions of the Airport and areas south of the Molalla River left bank are within the floodway, 100-year floodplain, and 500-year floodplain (Figure 1, FEMA 2008).

Development within the 100-year floodplain would require a Floodplain Development Permit from Clackamas County and a Permit for Floodplain Development from FEMA.

WATER QUALITY

Some surface features that are part of the Airport's stormwater system were observed during the on-site investigation. Several catch basins and a detention pond were observed within the study area. A 2007 storm utilities design drawing depicts a stormwater system with two central storm lines that run north/south and multiple branches that extend east and west across the property. Two stormwater detention ponds exist, one to the northwest (outside the study area) and one to the northeast (Potential Wetland Area A). The pond within Area A drains through roadside ditches offsite and is not managed onsite.

The current stormwater system will need to be updated to manage stormwater (quality and quantity) associated with future development. Provided that stormwater is managed on site (both for quality and quantity), the addition of new impervious surface from the project should not affect surface water flows. The water quality of the Molalla River may be affected or impaired by this project. If wetlands or other surface waters are impacted, permits and management requirements would need to be obtained from and fulfilled by state and federal agencies including the Oregon Department of State Lands, U.S. Army Corps of Engineers, Oregon Department of Environmental Quality, and National Marine Fisheries Service.

PROTECTED SPECIES AND HABITAT

Species evaluated in this memorandum are those listed as endangered or threatened, proposed for listing, or candidate for listing under the Endangered Species Act (16 US 1531, et seq.), as amended, that could occur in the project vicinity in Clackamas County. An official species list was obtained from the U.S. Fish and Wildlife Service (USFWS) website Information Planning and Conservation (IPaC) tool (January 25, 2016). Species listed under the ESA addressed in this memo are displayed in Table 1.

The Oregon Biodiversity Information Center was also queried to obtain records of known sensitive, threatened and endangered plant and animal species within the vicinity of the project area (ORBIC 2016).

StreamNet (2016) fish distribution data identifies mapping was used to identify the presence of listed species in the Molalla River. Species listed under the Endangered Species Act addressed in this memo are displayed in Table 1. Field work was conducted on-site on January 27, 2016 to evaluate habitat conditions.

Table 1. Species Listed under the Endangered Species Act That Could Potentially Occur in the Project Area

Species Common Name (*Scientific Name*)	Federal Endangered Species Act Status	Actual and Potential Occurrence in Project Limits
Northern spotted owl (*Strix occidentalis caurina*) Population: Entire	Threatened	No documented occurrence (ORBIC 2016) and no suitable habitat.
Streaked Horned lark (*Eremophila alpestris strigata*)	Threatened	No documented occurrence (ORBIC 2016) and no suitable habitat.
Bradshaw's desert-parsley (*Lomatium bradshawii*)	Endangered	No documented occurrence (ORBIC 2016) and no suitable habitat.
Kincaid's Lupine (*Lupinus sulphureus ssp. kincaidii*)	Threatened	No documented occurrence (ORBIC 2016) and no suitable habitat.
Nelson's checker-mallow (*Sidalcea nelsoniana*)	Threatened	No documented occurrence (ORBIC 2016) and no suitable habitat.
Water howellia (*Howellia aquatilis*)	Threatened	No documented occurrence (ORBIC 2016) and no suitable habitat.
Willamette daisy (*Erigeron decumbens var.*)	Endangered	No documented occurrence (ORBIC 2016) and no suitable habitat.
Steelhead Trout (*Oncorhynchus mykiss*) Population: Upper Willamette River ESU	Threatened	Known occurrences. Molalla River is designated as Critical Habitat.
Chinook salmon (*Oncorhynchus tshawytscha*) Population: Upper Willamette River ESU	Threatened	Known occurrences. Molalla River is designated as Critical Habitat.

Northern Spotted Owl

Northern spotted owls live in forests characterized by dense canopy closure of mature and old-growth trees, abundant logs, standing snags, and live trees with broken tops. Although they are known to nest, roost, and feed in a wide variety of habitat types, these owls prefer older forest stands with variety: multi-layered canopies of several tree species of varying size and age; both standing and fallen dead trees; and open space among the lower branches to allow flight under the canopy. Forests do not typically attain these characteristics until they are at least 150 to 200 years old (USFWS 2012a). Critical Habitat was designated in 2012 (USFWS 2012c). There is no Critical Habitat within the project area or in the vicinity of Mulino and there is no suitable habitat on Airport property.

The project will have ***no effect on northern spotted owl*** for the following reason:

- There are no documented recent or historic occurrences of northern spotted owl within a 2-mile radius of the project area (ORBIC 2016).
- There is no suitable habitat within the project area.

The project will have ***no effect on northern spotted owl critical habitat*** for the following reasons:

- There is no Critical Habitat within the project area or vicinity of Mulino.

Streaked Horned Lark

The streaked horned lark is a small, slender bird with long wings and feather tufts that give the appearance of black "horns". These birds are generally found in bare ground or sparsely vegetated habitats, often nesting in grass seed fields, pastures, fallow fields, and wetland mudflats. In Oregon, this species was once abundant in Benton, Lane, Linn, Polk, and Yamhill counties in the Willamette Valley, and in Jackson County in the Rogue River Valley. Habitat loss has reduced the population, however, and today the bird is most abundant in the central Willamette Valley (USFWS 2012b). There are no documented occurrences of the streaked horned lark on or near the project site, and the site does not provide habitat suitable for this species. Critical Habitat was designated in 2013 (USFWS 2013). There is no Critical Habitat within the project area or in the vicinity of Mulino.

The project will have ***no effect on streaked horned lark*** for the following reason:

- There are no documented recent or historic occurrences of streaked horned lark within a 2-mile radius of the project area (ORBIC 2016).
- There is no suitable habitat within the project area.

The project will have ***no effect on streaked horned lark critical habitat*** for the following reasons:

- There is no Critical Habitat designated within the project area or vicinity of Mulino.

Bradshaw's Desert-Parsley

Bradshaw's desert parsley is a perennial species with small, yellow flowers that appear generally mid-April through May (ODA 2010). It inhabits Willamette Valley wet prairie habits, with predominant populations in the southern Willamette Valley. No Critical Habitat has been designated for this species.

The project will have ***no effect on Bradshaw's desert-parsley*** for the following reasons:

- There are no documented recent or historic occurrences of Bradshaw's desert-parsley within a 2-mile radius of the project area (ORBIC 2016).
- There is no suitable habitat within the project area.

Kincaid's Lupine

Kincaid's lupine is a perennial species in the pea or legume family. It is found mainly in the Willamette Valley, Oregon, in native grassland habitats, typically in native upland prairie with dominant species being red fescue and/or Idaho fescue (USFWS 2016b). There are no documented recent or historic sightings of Kincaid's lupine within a 2-mile radius of the project (ORBIC 2016). Kincaid's Lupine is not known to or is not believed to occur within Clackamas County (USFWS 2015a). Critical Habitat was designated in 2006 and does not include habitat within Clackamas County (USFWS 2006).

EFFECTS DETERMINATION:

The project will have ***no effect on Kincaid's lupine*** for the following reasons:

- There are no documented recent or historic occurrences of Kincaid's lupine within a 2-mile radius of the project area (ORBIC 2016).
- There is no suitable habitat within the project area.
- Kincaid's Lupine is not known to or believed to occur within Clackamas County.

The project will have ***no effect on Kincaid's lupine critical habitat*** for the following reason:

- There is no Critical Habitat designated within the project area or within Clackamas County.

Nelson's Checker-Mallow

Nelson's checker-mallow is a perennial herb in the mallow family. The plant generally occurs in Oregon ash swales and meadows with wet depressions, or along streams, but also grows in wetlands within remnant prairie grasslands. This species occurs primarily in open areas with little or no shade and is intolerant of encroachment by woody species (USFWS 2015b). The project area consists mostly of developed property or riparian forest which is not suitable habitat for the Nelson's checker-mallow. There are no documented recent or historic sightings of Nelson's checker-mallow within a 2-mile radius of the project (ORBIC 2016). No Critical Habitat has been designated for Nelson's Checker-mallow (USFWS 2015b).

The project will have ***no effect on Nelson's checker-mallow*** for the following reasons:

- There are no documented recent or historic occurrences of Nelson's checker-mallow within a 2-mile radius of the project area (ORBIC 2016).
- There is no suitable habitat and no Critical Habitat within the project area.

Water Howellia

Water howellia is a winter annual aquatic plant. The plant grows in shallow water (1-2 meters deep) areas that were once associated with glacial potholes and former river oxbows that flood in the spring, but usually dry at least partially by late summer. There is no suitable habitat for water howellia within the project area. There are no documented recent or historic sightings of water howellia within a 2-mile radius of the project (ORBIC 2016). There are no currently known occurrences of water howellia in the State of Oregon (USDA 2010), though historically found in Clackamas County (USFWS 2016b).

The project will have ***no effect on water howellia*** for the following reasons:

- There are no documented recent or historic occurrences of water howellia within a 2-mile radius of the project area (ORBIC 2016).
- There is no suitable habitat and no Critical Habitat within the project area.

Willamette Daisy

Willamette daisy is a perennial herb which inhabits Willamette Valley prairie habitats. It is found on alluvial soils, with light purple flowers that bloom during June and early July (USFWS 2016c). There are no documented recent or historic sightings of Willamette Valley daisy within a 2-mile radius of the project (ORBIC 2016). Critical Habitat was designated in 2006 (USFWS 2006).

The project will have ***no effect on Willamette daisy*** for the following reasons:

- There are no documented recent or historic occurrences of Willamette daisy within a 2-mile radius of the project area (ORBIC 2016).
- There is no suitable habitat within the project area.

The project will have ***no effect on Willamette daisy critical habitat*** for the following reason:

- There is no Critical Habitat designated within the project area or within Clackamas County.

Steelhead Trout, Upper Willamette River ESU

The UWR steelhead ESU includes all naturally spawned populations of winter-run steelhead in the Willamette River and its tributaries upstream from Willamette Falls to the Calapooia River (NMFS

2005a, 2006). This ESA consists of four independent populations: Molalla River, North Fork Santiam River, South Fork Santiam River, and Calapooia River (Myers et al., 2006). These anadromous fish require clean, silt free gravel for spawning; a minimum dissolved oxygen concentration of seven parts per million; and deep slow-moving pools for wintering habitat.

StreamNet (2016) identifies both summer run (ocean-maturing type) and winter run (stream-maturing type) steelhead as occurring in the Molalla River for the purpose of migration (summer run, winter run) and rearing (winter run). There is current and historic distribution of steelhead trout in the vicinity of the project area, including the Molalla River and the nearby Milk Creek. The Molalla River and Milk Creek are designated as Critical Habitat for the UWR ESU (NMFS 2005b). Winter run steelhead were last observed within the Molalla River upper and lower watersheds, Milk Creek watershed, and additional watersheds in 2009 during migration and rearing (ORBIC 2016).

Additional analysis and development specifics relating to stormwater management and vegetation removal along the Molalla River is required before an effects determination can be made on UWR Steelhead ESU and Critical Habitat.

Chinook Salmon, Upper Willamette River ESU

The UWR Chinook salmon ESU includes all naturally spawned populations of spring-run Chinook salmon in the Clackamas River and in the Willamette River, and its tributaries, above Willamette Falls, Oregon (NMFS 2005a). The Willamette/Lower Columbia Technical Recovery Team (W/LC TRT) identified seven independent populations within this ESU: Clackamas River, Molalla River, North Fork Santiam River, South Fork Santiam River, Calapooia River, McKenzie River, and Middle Fork Willamette River (Myers et al., 2006).

StreamNet (2016) identifies both spring run and fall fun Chinook salmon steelhead as occurring in the Molalla River for the purpose of spawning (fall run), rearing (spring run, fall run), migration (spring run). Chinook salmon have been verified as extant within the Molalla River upper and lower watersheds, Milk Creek watershed, and additional watersheds within the region (ORBIC 2016). Data from 2008 classifies an undocumented occurrence, and ODFW considers this to be a non-native reintroduction (ORBIC 2016).

Additional analysis and development specifics relating to stormwater management and vegetation removal along the Molalla River is required before an effects determination can be made on UWR Chinook Salmon ESU and Critical Habitat.

ESSENTIAL FISH HABITAT

The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) requires federal fishery management plans to describe the habitat essential to the fish being managed and describe threats to that habitat from both fishing and non-fishing activities. The Pacific Fishery Management Council manages the fisheries for Coho, Chinook, and Puget Sound Pink Salmon and has defined Essential Fish Habitat (EFH) for these three species. Salmon EFH includes all those streams, lakes, ponds, wetlands, and other water bodies currently or historically accessible to salmon in Washington, Oregon, Idaho, and California. Salmon EFH excludes areas upstream of longstanding naturally impassible barriers (i.e. natural waterfalls in existence for several hundred years), but includes aquatic areas above all artificial barriers except specifically named impassible dams. According to the

NOAA Essential Fish Habitat Mapper, the Molalla River contains EFH for Chinook salmon (NOAA 2016).

Additional analysis and development specifics relating to stormwater management and vegetation removal along the Molalla River is required before an effects determination can be made on EFH.

LAND USE COMPATABILITY AND SECTION 4(F)

Mulino Airport is considered a Category 4 Public Use Airport – Community General Aviation (ODA 2003). The function of a Category 4 airport is to accommodate general aviation users and local business activities, with 2,500 or more annual operations or more than ten based aircraft (ODA 2003). Clackamas County Zoning and Development Section 700 - Special Districts contains Ordinance 713 - Public Use Airport and Safety Overlay Zones (Clackamas County 2014). Uses and activities permitted outright in this special use zoning district are listed in 713.04, and include but are not limited to:

1. Customary and usual aviation-related activities, including takeoffs and landings;
2. Air passenger and air freight services and facilities;
3. Emergency medical flight services, including activities, aircraft, accessory structures, and other facilities necessary to support emergency transportation for medical purposes
4. Aircraft service, maintenance and training;
5. Crop dusting activities; and
6. Agricultural and forestry activities.

Uses not permitted outright and not identified in Section 713.04 are subject to review. These uses not permitted outright would require a Type III land use review as described in Section 713.05.

The Airport is outside of the Urban Growth Boundary for the Portland Metro Region and the tax lots within Airport property have multiple land use zones: RRFF5 – Rural Residential Farm Forest 5-Acre, EFU – Exclusive Farm Use, RA2 – Rural Area Residential 2-Acre, combination RRFF5/EFU, and combination RRFF5/RA2/EFU (Clackamas County 2016b). Surrounding land in the vicinity is primarily EFU and several types of Rural zoning (RC - Rural Commercial, RA1 - Rural Area Residential, RA-2, RRFF-5). Adjacent land uses include Arrowhead Golf Club, single-family residential homes, and farming.

The 2013 Oregon Revised Statues (ORS) Vol. 17 Chapter 836 – Airports and Landing Fields, Section 625 states that limitations on uses made of land in EFU zones as described in ORS 215 do not apply to provisions of ORS 836 regarding airport uses (State of Oregon 2013); airports zoned EFU must comply with ORS 215.296. The Airport is considered a compatible land use in EFU zones by ORS 836. ORS 836.616 states that local government land use plans and regulations shall accommodate airport zones and uses, and shall authorize uses and activities allowed with airport boundaries defined in ORS 836.610 and ORS 836.608 (State of Oregon 2013).

Clackamas County has established several overlay zones for public airports within the county. These zones are listed in Section 713.06 and include the following: noise impact boundary, primary surface, runway protection zone, approach surface, horizontal surface, conical surface, transitional surface, direct impact boundaries, and secondary impact boundaries. Land use applications or building use applications must abide by and meet the requirements of Section 713. Development standards listed under Section 1000 of Clackamas County Code are to be abided by and followed. The Airport is considered a compatible use under its current zoning.

Mulino is outside of the Metropolitan (Metro) Urban Growth Boundary, and there are no Metro Title 13 Habitat Conservation Areas or Metro Title 3 Water Quality Resource Areas contained within the vicinity of the project area (Metro 2016a-c). Clackamas County Zoning and Development Ordinance Sections 709 – Water Quality Resource Area District and 706 – Habitat Conservation Area District do not apply to Mulino and areas outside of the Metro Urban Growth Boundary.

There is no publicly-owned land of a park, recreational area, or wildlife and waterfowl refuge of national, state, or local significance near Airport property. The site of the former Willamette Valley Southern railroad crossing in Potential Wetland Area C may be considered a historic site and should be further evaluated if development is proposed near this site (WH Pacific 2008). No other land of a historic site of national, state, or local significance exists on or near Airport property.

The BLM considers a segment of the Molalla River upstream of the project site to be a Recreation Corridor, but this corridor does not include the segment of the Molalla River that passes through the project area (BLM 2016). The closest boat ramp (non-developed) is present at Wagon Wheel Park is located approximately one mile upstream on the left bank of the Molalla River.

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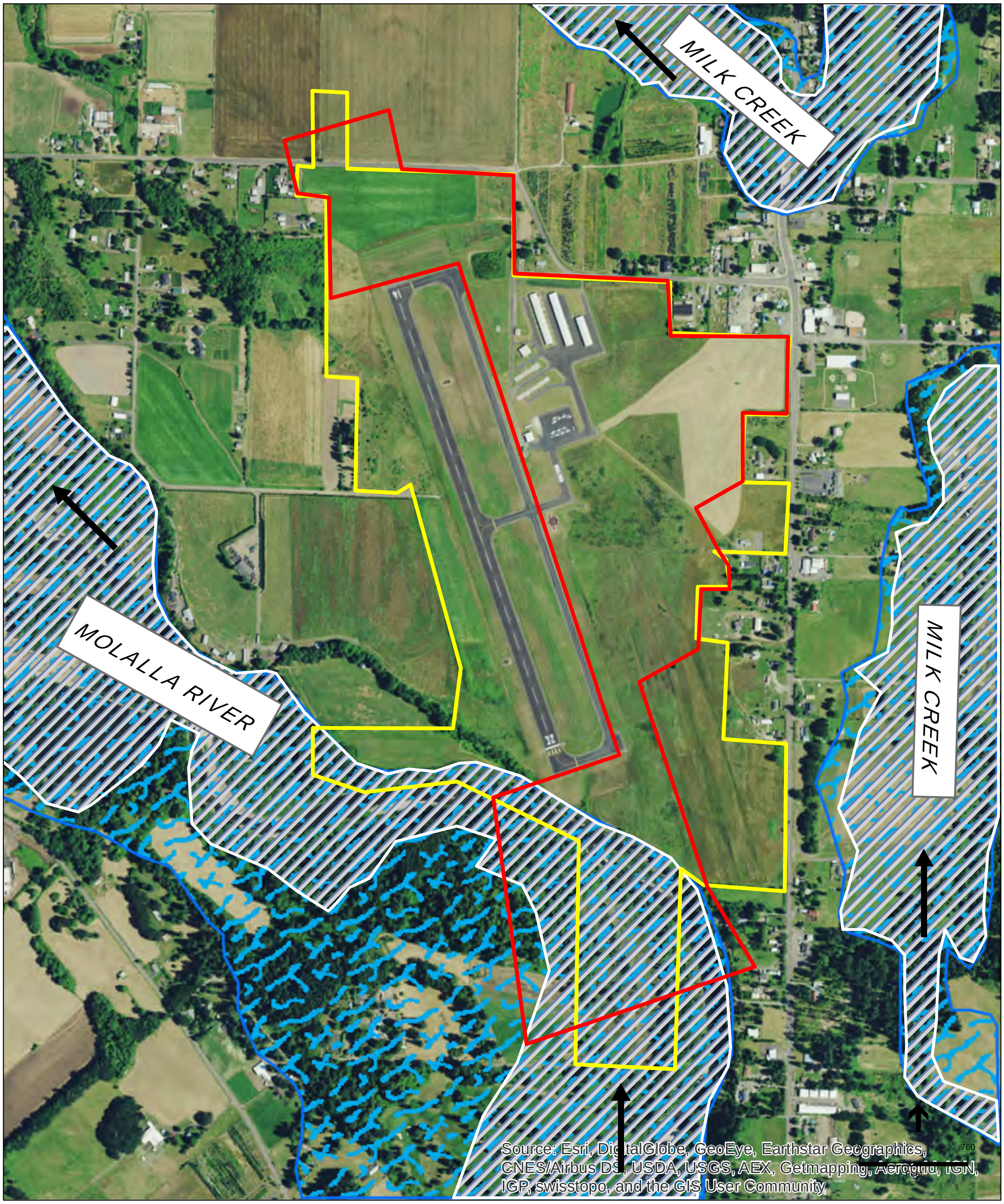


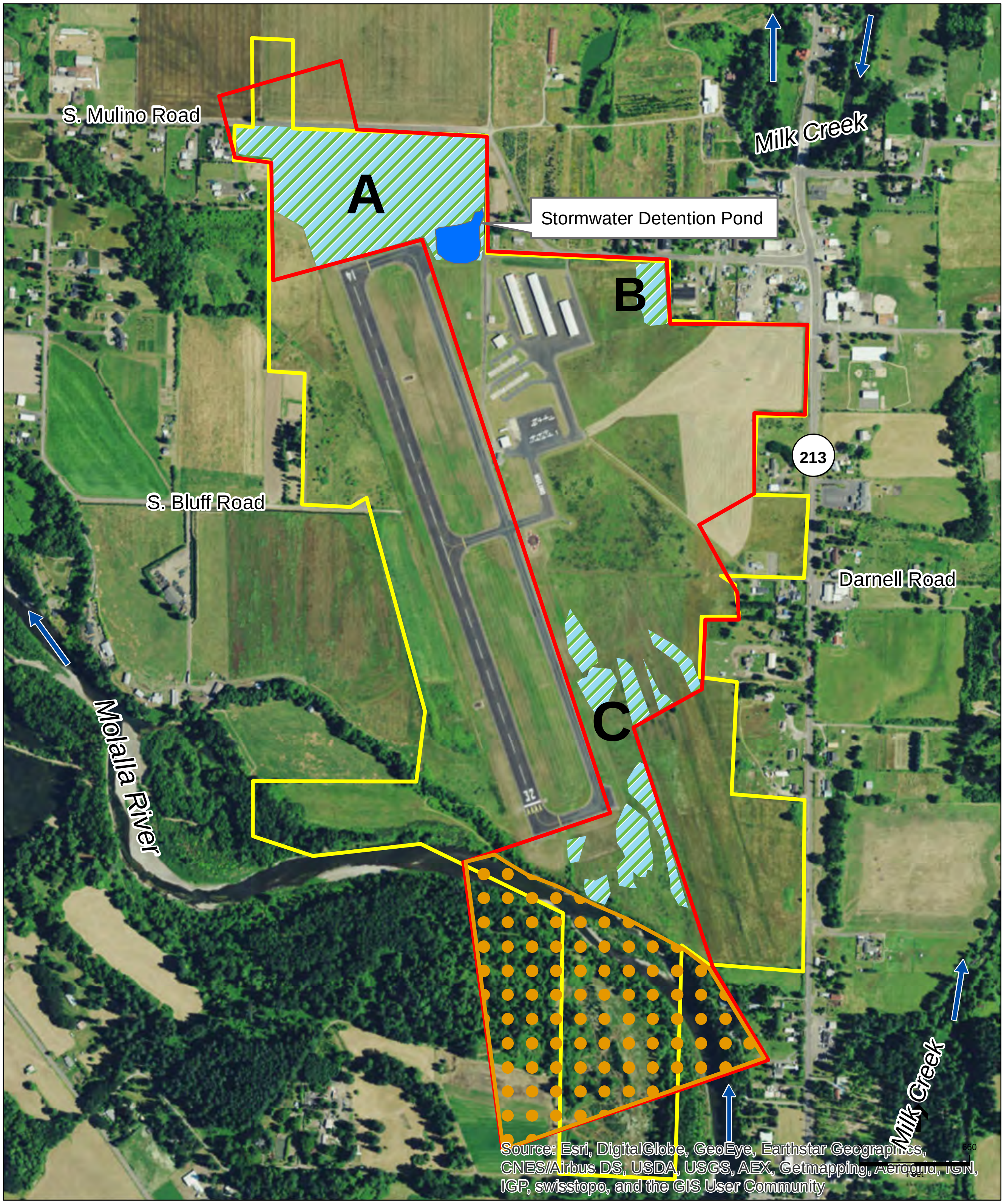
Legend

- Study Area
- Mulino Airport Property Limit
- 100-Year Floodplain
- 500-Year Floodplain

Mulino State Airport Master Plan Update. D160050.00

Figure 1

Vicinity Floodplain Map



Legend

- Study Area
- Mulino Airport Property Limit
- Potential Wetlands
- Area Not Accessed

Mulino State Airport Master Plan Update. D160050.00

Figure 2

Potential Wetlands Map

N

1,000 500 0 1,000 Feet

Appendix D

MEMO

To: Matthew Maass, Heather Peck, Jeff Caines
Oregon Department of Aviation

From: Century West Engineering

Date: February 5, 2016

Re: **Mulino State Airport (4S9)**
Mulino, Oregon
Displaced Threshold with Declared Distances Memo

Introduction

This memorandum (memo) is intended to assess the impacts of the Molalla River, which is located immediately south of Runway 14/32 at the Mulino State Airport (4S9 or "the Airport"). Runway 14/32 currently has a relocated threshold off the south, Runway 32 end. The threshold was relocated in 2003 to meet FAA safety standards, based on information contained in the 2008 Airport Master Plan Report and noted on the approved Airport Layout Plan (ALP). The 2008 FAA Approved ALP included a note stating the threshold was relocated to provide the FAA recommended Runway Safety Area length of 300 feet. Specifically, Note 3 on the Approved ALP states:

> "The Mulino River has eroded portions of the Runway 32 Runway Safety Area, which required a 175" Threshold relocation. If more erosion of the safety area occurs, it may be necessary to extend Runway 14 commensurate to the loss of runway length."

The 2008 approved ALP also proposed removal of the 175 feet of existing runway pavement south of the relocated threshold. In addition, the ALP proposed removal of the existing access taxiway connecting the parallel taxiway to the Runway 32 end with future construction of a new access taxiway that would enter at the relocated threshold. These recommendations were proposed in accordance with guidance provided in FAA Engineering Brief 75: Incorporation of Runway Incursion Prevention into Taxiway and Apron Design.

A review of the existing terrain south of Runway 14/32 and the existing relocated threshold resulted in an effort to evaluate possible options for the optimum threshold location – either implementing a displaced threshold using Declared Distances or as an alternative, a threshold relocation that would reclaim some of the existing 175 feet of runway pavement.

This memo is being prepared to assess the existing relocated threshold in accordance with Federal Aviation Administration (FAA) Order 5200.8 Runway Safety Area Program, effective date October 1, 1999. This memo includes the following sections:

1. Existing Conditions – describes the location, airfield configuration, and the condition of Runway 14/32 (Runway 32 end) and the Molalla River. It includes a description of the Runway 32 Runway Protection Zone (RPZ), RSA, and OFA.
2. Recommended Alternative – Describes the recommended USE OF DECLARED DISTANCES TO REMOVE THE RELOCATED THRESHOLD AND THE MOLALLA RIVER FROM RUNWAY 14/32 RSA AND OFA.

Existing Conditions

LOCATION

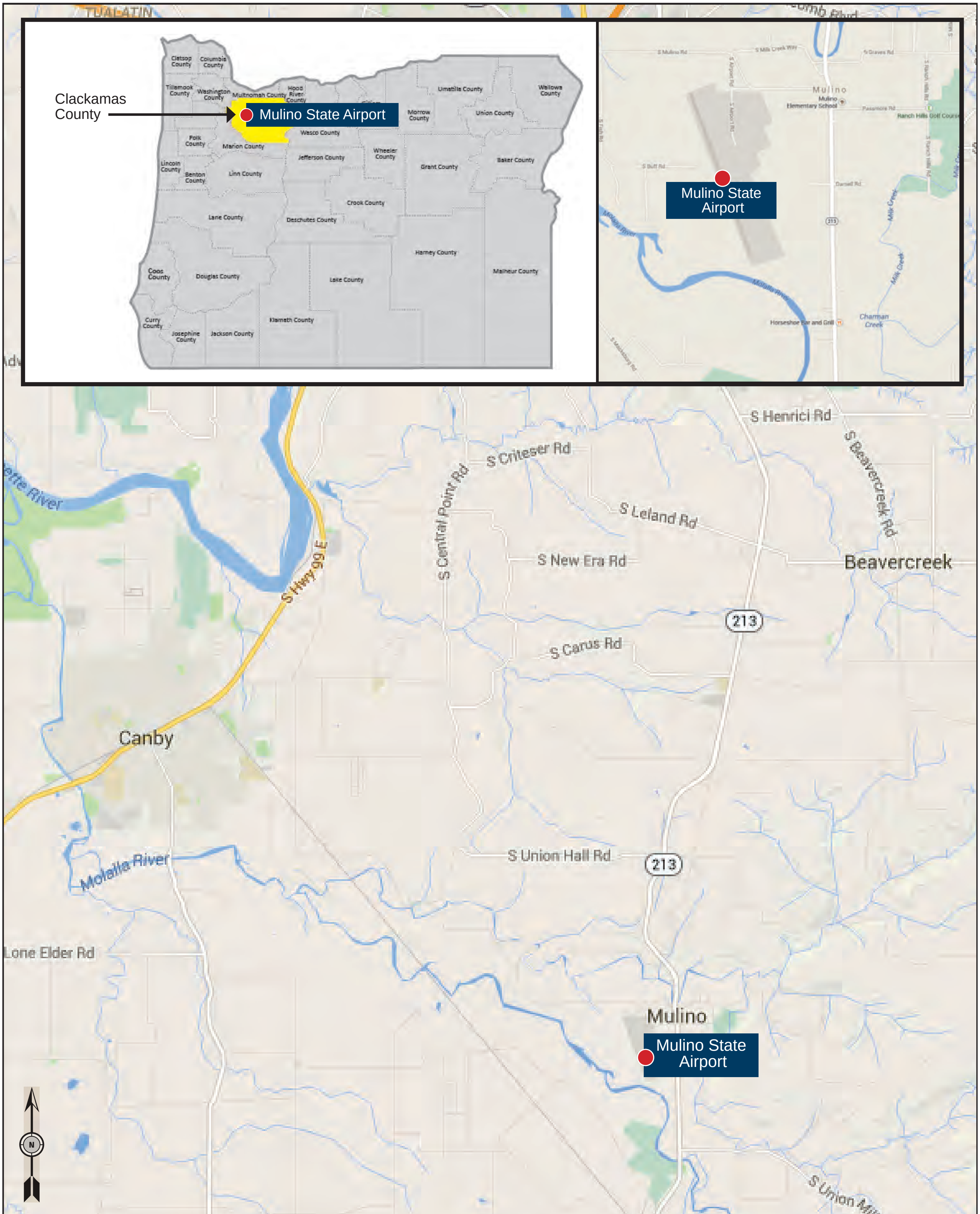
The Airport is located within the Hamlet of Mulino, near the southeastern corner of the Portland metropolitan area in northern Clackamas County. Mulino is located approximately 21 miles south of downtown Portland, ten miles south of Oregon City, and five mile north of Molalla on the eastern slopes of the Willamette Valley. Access to the airport is provided via South Mulino Road to Oregon State Highway 213 (OR-213). OR 213 interchanges with Interstate 205 in Oregon City approximately 12 miles north (Exit 10, between Gladstone and Oregon City). Highway 99E is located approximately 7 miles west of Mulino (at Canby) via South Mulino Road. Interstate 5 (Exit 278, south of Aurora State Airport) is approximately 13 miles west of Mulino. A location map is included in **Figure 1**.

AIRFIELD CONFIGURATION

The airport has a single runway, Runway 14/32. The runway is generally aligned in a north northwest – south southeast direction. As constructed, Runway 14/32 is 3,600 feet long by 100 feet wide with an asphalt surface. Available records indicate that the Runway 32 threshold was relocated 175 feet to the north in 2003.

FAA design standards for Runway 14/32 are based on an ARC B-II.[1] The runway has an effective gradient of 0.34 percent, with a high point (elevation 259.6 feet MSL) located at the southeast end relocated threshold (Runway 32 threshold). Runway 14/32 is served by a full-length parallel taxiway (Taxiway A) located on the east side of the runway. The runway has Basic markings on both runway ends, which is consistent with the current visual approach capabilities. Runway 14/32 is equipped with medium intensity runway lighting (MIRL). Both the Runway 14 and Runway 32 thresholds are equipped with Precision Approach Path Indicator (PAPI-2) units. This memo addresses the relocated threshold on Runway 14/32.

[1] Mulino State Airport, Airport Layout Plan (April 2008)



MULINO STATE AIRPORT

LOCATION MAP | **FIGURE 1**

MOLALLA RIVER

The Molalla River and the Clackamas River are major drainages from the Cascade Range that connect with the Willamette River, northwest of Mulino. The Molalla River forms the southern end of the airfield, although a small area of airport property extends south of the river. At the nearest point, the ravine formed by the Molalla River is located approximately 217 feet beyond the end of Runway 32, thereby placing it within the Runway 14/32 RSA, OFA, and RPZ.

FAA Design Standards

FAA AC 150/5300-13A establishes the guidelines applicable to all development on the Airport. Airport runways have specific design requirements that are outlined in this Advisory Circular. These requirements include the RSA, OFA, OFZ, and RPZ. Of primary concern to this study are is RSA on the Runway 32 end of Runway 14/32.

The RSA enhances the safety of aircraft that undershoot, overrun, or veer off the runway. The FAA recommended RSA dimensions for Runway 14/32 are 150 feet wide and 300 feet prior to threshold and 300 feet beyond the runway end.

The OFA is an area centered on the runway with specific clearing standards. FAA requires the OFA be clear of aboveground objects protruding above the nearest point of the RSA. Terrain should not protrude above the nearest point of the RSA within a distance from the edge of the RSA equal to one-half the most demanding wingspan of the Runway Design Code (RDC) of the runway. Objects that need to be located in the OFA for air navigation or aircraft ground maneuvering purposes may protrude above the nearest point of the RSA, but should meet the same frangibility requirements as the RSA. In addition, aircraft may taxi and hold in the OFA, but may not park within it. The OFA for Runway 14/32 is 500 feet wide, 300 feet prior to threshold, and 300 feet beyond runway end.

The OFZ is a three-dimensional airspace centered along the runway and extended runway centerline. FAA criteria stipulate the OFZ be clear of obstacles for the protection of aircraft landing or taking off from the runway and for missed approaches. Parked or holding aircraft and other object penetrations, except frangible NAVAIDs that need to be located in the OFZ because of their function are also precluded from being in the OFZ. The OFZ for Runway 14/32 is 250 feet wide and extends 200 feet beyond each runway end.

The RPZ's function is to enhance the protection of people and property on the ground. The RPZ is trapezoidal in shape and centered on the runway centerline. The RPZ begins 200 feet from the end of the threshold and its length is dependent on the design aircraft and runway visibility minimums.

Standard RPZ dimensions for Runway 14/32 are an inner width of 500 feet, an outer width of 700 feet, an overall length of 1,000 feet with the RPZ sited 200 feet beyond the relocated threshold on Runway 32 and 200 feet beyond the Runway 14 threshold.

Recommended Alternative

USE DECLARED DISTANCES TO MITIGATE MOLALLA RIVER IN THE RUNWAY 14/32 RSA.

This alternative uses a displaced threshold with declared distances to mitigate the Molalla River's location within the RSA for Runway 14/32. Declared distances can be applied when a standard safety area beyond the runway threshold cannot be met. The Airport would therefore be able to mitigate deviations from the RSA standards by using declared distances.

Implementation of a displaced threshold with declared distances will result in the Runway 32 end having both an approach RPZ and departure RPZ. The approach RPZ extends from a point 200 feet from the displaced runway threshold, for a distance specific to the runway's aircraft approach category and approach visibility minimums associated with the approach runway end. The departure RPZ begins 200 feet beyond the runway end or, if the TORA and the runway end are not the same, 200 feet beyond the far end of the TORA. The approach and departure RPZ dimensions for Runway 14/32 are included in **Table 1**.

TABLE 1: RUNWAY 14/32 APPROACH AND DEPARTURE RPZ.

DIMENSION	RUNWAY 14		RUNWAY 32	
	APPROACH RPZ	DEPARTURE RPZ	APPROACH RPZ	DEPARTURE RPZ
LENGTH	1,000 feet	1,000 feet	1,000 feet	1,000 feet
INNER WIDTH	500 feet	500 feet	500 feet	500 feet
OUTER WIDTH	700 feet	700 feet	700 feet	700 feet

Table 2 lists the declared distances associated with this recommended alternative. The declared distances are overlaid in plan view in the attached **Figure 2 - Displaced Threshold Alternative**.

"Declared distances represent the maximum distances available and suitable for meeting takeoff, rejected takeoff, and landing distances performance requirements for turbine powered aircraft as outlined in FAA AC 150/5300-13A. The declared distances are:

- *TORA - Takeoff run available* is the length of runway available and suitable for the ground run of an airplane takeoff.
- *TODA - Takeoff distance available* is the length of the takeoff run available plus the length of a clearway (if provided).

- *ASDA - Accelerate stop distance available* includes the length of the runway and stopway available for the acceleration and deceleration of an airplane aborting takeoff.
- *LDA - Landing distance available* is the runway length declared available and suitable for landing an aircraft."[2]

"Declared distances may be used to obtain additional RSA and/or ROFA prior to the runway's threshold (the start of the LDA) and/or beyond the stop end of the LDA and ASDA, to mitigate unacceptable incompatible land uses in the RPZ, to meet runway approach and/or departure surface clearance requirements, in accordance with airport design standards, or to mitigate environmental impacts. Declared distances may also be used as an incremental improvement technique when it is not practical to fully meet these requirements. However, declared distances may only be used for these purposes where it is impracticable to meet the airport design standards or mitigate the environmental impacts by other means, and the use of declared distances is practical."

TABLE 2: RECOMMENDED DECLARED DISTANCES FOR RUNWAY 14/32.

DECLARED DISTANCE COMPONENT	RELOCATED THRESHOLD		DISPLACED THRESHOLD	
	RUNWAY 14	RUNWAY 32	RUNWAY 14	RUNWAY 32
Takeoff Distance Available (TODA)	3,425 feet	3,425 feet	3,517 feet	3,600 feet
Takeoff Run Available (TORA)	3,425 feet	3,425 feet	3,517 feet	3,600 feet
Accelerate Stop Distance Available (ASDA)	3,425 feet	3,425 feet	3,517 feet	3,600 feet
Landing Distance Available (LDA)	3,425 feet	3,425 feet	3,517 feet	3,517 feet

Implementation of a displaced threshold with declared distances will enable the Airport to regain the full 3,600 feet of pavement for departures to the north (TORA, TODA, ASDA) while eliminating the removal of any existing runway pavement. This alternative would also retain the existing entrance taxiway pavement while eliminating the need to construct a new entrance taxiway to the existing relocated threshold.

This option would result in an LDA of 3,517 feet for Runway 32 as well as revised TORA, TODA, ASDA, and LDA of 3,517 feet for Runway 14. However, all of the TORA, TODA, ASDA, and LDA's for Runways 14 and 32 would exceed those currently provided with the existing relocated threshold.

Note that the location of the Runway 32 PAPI may need to be adjusted to accommodate a displaced threshold.

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[2] AC 150/5300-13A (Change 1) 322.B(1), pg. 96, notes:

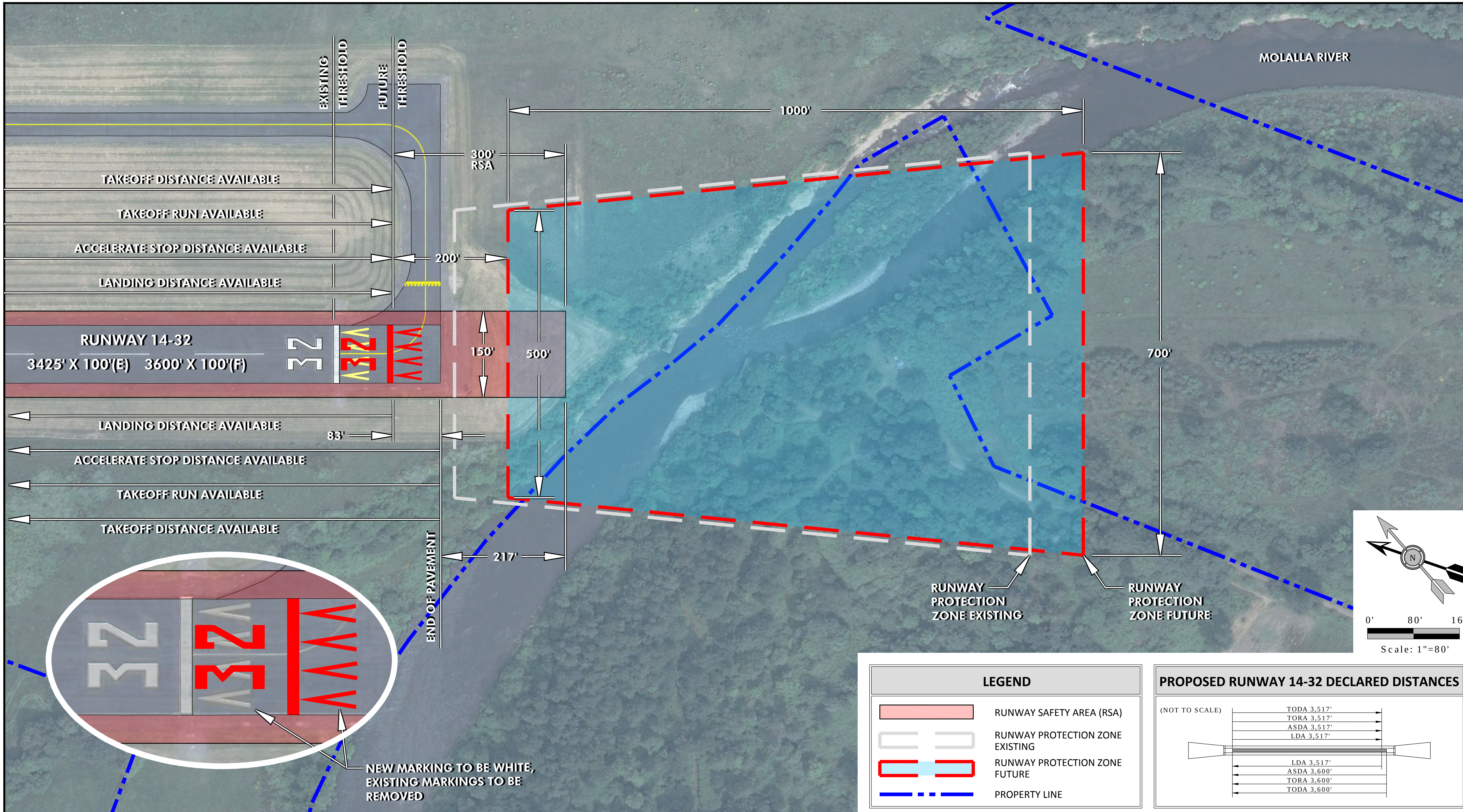

FIGURE 2

MULINO STATE AIRPORT
RUNWAY 32 PROPOSED THRESHOLD RECONFIGURATION

CENTURY WEST ENGINEERING

Appendix E

E. Airport Noise Impact Boundary. Areas located within 1,500 feet of an airport runway or within established noise contour boundaries exceeding 55 Ldn.

F. Airport Sponsor. The owner, manager, or other person or entity designated to represent the interests of an airport.

G. Approach Surface. A surface longitudinally centered on the extended runway centerline and extending outward and upward from each end of the primary surface.

1. The inner edge of the approach surface is the same width as the primary surface and it expands uniformly to a width of:

   a. 1,250 feet for a utility runway having only visual approaches;

   b. 1,500 feet for a runway other than a utility runway with only visual approaches;

   c. 2,000 feet for a runway with a non-precision instrument approach;

   d. 3,500 feet for a non-precision instrument runway other than utility, having visibility minimums greater than three-fourths statute mile;

   e. 4,000 feet for a non-precision instrument runway, other than utility, having a non-precision approach with visibility minimums as low as three-fourths statute mile; and

   f. 16,000 feet for precision instrument runways.

2. The approach surface extends for a horizontal distance of:

   a. 5,000 feet at a slope of 20 feet outward for each foot upward for all utility and visual runways;

   b. 10,000 feet at a slope of 34 feet outward for each foot upward for all non-precision instrument runways, other than utility; and

   c. 10,000 feet at a slope of 50 feet outward for each one foot upward, with an additional 40,000 feet at a slope of 40 feet outward for each one foot upward, for precision instrument runways.

3. The outer width of an approach surface will be that width prescribed in this subsection for the most precise approach existing or planned for that runway end.

H. Conical Surface. A surface extending outward and upward from the periphery of the horizontal surface at a slope of 20 to one for a horizontal distance of 4,000 feet.

I. Hazard. All hazards within and around airports shall be as determined by the Oregon Department of Aviation or Federal Aviation Administration (FAA).

J. Heliports. A heliport is an area of land, water, or structure designated for the landing and take-off of helicopters or other rotorcraft. The heliport overlay zone applies the following imaginary surfaces. The heliport approach surfaces begin at each end of the heliport primary surface and have the same width as the primary surface. They extend outward and upward for a horizontal distance of 4,000 feet where their width is 500 feet. The slope of the approach surfaces is eight to one for civilian heliports and 10 to one for military heliports. The heliport primary surface coincides in size and shape with the designated takeoff and landing area of a heliport. The heliport primary surface is a horizontal plane at the established heliport elevation. The heliport transitional surfaces extend outward and upward from the lateral boundaries of the heliport primary surface and from the approach surfaces at a slope of two to one for a distance of 250 feet measured horizontally from the centerline of the primary and approach surfaces.

K. Horizontal Surface. A horizontal plane 150 feet above the established airport elevation, the perimeter of which is constructed by swinging arcs of specified radii from the center of each end of the primary surface of each runway of each airport and connecting the adjacent arcs by lines tangent to those arcs. The radius of each arc is:

1. 5,000 feet for all runways designated as utility or visual.

2. 10,000 feet for all other runways.

3. The radius of the arc specified for each end of a runway will have the same arithmetical value. That value will be the highest determined for either end of the runway. When a 5,000 foot arc is encompassed by tangents connecting two adjacent 10,000 foot arcs, the 5,000 foot arc shall be disregarded on the construction of the perimeter of the horizontal surface.

L. Non-Precision Instrument Runway. A runway having an existing instrument approach procedure utilizing air navigation facilities with only horizontal guidance, or area type navigation equipment, for which a straight-in non-precision instrument approach has been approved, or planned, and for which no precision approach facilities are planned or indicated on an FAA-approved airport layout plan or other FAA planning document.

M. Other than Utility Runway. A runway that is constructed for and intended to be used by turbine-driven aircraft or by propeller-driven aircraft exceeding 12,500 pounds gross weight.

N. Precision Instrument Runway. A runway having an existing instrument approach procedure utilizing air navigation facilities that provide both horizontal and vertical guidance, such as an Instrument Landing System (ILS) or Precision Approach Radar (PAR). It also means a runway for which a precision approach system is planned and is so indicated by an FAA-approved airport layout plan or other FAA planning document.

O. Primary Surface. A surface longitudinally centered on a runway. When a runway has a specially prepared hard surface, the primary surface extends 200 feet beyond each end of that runway. When a runway has no specially prepared hard surface, or planned hard surface, the primary surface ends at each end of that runway. The elevation of any point on the primary surface is the same as the elevation of the nearest point on the runway centerline. The width of the primary surface is:

1. 250 feet for utility runways having only visual approaches;

2. 500 feet for utility runways having non-precision instrument approaches;

3. For other than utility runways the width is:

   a. 500 feet for visual runways having only visual approaches;

   b. 500 feet for non-precision instrument runways having visibility minimums greater than three-fourths statute mile;

   c. 1,000 feet for a non-precision instrument runway having a non-precision instrument approach with a visibility minimum as low as three-fourths statute mile, and for precision instrument runways.

P. Public Assembly Facility. A permanent or temporary structure or facility, place or activity where concentrations of people gather in reasonably close quarters for purposes such as deliberation, education, worship, shopping, employment, entertainment, recreation, sporting events, or similar activities. Public assembly facilities include, but are not limited to, schools, churches, conference or convention facilities, employment and shopping centers, arenas, athletic fields, stadiums, clubhouses, museums, and similar facilities and places, but do not include parks, golf courses or similar facilities unless used in a manner where people are concentrated in reasonably close quarters. Public assembly facilities also do not include air shows, structures or uses approved by the FAA in an adopted airport master plan, or places where people congregate for short periods of time such as parking lots or bus stops.

Q. Runway. A defined area on an airport prepared for landing and takeoff of aircraft along its length.

R. Runway Protection Zone (RPZ). An area off the runway end used to enhance the protection of people and property on the ground. The RPZ is trapezoidal in shape and centered about the extended runway centerline. The inner width of the RPZ is the same as the width of the primary surface. The outer width of the RPZ is a function of the type of aircraft and specified approach visibility minimum associated with the runway end. The RPZ extends from each end of the primary surface for a horizontal distance of:

1. 1,000 feet for utility runways.

2. 1,700 feet for other than utility runways having non-precision instrument approaches.

3. 2,500 feet for precision instrument runways.

S. Structure. Any constructed or erected object which requires location on the ground or is attached to something located on the ground. Structures include but are not limited to buildings, decks, fences, signs, towers, cranes, flagpoles, antennas, smokestacks, earthen formations and overhead transmission lines. Structures do not include paved areas.

T. Transitional Surface. Those surfaces that extend upward and outward at 90 degree angles to the runway centerline and the runway centerline extended at a slope of seven feet horizontally for each foot vertically from the sides of the primary and approach surfaces to the point of intersection with the horizontal and conical surfaces. Transitional surfaces for those portions of the precision approach surfaces which project through and beyond the limits of the conical surface, extend a distance of 5,000 feet measured horizontally from the edge of the approach surface and at a 90 degree angle to the extended runway centerline.

U. Utility Runway. A runway that is constructed for and intended to be used by propeller driven aircraft of 12,500 pounds maximum gross weight or less.

V. Visual Runway. A runway intended solely for the operation of aircraft using visual approach procedures, where no straight-in instrument approach procedures or instrument designations have been approved or planned, or are indicated on an FAA-approved airport layout plan or any other FAA planning document.

W. Water Impoundment. Includes wastewater treatment settling ponds, surface mining ponds, detention and retention ponds, artificial lakes and ponds, and similar water features. A new water impoundment includes an expansion of an existing water impoundment except where such expansion was previously authorized by land use action approved prior to the effective date of Section 713.

713.04 USES PERMITTED OUTRIGHT

The following uses and activities are permitted outright in the Public Use Airport special use zoning district:

A. Customary and usual aviation-related activities, including but not limited to takeoffs and landings; aircraft hangars and tie-downs; construction and maintenance of airport facilities; fixed-base operator facilities; one single-family dwelling in conjunction with an airport (if there is not one there already) for an airport manager, caretaker, or security officer; and other activities incidental to the normal operation of an airport. Except as provided in this ordinance, "customary and usual aviation-related activities" do not include residential, commercial, industrial, manufacturing, and other uses.

B. Air passenger and air freight services and facilities, at levels consistent with the classification and needs identified in the Oregon Department of Aviation Airport System Plan.

C. Emergency medical flight services, including activities, aircraft, accessory structures, and other facilities necessary to support emergency transportation for medical purposes. Emergency medical flight services do not include hospitals, medical offices, medical labs, medical equipment sales, and other similar uses.

D. Law enforcement, military, and firefighting activities, including aircraft and ground-based activities, facilities and accessory structures necessary to support federal, state or local law enforcement or land management agencies engaged in law enforcement or firefighting activities. Law enforcement and firefighting activities include transport of personnel, aerial observation, and transport of equipment, water, fire retardant and supplies.

E. Search and rescue operations, including aircraft and ground based activities that support the orderly and efficient conduct of search or rescue related activities.

F. Flight instruction, including activities, facilities, and accessory structures located at airport sites that provide education and training directly related to aeronautical activities. Flight instruction includes ground training and aeronautic skills training, but does not include schools for flight attendants, ticket agents or similar personnel.

G. Aircraft service, maintenance and training, including activities, facilities and accessory structures provided to teach aircraft service and maintenance skills and to maintain, service, refuel or repair aircraft and aircraft components. "Aircraft service, maintenance and training" includes the construction and assembly of aircraft and aircraft components for personal use, but does not include activities, structures or facilities for the manufacturing of aircraft, aircraft components or other aircraft-related products for sale to the public.

H. Aircraft rental, including activities, facilities and accessory structures that support the provision of aircraft for rent or lease to the public.

I. Aircraft sales and the sale of aeronautic equipment and supplies, including activities, facilities and accessory structures for the storage, display, demonstration and sales of aircraft and aeronautic equipment and supplies to the public but not including activities, facilities or structures for the manufacturing of aircraft, aircraft components or other aircraft-related products for sale to the public.

J. Crop dusting activities, including activities, facilities and structures accessory to crop dusting operations. Crop dusting activities include, but are not limited to, aerial application of chemicals, seed, fertilizer, defoliant and other chemicals or products used in a commercial agricultural, forestry or rangeland management setting.

K. Agricultural and Forestry Activities, including activities, facilities and accessory structures that qualify as a "farm use" as defined in ORS 215.203 or "farming practice" as defined in ORS 30.930.

L. Aeronautic recreational and sporting activities, including activities, facilities and accessory structures at airports that support recreational usage of aircraft and sporting activities that require the use of aircraft or other devices used and intended for use in flight. Aeronautic recreation and sporting activities authorized under this paragraph include, but are not limited to, fly-ins; glider flights; hot air ballooning; ultralight aircraft flights; displays of aircraft; aeronautic flight skills contests; and gyrocopter flights, but do not include flights carrying parachutists or parachute drops (including all forms of skydiving).

M. Flights carrying parachutists, and parachute drops (including all forms of skydiving) onto an airport, but only upon demonstration that the parachutist business has secured approval to use a drop zone that is at least 10 contiguous acres in size. The configuration of the drop zone shall roughly approximate a square or a circle and may contain structures, trees, or other obstacles only if the remainder of the drop zone provides adequate areas for parachutists to land safely.

N. Uses not identified in Subsection 713.04, but permitted in the underlying zoning district, may be permitted if they do not conflict with permitted uses in Subsection 713.04, safety, or the continued operation and vitality of the airport.

713.05 USES PERMITTED SUBJECT TO REVIEW

Uses not identified in Subsection 713.04 and contained in an Airport Expansion Plan approved by the County as part of the Comprehensive Plan shall require review as a Type III application pursuant to Section 1307 and shall be subject to the following standards and criteria:

A. The use is, or will be, supported by adequate types and levels of public facilities, services, and transportation systems authorized by applicable statewide land use planning goals;

B. The use does not seriously interfere with existing land uses in areas surrounding the airport; and

C. For airports where the underlying zoning district is EFU, the use shall comply with the standards described in ORS 215.296.

D. The development standards in Section 1000 shall be applied appropriate to the type of use permitted.

E. An applicant may demonstrate that these standards will be satisfied through the imposition of clear and objective conditions.

713.06 IMAGINARY SURFACE AND NOISE IMPACT BOUNDARY DELINEATION

The airport elevation, the airport noise impact boundary, and the location and dimensions of the runway, primary surface, runway protection zone, approach surface, horizontal surface, conical surface and transitional surface, direct and secondary impact boundaries shall be delineated for each public use airport where this district is applied and shall be made part of the zoning maps adopted pursuant to Subsection 103.02. All lands, waters, and airspace, or portions thereof, that are located within these boundaries or surfaces shall be subject to the requirements of this zone.

713.07 LAND USE COMPATIBILITY REQUIREMENTS

Applications for land use or building permits for properties within the boundaries of these safety overlay zones shall comply with the requirements of this Section as provided herein.

713.08 WATER IMPOUNDMENTS WITHIN SAFETY OVERLAY ZONES

Any use or activity that would result in the establishment or expansion of a water impoundment shall comply with the requirements of this section.

713.09 NONCONFORMING USES

Section 713 shall not be construed to require the removal, lowering, or alteration of any existing structure or vegetation not conforming to Section 713. Section 713 shall not require any change in the construction, or alteration of the intended use of any structure, the construction or alteration of which was begun or completed prior to the effective date of this safety overlay zone.

[Amended by Ord. ZDO-248, 10/13/14]

Appendix F

FAA
Airports

ASSURANCES

Airport Sponsors

A. General.

1. These assurances shall be complied with in the performance of grant agreements for airport development, airport planning, and noise compatibility program grants for airport sponsors.
2. These assurances are required to be submitted as part of the project application by sponsors requesting funds under the provisions of Title 49, U.S.C., subtitle VII, as amended. As used herein, the term "public agency sponsor" means a public agency with control of a public-use airport; the term "private sponsor" means a private owner of a public-use airport; and the term "sponsor" includes both public agency sponsors and private sponsors.
3. Upon acceptance of this grant offer by the sponsor, these assurances are incorporated in and become part of this grant agreement.

B. Duration and Applicability.

1. **Airport development or Noise Compatibility Program Projects Undertaken by a Public Agency Sponsor.**

   The terms, conditions and assurances of this grant agreement shall remain in full force and effect throughout the useful life of the facilities developed or equipment acquired for an airport development or noise compatibility program project, or throughout the useful life of the project items installed within a facility under a noise compatibility program project, but in any event not to exceed twenty (20) years from the date of acceptance of a grant offer of Federal funds for the project. However, there shall be no limit on the duration of the assurances regarding Exclusive Rights and Airport Revenue so long as the airport is used as an airport. There shall be no limit on the duration of the terms, conditions, and assurances with respect to real property acquired with federal funds. Furthermore, the duration of the Civil Rights assurance shall be specified in the assurances.

2. **Airport Development or Noise Compatibility Projects Undertaken by a Private Sponsor.**

   The preceding paragraph 1 also applies to a private sponsor except that the useful life of project items installed within a facility or the useful life of the facilities developed or equipment acquired under an airport development or noise compatibility program project shall be no less than ten (10) years from the date of acceptance of Federal aid for the project.

3. **Airport Planning Undertaken by a Sponsor.**

Unless otherwise specified in this grant agreement, only Assurances 1, 2, 3, 5, 6, 13, 18, 25, 30, 32, 33, and 34 in Section C apply to planning projects. The terms, conditions, and assurances of this grant agreement shall remain in full force and effect during the life of the project; there shall be no limit on the duration of the assurances regarding Airport Revenue so long as the airport is used as an airport.

C. Sponsor Certification.

The sponsor hereby assures and certifies, with respect to this grant that:

1. **General Federal Requirements.**

It will comply with all applicable Federal laws, regulations, executive orders, policies, guidelines, and requirements as they relate to the application, acceptance and use of Federal funds for this project including but not limited to the following:

Federal Legislation

a. Title 49, U.S.C., subtitle VII, as amended.
b. Davis-Bacon Act - 40 U.S.C. 276(a), et seq.[1]
c. Federal Fair Labor Standards Act - 29 U.S.C. 201, et seq.
d. Hatch Act – 5 U.S.C. 1501, et seq.[2]
e. Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 Title 42 U.S.C. 4601, et seq.[1 2]
f. National Historic Preservation Act of 1966 - Section 106 - 16 U.S.C. 470(f).[1]
g. Archeological and Historic Preservation Act of 1974 - 16 U.S.C. 469 through 469c.[1]
h. Native Americans Grave Repatriation Act - 25 U.S.C. Section 3001, et seq.
i. Clean Air Act, P.L. 90-148, as amended.
j. Coastal Zone Management Act, P.L. 93-205, as amended.
k. Flood Disaster Protection Act of 1973 - Section 102(a) - 42 U.S.C. 4012a.[1]
l. Title 49, U.S.C., Section 303, (formerly known as Section 4(f))
m. Rehabilitation Act of 1973 - 29 U.S.C. 794.
n. Title VI of the Civil Rights Act of 1964 (42 U.S.C. § 2000d et seq., 78 stat. 252) (prohibits discrimination on the basis of race, color, national origin);
o. Americans with Disabilities Act of 1990, as amended, (42 U.S.C. § 12101 et seq.), prohibits discrimination on the basis of disability).
p. Age Discrimination Act of 1975 - 42 U.S.C. 6101, et seq.
q. American Indian Religious Freedom Act, P.L. 95-341, as amended.
r. Architectural Barriers Act of 1968 -42 U.S.C. 4151, et seq.[1]
s. Power plant and Industrial Fuel Use Act of 1978 - Section 403- 2 U.S.C. 8373.[1]
t. Contract Work Hours and Safety Standards Act - 40 U.S.C. 327, et seq.[1]
u. Copeland Anti-kickback Act - 18 U.S.C. 874.1
v. National Environmental Policy Act of 1969 - 42 U.S.C. 4321, et seq.[1]
w. Wild and Scenic Rivers Act, P.L. 90-542, as amended.
x. Single Audit Act of 1984 - 31 U.S.C. 7501, et seq.[2]
y. Drug-Free Workplace Act of 1988 - 41 U.S.C. 702 through 706.

z. The Federal Funding Accountability and Transparency Act of 2006, as amended (Pub. L. 109-282, as amended by section 6202 of Pub. L. 110-252).

Executive Orders

a. Executive Order 11246 - Equal Employment Opportunity[1]
b. Executive Order 11990 - Protection of Wetlands
c. Executive Order 11998 – Flood Plain Management
d. Executive Order 12372 - Intergovernmental Review of Federal Programs
e. Executive Order 12699 - Seismic Safety of Federal and Federally Assisted New Building Construction[1]
f. Executive Order 12898 - Environmental Justice

Federal Regulations

a. 2 CFR Part 180 - OMB Guidelines to Agencies on Governmentwide Debarment and Suspension (Nonprocurement).
b. 2 CFR Part 200, Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards. [OMB Circular A-87 Cost Principles Applicable to Grants and Contracts with State and Local Governments, and OMB Circular A-133 - Audits of States, Local Governments, and Non-Profit Organizations].[4, 5, 6]
c. 2 CFR Part 1200 – Nonprocurement Suspension and Debarment
d. 14 CFR Part 13 - Investigative and Enforcement Procedures14 CFR Part 16 - Rules of Practice For Federally Assisted Airport Enforcement Proceedings.
e. 14 CFR Part 150 - Airport noise compatibility planning.
f. 28 CFR Part 35- Discrimination on the Basis of Disability in State and Local Government Services.
g. 28 CFR § 50.3 - U.S. Department of Justice Guidelines for Enforcement of Title VI of the Civil Rights Act of 1964.
h. 29 CFR Part 1 - Procedures for predetermination of wage rates.[1]
i. 29 CFR Part 3 - Contractors and subcontractors on public building or public work financed in whole or part by loans or grants from the United States.[1]
j. 29 CFR Part 5 - Labor standards provisions applicable to contracts covering federally financed and assisted construction (also labor standards provisions applicable to non-construction contracts subject to the Contract Work Hours and Safety Standards Act).[1]
k. 41 CFR Part 60 - Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department of Labor (Federal and federally assisted contracting requirements).[1]
l. 49 CFR Part 18 - Uniform administrative requirements for grants and cooperative agreements to state and local governments.[3]
m. 49 CFR Part 20 - New restrictions on lobbying.
n. 49 CFR Part 21 – Nondiscrimination in federally-assisted programs of the Department of Transportation - effectuation of Title VI of the Civil Rights Act of 1964.
o. 49 CFR Part 23 - Participation by Disadvantage Business Enterprise in Airport Concessions.

p. 49 CFR Part 24 – Uniform Relocation Assistance and Real Property Acquisition for Federal and Federally Assisted Programs.[1 2]
q. 49 CFR Part 26 – Participation by Disadvantaged Business Enterprises in Department of Transportation Programs.
r. 49 CFR Part 27 – Nondiscrimination on the Basis of Handicap in Programs and Activities Receiving or Benefiting from Federal Financial Assistance.[1]
s. 49 CFR Part 28 – Enforcement of Nondiscrimination on the Basis of Handicap in Programs or Activities conducted by the Department of Transportation.
t. 49 CFR Part 30 - Denial of public works contracts to suppliers of goods and services of countries that deny procurement market access to U.S. contractors.
u. 49 CFR Part 32 – Governmentwide Requirements for Drug-Free Workplace (Financial Assistance)
v. 49 CFR Part 37 – Transportation Services for Individuals with Disabilities (ADA).
w. 49 CFR Part 41 - Seismic safety of Federal and federally assisted or regulated new building construction.

Specific Assurances

Specific assurances required to be included in grant agreements by any of the above laws, regulations or circulars are incorporated by reference in this grant agreement.

Footnotes to Assurance C.1.

1 These laws do not apply to airport planning sponsors.

2 These laws do not apply to private sponsors.

3 49 CFR Part 18 and 2 CFR Part 200 contain requirements for State and Local Governments receiving Federal assistance. Any requirement levied upon State and Local Governments by this regulation and circular shall also be applicable to private sponsors receiving Federal assistance under Title 49, United States Code.

4 On December 26, 2013 at 78 FR 78590, the Office of Management and Budget (OMB) issued the Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards in 2 CFR Part 200. 2 CFR Part 200 replaces and combines the former Uniform Administrative Requirements for Grants (OMB Circular A-102 and Circular A-110 or 2 CFR Part 215 or Circular) as well as the Cost Principles (Circulars A-21 or 2 CFR part 220; Circular A-87 or 2 CFR part 225; and A-122, 2 CFR part 230). Additionally it replaces Circular A-133 guidance on the Single Annual Audit. In accordance with 2 CFR section 200.110, the standards set forth in Part 200 which affect administration of Federal awards issued by Federal agencies become effective once implemented by Federal agencies or when any future amendment to this Part becomes final. Federal agencies, including the Department of Transportation, must implement the policies and procedures applicable to Federal awards by promulgating a regulation to be effective by December 26, 2014 unless different provisions are required by statute or approved by OMB.

[5] Cost principles established in 2 CFR part 200 subpart E must be used as guidelines for determining the eligibility of specific types of expenses.

[6] Audit requirements established in 2 CFR part 200 subpart F are the guidelines for audits.

2. **Responsibility and Authority of the Sponsor.**

   a. Public Agency Sponsor:

   It has legal authority to apply for this grant, and to finance and carry out the proposed project; that a resolution, motion or similar action has been duly adopted or passed as an official act of the applicant's governing body authorizing the filing of the application, including all understandings and assurances contained therein, and directing and authorizing the person identified as the official representative of the applicant to act in connection with the application and to provide such additional information as may be required.

   b. Private Sponsor:

   It has legal authority to apply for this grant and to finance and carry out the proposed project and comply with all terms, conditions, and assurances of this grant agreement. It shall designate an official representative and shall in writing direct and authorize that person to file this application, including all understandings and assurances contained therein; to act in connection with this application; and to provide such additional information as may be required.

3. **Sponsor Fund Availability.**

   It has sufficient funds available for that portion of the project costs which are not to be paid by the United States. It has sufficient funds available to assure operation and maintenance of items funded under this grant agreement which it will own or control.

4. **Good Title.**

   a. It, a public agency or the Federal government, holds good title, satisfactory to the Secretary, to the landing area of the airport or site thereof, or will give assurance satisfactory to the Secretary that good title will be acquired.

   b. For noise compatibility program projects to be carried out on the property of the sponsor, it holds good title satisfactory to the Secretary to that portion of the property upon which Federal funds will be expended or will give assurance to the Secretary that good title will be obtained.

5. **Preserving Rights and Powers.**

   a. It will not take or permit any action which would operate to deprive it of any of the rights and powers necessary to perform any or all of the terms, conditions, and assurances in this grant agreement without the written approval of the Secretary, and will act promptly to acquire, extinguish or modify any outstanding rights or claims of right of others which would interfere with such performance by the sponsor. This shall be done in a manner acceptable to the Secretary.

b. It will not sell, lease, encumber, or otherwise transfer or dispose of any part of its title or other interests in the property shown on Exhibit A to this application or, for a noise compatibility program project, that portion of the property upon which Federal funds have been expended, for the duration of the terms, conditions, and assurances in this grant agreement without approval by the Secretary. If the transferee is found by the Secretary to be eligible under Title 49, United States Code, to assume the obligations of this grant agreement and to have the power, authority, and financial resources to carry out all such obligations, the sponsor shall insert in the contract or document transferring or disposing of the sponsor's interest, and make binding upon the transferee all of the terms, conditions, and assurances contained in this grant agreement.

c. For all noise compatibility program projects which are to be carried out by another unit of local government or are on property owned by a unit of local government other than the sponsor, it will enter into an agreement with that government. Except as otherwise specified by the Secretary, that agreement shall obligate that government to the same terms, conditions, and assurances that would be applicable to it if it applied directly to the FAA for a grant to undertake the noise compatibility program project. That agreement and changes thereto must be satisfactory to the Secretary. It will take steps to enforce this agreement against the local government if there is substantial non-compliance with the terms of the agreement.

d. For noise compatibility program projects to be carried out on privately owned property, it will enter into an agreement with the owner of that property which includes provisions specified by the Secretary. It will take steps to enforce this agreement against the property owner whenever there is substantial non-compliance with the terms of the agreement.

e. If the sponsor is a private sponsor, it will take steps satisfactory to the Secretary to ensure that the airport will continue to function as a public-use airport in accordance with these assurances for the duration of these assurances.

f. If an arrangement is made for management and operation of the airport by any agency or person other than the sponsor or an employee of the sponsor, the sponsor will reserve sufficient rights and authority to insure that the airport will be operated and maintained in accordance Title 49, United States Code, the regulations and the terms, conditions and assurances in this grant agreement and shall insure that such arrangement also requires compliance therewith.

g. Sponsors of commercial service airports will not permit or enter into any arrangement that results in permission for the owner or tenant of a property used as a residence, or zoned for residential use, to taxi an aircraft between that property and any location on airport. Sponsors of general aviation airports entering into any arrangement that results in permission for the owner of residential real property adjacent to or near the airport must comply with the requirements of Sec. 136 of Public Law 112-95 and the sponsor assurances.

6. **Consistency with Local Plans.**

   The project is reasonably consistent with plans (existing at the time of submission of this application) of public agencies that are authorized by the State in which the project is located to plan for the development of the area surrounding the airport.

7. **Consideration of Local Interest.**

   It has given fair consideration to the interest of communities in or near where the project may be located.

8. **Consultation with Users.**

   In making a decision to undertake any airport development project under Title 49, United States Code, it has undertaken reasonable consultations with affected parties using the airport at which project is proposed.

9. **Public Hearings.**

   In projects involving the location of an airport, an airport runway, or a major runway extension, it has afforded the opportunity for public hearings for the purpose of considering the economic, social, and environmental effects of the airport or runway location and its consistency with goals and objectives of such planning as has been carried out by the community and it shall, when requested by the Secretary, submit a copy of the transcript of such hearings to the Secretary. Further, for such projects, it has on its management board either voting representation from the communities where the project is located or has advised the communities that they have the right to petition the Secretary concerning a proposed project.

10. **Metropolitan Planning Organization.**

    In projects involving the location of an airport, an airport runway, or a major runway extension at a medium or large hub airport, the sponsor has made available to and has provided upon request to the metropolitan planning organization in the area in which the airport is located, if any, a copy of the proposed amendment to the airport layout plan to depict the project and a copy of any airport master plan in which the project is described or depicted.

11. **Pavement Preventive Maintenance.**

    With respect to a project approved after January 1, 1995, for the replacement or reconstruction of pavement at the airport, it assures or certifies that it has implemented an effective airport pavement maintenance-management program and it assures that it will use such program for the useful life of any pavement constructed, reconstructed or repaired with Federal financial assistance at the airport. It will provide such reports on pavement condition and pavement management programs as the Secretary determines may be useful.

12. **Terminal Development Prerequisites.**

    For projects which include terminal development at a public use airport, as defined in Title 49, it has, on the date of submittal of the project grant application, all the safety equipment required for certification of such airport under section 44706 of Title 49, United States Code, and all the security equipment required by rule or regulation, and has provided for access to the passenger enplaning and deplaning area of such airport to passengers enplaning and deplaning from aircraft other than air carrier aircraft.

13. **Accounting System, Audit, and Record Keeping Requirements.**

    a. It shall keep all project accounts and records which fully disclose the amount and disposition by the recipient of the proceeds of this grant, the total cost of the project in connection with which this grant is given or used, and the amount or nature of that portion of the cost of the project supplied by other sources, and such other financial records pertinent to the project. The accounts and records shall be kept in accordance with an accounting system that will facilitate an effective audit in accordance with the Single Audit Act of 1984.

    b. It shall make available to the Secretary and the Comptroller General of the United States, or any of their duly authorized representatives, for the purpose of audit and examination, any books, documents, papers, and records of the recipient that are pertinent to this grant. The Secretary may require that an appropriate audit be conducted by a recipient. In any case in which an independent audit is made of the accounts of a sponsor relating to the disposition of the proceeds of a grant or relating to the project in connection with which this grant was given or used, it shall file a certified copy of such audit with the Comptroller General of the United States not later than six (6) months following the close of the fiscal year for which the audit was made.

14. **Minimum Wage Rates.**

    It shall include, in all contracts in excess of $2,000 for work on any projects funded under this grant agreement which involve labor, provisions establishing minimum rates of wages, to be predetermined by the Secretary of Labor, in accordance with the Davis-Bacon Act, as amended (40 U.S.C. 276a-276a-5), which contractors shall pay to skilled and unskilled labor, and such minimum rates shall be stated in the invitation for bids and shall be included in proposals or bids for the work.

15. **Veteran's Preference.**

    It shall include in all contracts for work on any project funded under this grant agreement which involve labor, such provisions as are necessary to insure that, in the employment of labor (except in executive, administrative, and supervisory positions), preference shall be given to Vietnam era veterans, Persian Gulf veterans, Afghanistan-Iraq war veterans, disabled veterans, and small business concerns owned and controlled by disabled veterans as defined in Section 47112 of Title 49, United States Code. However, this preference shall apply only where the individuals are available and qualified to perform the work to which the employment relates.

16. **Conformity to Plans and Specifications.**

    It will execute the project subject to plans, specifications, and schedules approved by the Secretary. Such plans, specifications, and schedules shall be submitted to the Secretary prior to commencement of site preparation, construction, or other performance under this grant agreement, and, upon approval of the Secretary, shall be incorporated into this grant agreement. Any modification to the approved plans, specifications, and schedules shall also be subject to approval of the Secretary, and incorporated into this grant agreement.

17. **Construction Inspection and Approval.**

    It will provide and maintain competent technical supervision at the construction site throughout the project to assure that the work conforms to the plans, specifications, and schedules approved by the Secretary for the project. It shall subject the construction work on any project contained in an approved project application to inspection and approval by the Secretary and such work shall be in accordance with regulations and procedures prescribed by the Secretary. Such regulations and procedures shall require such cost and progress reporting by the sponsor or sponsors of such project as the Secretary shall deem necessary.

18. **Planning Projects.**

    In carrying out planning projects:

    a. It will execute the project in accordance with the approved program narrative contained in the project application or with the modifications similarly approved.

    b. It will furnish the Secretary with such periodic reports as required pertaining to the planning project and planning work activities.

    c. It will include in all published material prepared in connection with the planning project a notice that the material was prepared under a grant provided by the United States.

    d. It will make such material available for examination by the public, and agrees that no material prepared with funds under this project shall be subject to copyright in the United States or any other country.

    e. It will give the Secretary unrestricted authority to publish, disclose, distribute, and otherwise use any of the material prepared in connection with this grant.

    f. It will grant the Secretary the right to disapprove the sponsor's employment of specific consultants and their subcontractors to do all or any part of this project as well as the right to disapprove the proposed scope and cost of professional services.

    g. It will grant the Secretary the right to disapprove the use of the sponsor's employees to do all or any part of the project.

    h. It understands and agrees that the Secretary's approval of this project grant or the Secretary's approval of any planning material developed as part of this grant does not constitute or imply any assurance or commitment on the part of the Secretary to approve any pending or future application for a Federal airport grant.

19. **Operation and Maintenance.**

    a. The airport and all facilities which are necessary to serve the aeronautical users of the airport, other than facilities owned or controlled by the United States, shall be operated at all times in a safe and serviceable condition and in accordance with the minimum standards as may be required or prescribed by applicable Federal, state and local agencies for maintenance and operation. It will not cause or permit any activity or action thereon which would interfere with its use for airport purposes. It will suitably operate and maintain the airport and all facilities thereon or connected therewith, with due regard to climatic and flood conditions. Any proposal to temporarily close the airport for non-aeronautical purposes must first be approved by the Secretary. In furtherance of this assurance, the sponsor will have in effect arrangements for-

1) Operating the airport's aeronautical facilities whenever required;
2) Promptly marking and lighting hazards resulting from airport conditions, including temporary conditions; and
3) Promptly notifying airmen of any condition affecting aeronautical use of the airport. Nothing contained herein shall be construed to require that the airport be operated for aeronautical use during temporary periods when snow, flood or other climatic conditions interfere with such operation and maintenance. Further, nothing herein shall be construed as requiring the maintenance, repair, restoration, or replacement of any structure or facility which is substantially damaged or destroyed due to an act of God or other condition or circumstance beyond the control of the sponsor.

b. It will suitably operate and maintain noise compatibility program items that it owns or controls upon which Federal funds have been expended.

20. **Hazard Removal and Mitigation.**

It will take appropriate action to assure that such terminal airspace as is required to protect instrument and visual operations to the airport (including established minimum flight altitudes) will be adequately cleared and protected by removing, lowering, relocating, marking, or lighting or otherwise mitigating existing airport hazards and by preventing the establishment or creation of future airport hazards.

21. **Compatible Land Use.**

It will take appropriate action, to the extent reasonable, including the adoption of zoning laws, to restrict the use of land adjacent to or in the immediate vicinity of the airport to activities and purposes compatible with normal airport operations, including landing and takeoff of aircraft. In addition, if the project is for noise compatibility program implementation, it will not cause or permit any change in land use, within its jurisdiction, that will reduce its compatibility, with respect to the airport, of the noise compatibility program measures upon which Federal funds have been expended.

22. **Economic Nondiscrimination.**

a. It will make the airport available as an airport for public use on reasonable terms and without unjust discrimination to all types, kinds and classes of aeronautical activities, including commercial aeronautical activities offering services to the public at the airport.

b. In any agreement, contract, lease, or other arrangement under which a right or privilege at the airport is granted to any person, firm, or corporation to conduct or to engage in any aeronautical activity for furnishing services to the public at the airport, the sponsor will insert and enforce provisions requiring the contractor to-

1) furnish said services on a reasonable, and not unjustly discriminatory, basis to all users thereof, and
2) charge reasonable, and not unjustly discriminatory, prices for each unit or service, provided that the contractor may be allowed to make reasonable and nondiscriminatory discounts, rebates, or other similar types of price reductions to volume purchasers.

c. Each fixed-based operator at the airport shall be subject to the same rates, fees, rentals, and other charges as are uniformly applicable to all other fixed-based operators making the same or similar uses of such airport and utilizing the same or similar facilities.

d. Each air carrier using such airport shall have the right to service itself or to use any fixed-based operator that is authorized or permitted by the airport to serve any air carrier at such airport.

e. Each air carrier using such airport (whether as a tenant, non-tenant, or subtenant of another air carrier tenant) shall be subject to such nondiscriminatory and substantially comparable rules, regulations, conditions, rates, fees, rentals, and other charges with respect to facilities directly and substantially related to providing air transportation as are applicable to all such air carriers which make similar use of such airport and utilize similar facilities, subject to reasonable classifications such as tenants or non-tenants and signatory carriers and non-signatory carriers. Classification or status as tenant or signatory shall not be unreasonably withheld by any airport provided an air carrier assumes obligations substantially similar to those already imposed on air carriers in such classification or status.

f. It will not exercise or grant any right or privilege which operates to prevent any person, firm, or corporation operating aircraft on the airport from performing any services on its own aircraft with its own employees [including, but not limited to maintenance, repair, and fueling] that it may choose to perform.

g. In the event the sponsor itself exercises any of the rights and privileges referred to in this assurance, the services involved will be provided on the same conditions as would apply to the furnishing of such services by commercial aeronautical service providers authorized by the sponsor under these provisions.

h. The sponsor may establish such reasonable, and not unjustly discriminatory, conditions to be met by all users of the airport as may be necessary for the safe and efficient operation of the airport.

i. The sponsor may prohibit or limit any given type, kind or class of aeronautical use of the airport if such action is necessary for the safe operation of the airport or necessary to serve the civil aviation needs of the public.

23. **Exclusive Rights.**

It will permit no exclusive right for the use of the airport by any person providing, or intending to provide, aeronautical services to the public. For purposes of this paragraph, the providing of the services at an airport by a single fixed-based operator shall not be construed as an exclusive right if both of the following apply:

a. It would be unreasonably costly, burdensome, or impractical for more than one fixed-based operator to provide such services, and

b. If allowing more than one fixed-based operator to provide such services would require the reduction of space leased pursuant to an existing agreement between such single fixed-based operator and such airport. It further agrees that it will not, either directly or indirectly, grant or permit any person, firm, or corporation, the exclusive right at the airport to conduct any aeronautical activities, including, but not limited to charter flights, pilot training, aircraft rental and sightseeing, aerial photography, crop dusting, aerial advertising and surveying, air carrier operations, aircraft sales and services, sale of aviation petroleum products whether or not conducted in conjunction with other aeronautical activity, repair and maintenance of aircraft, sale of aircraft parts, and any other activities which because of their direct relationship to the operation of aircraft can be regarded as an aeronautical activity, and that it will terminate any exclusive right to conduct an aeronautical activity now existing at such an airport before the grant of any assistance under Title 49, United States Code.

24. **Fee and Rental Structure.**

It will maintain a fee and rental structure for the facilities and services at the airport which will make the airport as self-sustaining as possible under the circumstances existing at the particular airport, taking into account such factors as the volume of traffic and economy of collection. No part of the Federal share of an airport development, airport planning or noise compatibility project for which a grant is made under Title 49, United States Code, the Airport and Airway Improvement Act of 1982, the Federal Airport Act or the Airport and Airway Development Act of 1970 shall be included in the rate basis in establishing fees, rates, and charges for users of that airport.

25. **Airport Revenues.**

a. All revenues generated by the airport and any local taxes on aviation fuel established after December 30, 1987, will be expended by it for the capital or operating costs of the airport; the local airport system; or other local facilities which are owned or operated by the owner or operator of the airport and which are directly and substantially related to the actual air transportation of passengers or property; or for noise mitigation purposes on or off the airport. The following exceptions apply to this paragraph:

1) If covenants or assurances in debt obligations issued before September 3, 1982, by the owner or operator of the airport, or provisions enacted before September 3, 1982, in governing statutes controlling the owner or operator's financing, provide for the use of the revenues from any of the airport owner or

operator's facilities, including the airport, to support not only the airport but also the airport owner or operator's general debt obligations or other facilities, then this limitation on the use of all revenues generated by the airport (and, in the case of a public airport, local taxes on aviation fuel) shall not apply.

2) If the Secretary approves the sale of a privately owned airport to a public sponsor and provides funding for any portion of the public sponsor's acquisition of land, this limitation on the use of all revenues generated by the sale shall not apply to certain proceeds from the sale. This is conditioned on repayment to the Secretary by the private owner of an amount equal to the remaining unamortized portion (amortized over a 20-year period) of any airport improvement grant made to the private owner for any purpose other than land acquisition on or after October 1, 1996, plus an amount equal to the federal share of the current fair market value of any land acquired with an airport improvement grant made to that airport on or after October 1, 1996.

3) Certain revenue derived from or generated by mineral extraction, production, lease, or other means at a general aviation airport (as defined at Section 47102 of title 49 United States Code), if the FAA determines the airport sponsor meets the requirements set forth in Sec. 813 of Public Law 112-95.

b. As part of the annual audit required under the Single Audit Act of 1984, the sponsor will direct that the audit will review, and the resulting audit report will provide an opinion concerning, the use of airport revenue and taxes in paragraph (a), and indicating whether funds paid or transferred to the owner or operator are paid or transferred in a manner consistent with Title 49, United States Code and any other applicable provision of law, including any regulation promulgated by the Secretary or Administrator.

c. Any civil penalties or other sanctions will be imposed for violation of this assurance in accordance with the provisions of Section 47107 of Title 49, United States Code.

26. **Reports and Inspections.**

It will:

a. submit to the Secretary such annual or special financial and operations reports as the Secretary may reasonably request and make such reports available to the public; make available to the public at reasonable times and places a report of the airport budget in a format prescribed by the Secretary;

b. for airport development projects, make the airport and all airport records and documents affecting the airport, including deeds, leases, operation and use agreements, regulations and other instruments, available for inspection by any duly authorized agent of the Secretary upon reasonable request;

c. for noise compatibility program projects, make records and documents relating to the project and continued compliance with the terms, conditions, and assurances of this grant agreement including deeds, leases, agreements, regulations, and other instruments, available for inspection by any duly authorized agent of the Secretary upon reasonable request; and

d. in a format and time prescribed by the Secretary, provide to the Secretary and make available to the public following each of its fiscal years, an annual report listing in detail:

   1) all amounts paid by the airport to any other unit of government and the purposes for which each such payment was made; and

   2) all services and property provided by the airport to other units of government and the amount of compensation received for provision of each such service and property.

27. **Use by Government Aircraft.**

It will make available all of the facilities of the airport developed with Federal financial assistance and all those usable for landing and takeoff of aircraft to the United States for use by Government aircraft in common with other aircraft at all times without charge, except, if the use by Government aircraft is substantial, charge may be made for a reasonable share, proportional to such use, for the cost of operating and maintaining the facilities used. Unless otherwise determined by the Secretary, or otherwise agreed to by the sponsor and the using agency, substantial use of an airport by Government aircraft will be considered to exist when operations of such aircraft are in excess of those which, in the opinion of the Secretary, would unduly interfere with use of the landing areas by other authorized aircraft, or during any calendar month that –

a. Five (5) or more Government aircraft are regularly based at the airport or on land adjacent thereto; or

b. The total number of movements (counting each landing as a movement) of Government aircraft is 300 or more, or the gross accumulative weight of Government aircraft using the airport (the total movement of Government aircraft multiplied by gross weights of such aircraft) is in excess of five million pounds.

28. **Land for Federal Facilities.**

It will furnish without cost to the Federal Government for use in connection with any air traffic control or air navigation activities, or weather-reporting and communication activities related to air traffic control, any areas of land or water, or estate therein, or rights in buildings of the sponsor as the Secretary considers necessary or desirable for construction, operation, and maintenance at Federal expense of space or facilities for such purposes. Such areas or any portion thereof will be made available as provided herein within four months after receipt of a written request from the Secretary.

29. **Airport Layout Plan.**

a. It will keep up to date at all times an airport layout plan of the airport showing

   1) boundaries of the airport and all proposed additions thereto, together with the boundaries of all offsite areas owned or controlled by the sponsor for airport purposes and proposed additions thereto;

   2) the location and nature of all existing and proposed airport facilities and structures (such as runways, taxiways, aprons, terminal buildings, hangars and

roads), including all proposed extensions and reductions of existing airport facilities;

3) the location of all existing and proposed nonaviation areas and of all existing improvements thereon; and

4) all proposed and existing access points used to taxi aircraft across the airport's property boundary. Such airport layout plans and each amendment, revision, or modification thereof, shall be subject to the approval of the Secretary which approval shall be evidenced by the signature of a duly authorized representative of the Secretary on the face of the airport layout plan. The sponsor will not make or permit any changes or alterations in the airport or any of its facilities which are not in conformity with the airport layout plan as approved by the Secretary and which might, in the opinion of the Secretary, adversely affect the safety, utility or efficiency of the airport.

b. If a change or alteration in the airport or the facilities is made which the Secretary determines adversely affects the safety, utility, or efficiency of any federally owned, leased, or funded property on or off the airport and which is not in conformity with the airport layout plan as approved by the Secretary, the owner or operator will, if requested, by the Secretary (1) eliminate such adverse effect in a manner approved by the Secretary; or (2) bear all costs of relocating such property (or replacement thereof) to a site acceptable to the Secretary and all costs of restoring such property (or replacement thereof) to the level of safety, utility, efficiency, and cost of operation existing before the unapproved change in the airport or its facilities except in the case of a relocation or replacement of an existing airport facility due to a change in the Secretary's design standards beyond the control of the airport sponsor.

30. **Civil Rights.**

It will promptly take any measures necessary to ensure that no person in the United States shall, on the grounds of race, creed, color, national origin, sex, age, or disability be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination in any activity conducted with, or benefiting from, funds received from this grant.

a. Using the definitions of activity, facility and program as found and defined in §§ 21.23 (b) and 21.23 (e) of 49 CFR § 21, the sponsor will facilitate all programs, operate all facilities, or conduct all programs in compliance with all non-discrimination requirements imposed by, or pursuant to these assurances.

b. Applicability

1) Programs and Activities. If the sponsor has received a grant (or other federal assistance) for any of the sponsor's program or activities, these requirements extend to all of the sponsor's programs and activities.

2) Facilities. Where it receives a grant or other federal financial assistance to construct, expand, renovate, remodel, alter or acquire a facility, or part of a facility, the assurance extends to the entire facility and facilities operated in connection therewith.

3) Real Property. Where the sponsor receives a grant or other Federal financial assistance in the form of, or for the acquisition of real property or an interest in real property, the assurance will extend to rights to space on, over, or under such property.

c. Duration.

The sponsor agrees that it is obligated to this assurance for the period during which Federal financial assistance is extended to the program, except where the Federal financial assistance is to provide, or is in the form of, personal property, or real property, or interest therein, or structures or improvements thereon, in which case the assurance obligates the sponsor, or any transferee for the longer of the following periods:

1) So long as the airport is used as an airport, or for another purpose involving the provision of similar services or benefits; or

2) So long as the sponsor retains ownership or possession of the property.

d. Required Solicitation Language. It will include the following notification in all solicitations for bids, Requests For Proposals for work, or material under this grant agreement and in all proposals for agreements, including airport concessions, regardless of funding source:

"The **(Name of Sponsor)**, in accordance with the provisions of Title VI of the Civil Rights Act of 1964 (78 Stat. 252, 42 U.S.C. §§ 2000d to 2000d-4) and the Regulations, hereby notifies all bidders that it will affirmatively ensure that any contract entered into pursuant to this advertisement, disadvantaged business enterprises and airport concession disadvantaged business enterprises will be afforded full and fair opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color, or national origin in consideration for an award."

e. Required Contract Provisions.

1) It will insert the non-discrimination contract clauses requiring compliance with the acts and regulations relative to non-discrimination in Federally-assisted programs of the DOT, and incorporating the acts and regulations into the contracts by reference in every contract or agreement subject to the non-discrimination in Federally-assisted programs of the DOT acts and regulations.

2) It will include a list of the pertinent non-discrimination authorities in every contract that is subject to the non-discrimination acts and regulations.

3) It will insert non-discrimination contract clauses as a covenant running with the land, in any deed from the United States effecting or recording a transfer of real property, structures, use, or improvements thereon or interest therein to a sponsor.

4) It will insert non-discrimination contract clauses prohibiting discrimination on the basis of race, color, national origin, creed, sex, age, or handicap as a

covenant running with the land, in any future deeds, leases, license, permits, or similar instruments entered into by the sponsor with other parties:

a) For the subsequent transfer of real property acquired or improved under the applicable activity, project, or program; and

b) For the construction or use of, or access to, space on, over, or under real property acquired or improved under the applicable activity, project, or program.

f. It will provide for such methods of administration for the program as are found by the Secretary to give reasonable guarantee that it, other recipients, sub-recipients, sub-grantees, contractors, subcontractors, consultants, transferees, successors in interest, and other participants of Federal financial assistance under such program will comply with all requirements imposed or pursuant to the acts, the regulations, and this assurance.

g. It agrees that the United States has a right to seek judicial enforcement with regard to any matter arising under the acts, the regulations, and this assurance.

31. **Disposal of Land.**

a. For land purchased under a grant for airport noise compatibility purposes, including land serving as a noise buffer, it will dispose of the land, when the land is no longer needed for such purposes, at fair market value, at the earliest practicable time. That portion of the proceeds of such disposition which is proportionate to the United States' share of acquisition of such land will be, at the discretion of the Secretary, (1) reinvested in another project at the airport, or (2) transferred to another eligible airport as prescribed by the Secretary. The Secretary shall give preference to the following, in descending order, (1) reinvestment in an approved noise compatibility project, (2) reinvestment in an approved project that is eligible for grant funding under Section 47117(e) of title 49 United States Code, (3) reinvestment in an approved airport development project that is eligible for grant funding under Sections 47114, 47115, or 47117 of title 49 United States Code, (4) transferred to an eligible sponsor of another public airport to be reinvested in an approved noise compatibility project at that airport, and (5) paid to the Secretary for deposit in the Airport and Airway Trust Fund. If land acquired under a grant for noise compatibility purposes is leased at fair market value and consistent with noise buffering purposes, the lease will not be considered a disposal of the land. Revenues derived from such a lease may be used for an approved airport development project that would otherwise be eligible for grant funding or any permitted use of airport revenue.

b. For land purchased under a grant for airport development purposes (other than noise compatibility), it will, when the land is no longer needed for airport purposes, dispose of such land at fair market value or make available to the Secretary an amount equal to the United States' proportionate share of the fair market value of the land. That portion of the proceeds of such disposition which is proportionate to the United States' share of the cost of acquisition of such land will, (1) upon application to the Secretary, be reinvested or transferred to another eligible airport as prescribed by the Secretary. The Secretary shall give preference to the following, in descending order: (1) reinvestment in an approved noise compatibility project, (2) reinvestment in an approved project that is eligible for grant funding under Section 47117(e) of title 49 United States Code, (3) reinvestment in an approved airport development project that is eligible for grant funding under Sections 47114, 47115, or 47117 of title 49 United States Code, (4) transferred to an eligible sponsor of another public airport to be reinvested in an approved noise compatibility project at that airport, and (5) paid to the Secretary for deposit in the Airport and Airway Trust Fund.

c. Land shall be considered to be needed for airport purposes under this assurance if (1) it may be needed for aeronautical purposes (including runway protection zones) or serve as noise buffer land, and (2) the revenue from interim uses of such land contributes to the financial self-sufficiency of the airport. Further, land purchased with a grant received by an airport operator or owner before December 31, 1987, will be considered to be needed for airport purposes if the Secretary or Federal agency making such grant before December 31, 1987, was notified by the operator or owner of the uses of such land, did not object to such use, and the land continues to be used for that purpose, such use having commenced no later than December 15, 1989.

d. Disposition of such land under (a) (b) or (c) will be subject to the retention or reservation of any interest or right therein necessary to ensure that such land will only be used for purposes which are compatible with noise levels associated with operation of the airport.

32. **Engineering and Design Services.**

It will award each contract, or sub-contract for program management, construction management, planning studies, feasibility studies, architectural services, preliminary engineering, design, engineering, surveying, mapping or related services with respect to the project in the same manner as a contract for architectural and engineering services is negotiated under Title IX of the Federal Property and Administrative Services Act of 1949 or an equivalent qualifications-based requirement prescribed for or by the sponsor of the airport.

33. **Foreign Market Restrictions.**

It will not allow funds provided under this grant to be used to fund any project which uses any product or service of a foreign country during the period in which such foreign country is listed by the United States Trade Representative as denying fair and equitable market opportunities for products and suppliers of the United States in procurement and construction.

34. **Policies, Standards, and Specifications.**

It will carry out the project in accordance with policies, standards, and specifications approved by the Secretary including but not limited to the advisory circulars listed in the Current FAA Advisory Circulars for AIP projects, dated ____________ (the latest approved version as of this grant offer) and included in this grant, and in accordance with applicable state policies, standards, and specifications approved by the Secretary.

35. **Relocation and Real Property Acquisition.**

    a. It will be guided in acquiring real property, to the greatest extent practicable under State law, by the land acquisition policies in Subpart B of 49 CFR Part 24 and will pay or reimburse property owners for necessary expenses as specified in Subpart B.
    b. It will provide a relocation assistance program offering the services described in Subpart C and fair and reasonable relocation payments and assistance to displaced persons as required in Subpart D and E of 49 CFR Part 24.
    c. It will make available within a reasonable period of time prior to displacement, comparable replacement dwellings to displaced persons in accordance with Subpart E of 49 CFR Part 24.

36. **Access By Intercity Buses.**

    The airport owner or operator will permit, to the maximum extent practicable, intercity buses or other modes of transportation to have access to the airport; however, it has no obligation to fund special facilities for intercity buses or for other modes of transportation.

37. **Disadvantaged Business Enterprises.**

    The sponsor shall not discriminate on the basis of race, color, national origin or sex in the award and performance of any DOT-assisted contract covered by 49 CFR Part 26, or in the award and performance of any concession activity contract covered by 49 CFR Part 23. In addition, the sponsor shall not discriminate on the basis of race, color, national origin or sex in the administration of its DBE and ACDBE programs or the requirements of 49 CFR Parts 23 and 26. The sponsor shall take all necessary and reasonable steps under 49 CFR Parts 23 and 26 to ensure nondiscrimination in the award and administration of DOT-assisted contracts, and/or concession contracts. The sponsor's DBE and ACDBE programs, as required by 49 CFR Parts 26 and 23, and as approved by DOT, are incorporated by reference in this agreement. Implementation of these programs is a legal obligation and failure to carry out its terms shall be treated as a violation of this agreement. Upon notification to the sponsor of its failure to carry out its approved program, the Department may impose sanctions as provided for under Parts 26 and 23 and may, in appropriate cases, refer the matter for enforcement under 18 U.S.C. 1001 and/or the Program Fraud Civil Remedies Act of 1936 (31 U.S.C. 3801).

38. **Hangar Construction.**

    If the airport owner or operator and a person who owns an aircraft agree that a hangar is to be constructed at the airport for the aircraft at the aircraft owner's expense, the airport owner or operator will grant to the aircraft owner for the hangar a long term lease that is subject to such terms and conditions on the hangar as the airport owner or operator may impose.

39. **Competitive Access.**

a. If the airport owner or operator of a medium or large hub airport (as defined in section 47102 of title 49, U.S.C.) has been unable to accommodate one or more requests by an air carrier for access to gates or other facilities at that airport in order to allow the air carrier to provide service to the airport or to expand service at the airport, the airport owner or operator shall transmit a report to the Secretary that-

   1) Describes the requests;

   2) Provides an explanation as to why the requests could not be accommodated; and

   3) Provides a time frame within which, if any, the airport will be able to accommodate the requests.

b. Such report shall be due on either February 1 or August 1 of each year if the airport has been unable to accommodate the request(s) in the six month period prior to the applicable due date.

Glossary of Terms

GLOSSARY OF AVIATION TERMS

The following glossary of aviation terms was compiled from a variety of aviation industry sources.

Above Ground Level (AGL) – As measured above the ground; used to identify heights of built items (towers, etc.) on aeronautical charts in terms of absolute height above the ground.

Accelerate Stop Distance Available (ASDA) – The length of the takeoff run available plus the length of a stopway, when available.

Agricultural Aviation – The use of fixed-wing or rotor-wing aircraft in the aerial application of agricultural products (i.e., fertilizers, pesticides, etc.).

Air Cargo - All commercial air express and air freight with the exception of airmail and parcel post.

Air Carrier/Airline - All regularly scheduled airline activity performed by airlines certificated in accordance with Federal Aviation Regulations (FAR Part 121).

Air Taxi - Operations of aircraft "for hire" for specific trips, commonly referred to an aircraft available for charter (FAR Part 135).

Aircraft Approach Category - Grouping of aircraft based on the speed they are traveling when configured for landing (typically 1.3 times the aircraft stall speed in landing configuration). As a rule of thumb, slower approach speeds mean smaller airport dimensions and faster approach speeds require larger dimensions. The aircraft approach categories are:

Category A - Speed less than 91 knots;

Category B - Speed 91 knots or more but less than 121 knots

Category C - Speed 121 knots or more but less than 141 knots

Category D - Speed 141 knots or more but less than 166 knots

Category E - Speed 166 knots or more

Aircraft Holding Area – An area typically located adjacent to a taxiway and runway end designed to accommodate aircraft prior to departure (for pre–takeoff engine checks, instrument flight plan clearances, etc.). Per FAA design standards, aircraft holding areas should be located outside the runway safety area (RSA) and obstacle free zone (OFZ) and aircraft located in the holding area should not interfere with normal taxiway use (taxiway object free area). Sometimes referred to as holding bays or "elephant ear." Smaller areas (aircraft turnarounds) are used to facilitate aircraft movement on runways without exit taxiways or where back-taxiing is required.

Aircraft Operation - A landing or takeoff is one operation. An aircraft that takes off and then lands creates two aircraft operations.

Aircraft Owners and Pilots Association (AOPA) – A general aviation organization.

Aircraft Parking Line (APL) – A setback depicted on an ALP or other drawings that defines the minimum separation between aircraft parking areas and an adjacent runway or taxiway. The APL dimension reflects runway and taxiway clearances (object free area, etc.) and FAR Part 77 airspace surface clearance (transitional surface penetrations) for parked aircraft. Typically the tail height of the parked aircraft is used to determine adequate clearance for the transitional surface.

Airplane Design Group - A grouping of airplanes based on wingspan and tail height. As with Approach Category, the wider the wingspan, the bigger the aircraft is, the more room it takes up for operating on an airport. The Airplane Design Groups are:

Group I:	Up to but not including 49 feet or tail height up to but not including 20 feet.
Group II:	49 feet up to but not including 79 feet or tail height from 20 up to but not including 30 feet.
Group III:	79 feet up to but not including 118 feet or tail height from 30 up to but not including 45 feet.
Group IV:	118 feet up to but not including 171 feet or tail height from 45 up to but not including 60 feet.
Group V:	171 feet up to but not including 214 feet or tail height from 60 up to but not including 66 feet.
Group VI:	214 feet up to but not including 262 feet or tail height from 66 up to but not including 80 feet.

Airport - A landing area regularly used by aircraft for receiving or discharging passengers or cargo, including heliports and seaplane bases.

Airport Beacon (also Rotating Beacon) – A visual navigational aid that displays alternating green and white flashes for a lighted land airport and white for an unlighted land airport.

GLOSSARY OF AVIATION TERMS

Airports District Office (ADO) - The "local" office of the FAA that coordinates planning and construction projects. The Seattle ADO is responsible for airports located in Washington, Oregon, and Idaho.

Airport Improvement Program (AIP) - The funding program administered by the Federal Aviation Administration (FAA) with user fees which are dedicated to improvement of the national airport system. This program currently provides 95% of funding for eligible airport improvement projects. The local sponsor of the project (i.e., airport owner) provides the remaining 5% known as the "match."

Airport Layout Plan (ALP) - The FAA approved drawing which shows the existing and anticipated layout of an airport for the next 20 years. An ALP is prepared using FAA design standards. Future development projects must be consistent with the ALP to be eligible for FAA funding. ALP drawings are typically updated every 7 to 10 years to reflect significant changes, or as needed.

Airport Reference Code (ARC) - An FAA airport coding system that is defined based on the critical or design aircraft for an airport or individual runway. The ARC is an alpha-numeric code based on aircraft approach speed and airplane wingspan (see definitions in glossary). The ARC is used to determine the appropriate design standards for runways, taxiways, and other associated facilities. An airport designed to accommodate a Piper Cub (an A-I aircraft) requires less room than an airport designed to accommodate a Boeing 747 (a D-V aircraft).

Airport Reference Point (ARP) – The approximate mid-point of an airfield that is designated as the official airport location.

Aircraft Rescue and Fire Fighting (ARFF) - On airport emergency response required for certificated commercial service airports (see FAR Part 139).

Airside – The portion of an airport that includes aircraft movement areas (runways, taxiways, etc.).

Airspace - The area above the ground in which aircraft travel. It is divided into enroute and terminal airspace, with corridors, routes, and restricted zones established for the control and safety of air traffic.

Alternate Airport – An airport that is available for landing when the intended airport becomes unavailable. Required for instrument flight planning in the event that weather conditions at destination airport fall below approach minimums (cloud ceiling or visibility).

Annual Service Volume (ASV) - An estimate of how many aircraft operations an airport can handle based upon the number, type and configuration of runways, aircraft mix (large vs. small, etc.), instrumentation, and weather conditions with a “reasonable” amount of delay. ASV is a primary planning standard used to determine when a runway (or an airport) is nearing its capacity, and may require new runways or taxiways. As operations levels approach ASV, the amount of delay per operation increases; once ASV is exceeded, “excessive” delay generally exists.

Approach End of Runway - The end of the runway used for landing. Pilots generally land into the wind and choose a runway end that best aligns with the wind.

Approach Light System (ALS) – Configurations of lights positioned symmetrically beyond the runway threshold and the extended runway centerline. The ALS visually augments the electronic navigational aids for the runway.

Approach Reference Code (APRC) - The APRC is composed of three components: AAC, ADG, and visibility minimums. Visibility minimums are expressed as Runway Visual Range (RVR) values in feet of 1600, 2400, 4000, and 5000 (nominally corresponding to lower than 1/2 mile, lower than 3/4 mile but not lower than 1/2 mile, not lower than 3/4 mile, and not lower than one mile, respectively).

Approach Surface (Also FAR Part 77 Approach) - An imaginary (invisible) surface that rises and extends from the ends of a runway to provide an unobstructed path for aircraft to land or take off. The size and slope of the approach surface vary depending upon the size of aircraft that are accommodated and the approach capabilities (visual or instrument).

Apron - An area on an airport designated for the parking, loading, fueling, or servicing of aircraft (also referred to as tarmac and ramp).

Aqueous Film Forming Foam (AFFF) – A primary fire-fighting agent that is used to create a blanket that smothers flame or prevents ignition (fuel spills, etc.). AFFF is also used to foam runways during emergency landings.

Asphalt or Asphaltic Concrete (AC) – Flexible oil-based pavement used for airfield facilities (runways, taxiways, aircraft parking apron, etc.); also commonly used for road construction.

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Automated Surface Observation System (ASOS) and Automated Weather Observation System (AWOS) – Automated observation systems providing continuous on-site weather data, designed to support aviation activities and weather forecasting.

AVGAS – Highly refined gasoline used in airplanes with piston engines. The current grade of AVGAS available is 100 Octane Low Lead (100LL).

Avigation Easement - A grant of property interest (airspace) over land to ensure unobstructed flight. Typically acquired by airport owners to protect the integrity of runway approaches. Restrictions typically include maximum height limitations for natural (trees, etc.) or built items, but may also address permitted land uses by the owner of the underlying land that are compatible with airport operations.

Back-Taxiing – The practice of aircraft taxiing on a runway before takeoff or after landing, normally, in the opposite direction of the runway's traffic pattern. Back-taxiing is generally required on runways without taxiway access to both runway ends.

Based Aircraft - Aircraft permanently stationed at an airport usually through some form of agreement with the airport owner. Used as a measure of activity at an airport.

Capacity - A measure of the maximum number of aircraft operations that can be accommodated on the runways of an airport in an hour.

Ceiling – The height above the ground or water to base of the lowest cloud layers covering more than 50 percent of the sky.

Charter - Operations of aircraft "for hire" for specific trips, commonly referred to an aircraft available for charter.

Circle to Land or Circling Approach – An instrument approach procedure that allows pilots to "circle" the airfield to land on any authorized runway once visual contact with the runway environment is established and maintained throughout the procedure.

Commercial Service Airport - An airport designed and constructed to serve scheduled or unscheduled commercial airlines. Commercial service airports are certified under FAR Part 139.

Common Traffic Advisory Frequency (CTAF) – A frequency used by pilots to communicate and obtain airport advisories at an uncontrolled airport.

Complimentary Fire Extinguishing Agent – Fire extinguishing agents that provide rapid fire suppression, which may be used in conjunction with principal agents (e.g., foam). Examples include sodium-based and potassium-based dry chemicals, Halocarbons, and Carbon dioxide. Also recommended for electrical and metal fires where water-based foams are not used. Complimentary agents are paired with principal agents based on their compatibility of use.

Conical Surface - One of the "FAR Part 77 "Imaginary" Surfaces. The conical surface extends outward and upward from the edge of the horizontal surface at a slope of 20:1 to a horizontal distance of 4,000 feet.

Controlling Obstruction – The highest obstruction relative to a defined plane of airspace (i.e., approach surface, etc.).

Critical Aircraft - Aircraft which controls one or more design items based on wingspan, approach speed and/or maximum certificated take-off weight. The same aircraft may not be critical to all design items (i.e., runway length, pavement strength, etc.). Also referred to as "design aircraft."

Crosswind - Wind direction that is not parallel to the runway or the path of an aircraft.

Crosswind Runway – An additional runway (secondary, tertiary, etc.) that provides wind coverage not adequately provided by the primary runway. Crosswind runways are generally eligible for FAA funding when a primary runway accommodates less than 95 percent of documented wind conditions (see wind rose).

Decision Height (DH) – For precision instrument approaches, the height (typically in feet or meters above runway end touchdown zone elevation) at which a decision to land or execute a missed approach must be made by the pilot.

Declared Distances – The distances the airport owner declares available for airplane operations (e.g., takeoff run, takeoff distance, accelerate-stop distance, and landing distance). In cases where runways meet all FAA design criteria without modification, declared distances equal the total runway length. In cases where any declared distances are less than full runway length, the dimension should be published in the FAA Airport/Facility Directory (A/FD).

Departure Reference Code (DPRC) – The DPRC represents aircraft that can take off from a runway while any aircraft are present on adjacent taxiways, under particular meteorological conditions with no special operational procedures necessary.

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Departure Surface – A surface that extends upward from the departure end of an instrument runway that should be free of any obstacle penetrations. For instrument runways other than air carrier, the slope is 40:1, extending 10,200 feet from the runway end. Air carrier runways have a similar surface designed for one-engine inoperative conditions with a slope of 62.5: 1.

Design Aircraft - Aircraft which controls one or more design items based on wingspan, approach speed and/or maximum certificated takeoff weight. The same aircraft may not represent the design aircraft for all design items (i.e., runway length, pavement strength, etc.). Also referred to as "critical aircraft."

Displaced Threshold – A landing threshold located at a point other than on the runway end, usually provided to mitigate close-in obstructions to runway approaches for landing aircraft. The area between the runway end and the displaced threshold accommodates aircraft taxi and takeoff, but not landing.

Distance Measuring Equipment (DME) – Equipment that provides electronic distance information to enroute or approaching aircraft from a land-based transponder that sends and receives pulses of fixed duration and separation. The ground stations are typically co-located with VORs, but they can also be co-located with an ILS.

Distance Remaining Signs – Airfield signs that indicate to pilots the amount of useable runway remaining in 1,000-foot increments. The signs are located along the side of the runway, visible for each direction of runway operation.

DNL - Day-night sound levels, a mathematical method of measuring noise exposure based on cumulative, rather than single event impacts. Night time operations (10pm to 7AM) are assessed a noise penalty to reflect the increased noise sensitivity that exists during normal hours of rest. Previously referred to as Ldn.

Easement – An agreement that provides use or access of land or airspace (see avigation easement) in exchange for compensation.

Enplanements - Domestic, territorial, and international revenue passengers who board an aircraft in the states in scheduled and non-scheduled service of aircraft in intrastate, interstate, and foreign commerce and includes in-transit passengers (passengers on board international flights that transit an airport in the US for non-traffic purposes).

Entitlements - Distribution of Airport Improvement Plan (AIP) funds by FAA from the Airport & Airways Trust Fund to commercial service airport sponsors based on passenger enplanements or cargo volumes and smaller fixed amounts for general aviation airports (Non-Primary Entitlements).

Experimental Aircraft – See homebuilt aircraft.

Federal Aviation Administration (FAA) - The FAA is the branch of the U.S. Department of Transportation that is responsible for the development of airports and air navigation systems.

FAR Part 77 - Federal Air Regulations (FAR) which establish standards for determining obstructions in navigable airspace and defines imaginary (airspace) surfaces for airports and heliports that are designed to prevent hazards to air navigation. FAR Part 77 surfaces include approach, primary, transitional, horizontal, and conical surfaces. The dimensions of surfaces can vary with the runway classification (large or small airplanes) and approach type of each runway end (visual, non-precision instrument, precision instrument). The slope of an approach surface also varies by approach type and runway classification. FAR Part 77 also applies to helicopter landing areas.

FAR Part 139 - Federal Aviation Regulations which establish standards for airports with scheduled passenger commercial air service. Airports accommodating scheduled passenger service with aircraft more than 9 passenger seats must be certified as a "Part 139" airport. Airports that are not certified under Part 139 may accommodate scheduled commercial passenger service with aircraft having 9 passenger seats or less.

Final Approach Fix (FAF) – The fix (location) from which the final instrument approach to an airport is executed; also identifies beginning of final approach segment.

Final Approach Point (FAP) – For non-precision instrument approaches, the point at which an aircraft is established inbound for the approach and where the final descent may begin.

Fixed Base Operator (FBO) - An individual or company located at an airport providing aviation services. Sometimes further defined as a "full service" FBO or a limited service. Full service FBOs typically provide a broad range of services (flight instruction, aircraft rental, charter, fueling, repair, etc.) where a limited service FBO provides only one or two services (such as fueling, flight instruction or repair).

Fixed Wing - A plane with one or more "fixed wings," as opposed to a helicopter that utilizes a rotary wing.

Flexible Pavement – Typically constructed with an asphalt surface course and one or more layers of base and subbase courses that rest on a subgrade layer.

Flight Service Station (**FSS) –** FAA or contracted service for pilots to contact (on the ground or in the air) to get weather and airport information. Flight plans are also filed with the FSS.

General Aviation (GA) - All civil (non-military) aviation operations other than scheduled air services and non-scheduled air transport operations for hire.

Glide Slope (GS) – For precision instrument approaches, such as an instrument landing system (ILS), the component that provides electronic vertical guidance to aircraft.

Global Positioning System (GPS) - GPS is a system of navigating which uses multiple satellites to establish the location and altitude of an aircraft with a high degree of accuracy. GPS supports both enroute flight and instrument approach procedures.

Helicopter Landing Pad (Helipad) – A designated landing area for rotor wing aircraft. Requires protected FAR Part 77 imaginary surfaces, as defined for heliports (FAR Part 77.29).

Helicopter Parking Area – A designated area for rotor wing aircraft parking that is typically accessed via hover-taxi or ground taxiing from a designated landing area (e.g., helipad or runway-taxiway system). If not used as a designated landing area, helicopter parking pads do not require dedicated FAR Part 77 imaginary surfaces.

Heliport – A designated helicopter landing facility (as defined by FAR Part 77).

Height Above Airport (HAA) – The height of the published minimum descent altitude (MDA) above the published airport elevation. This is normally published in conjunction with circling minimums.

High Intensity Runway Lights (HIRL) - High intensity (i.e., very bright) lights are used on instrument runways to help pilots to see the runway when visibility is poor.

High Speed (Taxiway) Exit – An acute-angled exit taxiway extending from a runway to an adjacent parallel taxiway which allows landing aircraft to exit the runway at a higher rate of speed than is possible with standard (90-degree) exit taxiways.

Hold Line (Aircraft Hold Line) – Pavement markings located on taxiways that connect to runways, indicating where aircraft should stop before entering runway environment. At controlled airports, air traffic control clearance is required to proceed beyond a hold line. At uncontrolled airports, pilots are responsible for ensuring that a runway is clear prior to accessing for takeoff.

Hold/Holding Procedure – A defined maneuver in controlled airspace that allows aircraft to circle above a fixed point (often over a navigational aid or GPS waypoint) and altitude while awaiting further clearance from air traffic control.

Home Built Aircraft - An aircraft built by an amateur from a kit or specific design (not an FAA certified factory built aircraft). The aircraft built under the supervision of an FAA-licensed mechanic and are certified by FAA as "Experimental."

Horizontal Surface - One of the FAR Part 77 Imaginary (invisible) Surfaces. The horizontal surface is an imaginary flat surface 150 feet above the established airport elevation (typically the highest point on the airfield). Its perimeter is constructed by swinging arcs (circles) from each runway end and connecting the arcs with straight lines. The oval-shaped horizontal surface connects to other Part 77 surfaces extending upward from the runway and also beyond its perimeter.

Initial Approach Point/Fix (IAP/IAF) – For instrument approaches, a designated point where an aircraft may begin the approach procedure.

Instrument Approach Procedure (IAP) – A series of defined maneuvers designed to enable the safe transition between enroute instrument flight and landing under instrument flight conditions at a particular airport or heliport. IAPs define specific requirements for aircraft altitude, course, and missed approach procedures. See precision or non-precision instrument approach.

Instrument Flight Rules (IFR) - IFR refers to the set of rules pilots must follow when they are flying in bad weather. Pilots are required to follow these rules when operating in controlled airspace with visibility (ability to see in front of themselves) of less than three miles and/or ceiling (a layer of clouds) lower than 1,000 feet.

Instrument Landing System (ILS) - An ILS is an electronic navigational aid system that guides aircraft for a landing in bad weather. Classified as a precision instrument approach, it is designed to provide a precise approach path for course alignment and vertical descent of aircraft. Generally consists of a localizer, glide slope, outer marker, and middle marker. ILS runways are generally equipped with an approach lighting system (ALS) to maximize approach capabilities. A Category I ILS allows aircraft to descend as low as 200 feet above runway elevation with ½ mile visibility.

Instrument Meteorological Conditions (IMC) - Meteorological conditions expressed in terms of visibility, distance from clouds, and ceiling less than minima specified for visual meteorological conditions.

Instrument Runway - A runway equipped with electronic navigational aids that accommodate straight-in precision or non-precision instrument approaches.

Itinerant Operation - All aircraft operations at an airport other than local, i.e., flights that come in from another airport.

Jet Fuel – Highly refined grade of kerosene used by turbine engine aircraft. Jet-A is currently the common commercial grade of jet fuel.

Knot (Nautical Mile) – one nautical mile = 1.152 statute miles.

Landing Area - That part of the movement area intended for the landing and takeoff of aircraft.

Landing Distance Available (LDA) – The length of runway which is available and suitable for the ground run of an airplane landing.

Landside – The portion of an airport that includes aircraft parking areas, fueling, hangars, airport terminal area facilities, vehicle parking and other associated facilities.

Larger than Utility Runway – As defined under FAR Part 77, a runway designed and constructed to serve large planes (aircraft with maximum takeoff weights greater than 12,500 pounds).

Ldn – Noise measurement metric (see DNL).

Left Traffic – A term used to describe which side of a runway the airport traffic pattern is located. Left traffic indicates that the runway will be to the pilot's left when in the traffic pattern. Left traffic is standard unless otherwise noted in facility directories at a particular airport.

Large Aircraft - An aircraft with a maximum takeoff weight more than 12,500 lbs.

Light Sport Aircraft (LSA) – A basic aircraft certified by FAA that can be flown by pilots with limited flight training (Sport Pilot certificates), but also provide lower cost access to basic aircraft for all pilot levels. LSA design limits include maximum a gross takeoff weight of 1,320 pounds (land planes) and a maximum of two seats.

Local Area Augmentation System (LAAS) – GPS-based instrument approach that utilizes ground-based systems to augment satellite coverage to provide vertical (glideslope) and horizontal (course) guidance.

Local Operation - Aircraft operation in the traffic pattern or within sight of the tower, or aircraft known to be departing or arriving from flight in local practice areas, or aircraft executing practice instrument approaches at the airport.

Localizer – The component of an instrument landing system (ILS) that provides electronic lateral (course) guidance to aircraft. Also used to support non-precision localizer approaches.

LORAN C - A navigation system using land based radio signals, which indicates position and ground speed, but not elevation. (See GPS)

Localizer Performance with Vertical Guidance (LPV) – Satellite navigation (SATNAV) based GPS approaches providing "near category I" precision approach capabilities with course and vertical guidance. LPV approaches are expected to eventually replace traditional step- down, VOR and NDB procedures by providing a constant, ILS glideslope-like descent path. LPV approaches use high-accuracy WAAS signals, which allow narrower glideslope and approach centerline obstacle clearance areas.

Magnetic Declination – Also called magnetic variation, is the angle between magnetic north and true north. Declination is considered positive east of true north and negative when west. Magnetic declination changes over time and with location. Runway end numbers, which reflect the magnetic heading/alignment (within 5 degrees +/-) occasionally require change due to declination.

MALSR - **M**edium-intensity **A**pproach **L**ighting **S**ystem with **R**unway alignment indicator lights. An approach lighting system (ALS) which provides visual guidance to landing aircraft.

Medevac - Fixed wing or rotor-wing aircraft used to transport critical medical patients. These aircraft are equipped to provide life support during transport.

Medium Intensity Runway Lights (MIRL) - Runway edge lights which are not as intense as HIRLs (high intensity runway lights). Typical at medium and smaller airports which do not have sophisticated instrument landing systems.

Microwave Landing System (MLS) - An instrument landing system operating in the microwave spectrum, which provides lateral and vertical guidance to aircraft with compatible equipment. Originally developed as the “next-generation” replacement for the ILS, the FAA discontinued the MLS program in favor of GPS-based systems.

Minimum Descent Altitude (MDA) – The lowest altitude in a non-precision instrument approach that an aircraft may descend without establishing visual contact with the runway or airport environment.

Minimums - Weather condition requirements established for a particular operation or type of operation.

Missed Approach Procedure – A prescribed maneuver conducted by a pilot when an instrument approach cannot be completed to a landing. Usually requires aircraft to climb from the airport environment to a specific holding location where another approach can be executed or the aircraft can divert to another airport.

Missed Approach Point (MAP) – The defined location in a non-precision instrument approach where the procedure must be terminated if the pilot has not visually established the runway or airport environment.

Movement Area - The runways, taxiways and other areas of the airport used for taxiing, takeoff and landing of aircraft, i.e., for aircraft movement.

MSL - Elevation above Mean Sea Level.

National Plan of Integrated Airport Systems (NPIAS). The NPIAS is the federal airport classification system that includes public use airports that meet specific eligibility and activity criteria. A “NPIAS designation” is required for an airport to be eligible to receive FAA funding for airport projects.

Navigational Aid (Navaid) - Any visual or electronic device that helps a pilot navigate. Can be for use to land at an airport or for traveling from point A to point B.

Noise Contours – Continuous lines of equal noise level usually drawn around a noise source, such as runway, highway or railway. The lines are generally plotted in 5-decibel increments, with higher noise levels located nearer the noise source, and lesser exposure levels extending away from the source.

Non-directional Beacon (NDB) - Non-Directional Beacon which transmits a signal on which a pilot may "home" using equipment installed in the aircraft.

Non-Precision Instrument (NPI) Approach - A non-precision instrument approach provides horizontal (course) guidance to pilots for landing. NPI approaches often involve a series of “step down” sequences where aircraft descend in increments (based on terrain clearance), rather than following a continuous glide path. The pilot is responsible for maintaining altitude control between approach segments since no "vertical" guidance is provided.

Obstacle Clearance Surface (OCS) – As defined by FAA, an approach surface that is used in conjunction with alternative threshold siting/clearing criteria to mitigate obstructions within runway approach surfaces. Dimensions, slope and placement depend on runway type and approach capabilities. Also known as Obstacle Clearance Approach (OCA).

Obstruction - An object (tree, house, road, phone pole, etc.) that penetrates an imaginary surface described in FAR Part 77.

Obstruction Chart (OC) - A chart that depicts surveyed obstructions that penetrate an FAR Part 77 imaginary surface surrounding an airport. OC charts are developed by the National Ocean Service (NOS) based on a comprehensive survey that provides detailed location (latitude/longitude coordinates) and elevation data in addition to critical airfield data.

Parallel Taxiway – A taxiway that is aligned parallel to a runway, with connecting taxiways to allow efficient movement of aircraft between the runway and taxiway. The parallel taxiway effectively separates taxiing aircraft from arriving and departing aircraft located on the runway. Used to increase runway capacity and improve safety.

Passenger Facility Charge (PFC) – A user fee charged by commercial service airports for enplaning passengers. Airports must apply to the FAA and meet certain requirements in order to impose a PFC.

Pavement Condition Index (PCI) – A scale of 0-100 that is used to rate airfield pavements ranging from failed to excellent based on visual inspection. Future PCIs can be predicted based on pavement type, age, condition and use as part of a pavement maintenance program.

Pavement Strength or Weight Bearing Capacity – The design limits of airfield pavement expressed in maximum aircraft weight for specific and landing gear configurations (i.e., single wheel, dual wheel, etc.) Small general aviation airport pavements are typically designed to accommodate aircraft weighing up to 12,500 pounds with a single-wheel landing gear.

Portland Cement Concrete (PCC) – Rigid pavement used for airfield facilities (runways, taxiways, aircraft parking, helipads, etc.).

Precision Approach Path Indicator (PAPI) - A system of lights located by the approach end of a runway that provides visual approach slope guidance to aircraft during approach to landing. The lights typically show green if a pilot is on the correct flight path, and turn red of a pilot is too low.

Precision Instrument Runway (PIR) - A runway equipped with a "precision" instrument approach (descent and course guidance), which allows aircraft to land in bad weather.

Precision Instrument Approach – An instrument approach that provides electronic lateral (course) and vertical (descent) guidance to a runway end. A non-precision instrument approach typically provides only course guidance and the pilot is responsible for managing defined altitude assignments at designated points within the approach.

Primary Runway - That runway which provides the best wind coverage, etc., and receives the most usage at the airport.

Primary Surface - One of the FAR Part 77 Imaginary Surfaces, the primary surface is centered on top of the runway and extends 200 feet beyond each end. The width is from 250' to 1,000' wide depending upon the type of airplanes using the runway.

Principal Fire Extinguishing Agent – Fire extinguishing agents that provide permanent control of fire through a fire-smothering foam blanket. Examples include protein foam, aqueous film forming foam and fluoroprotein foam.

Procedure Turn (PT) - A maneuver in which a turn is made away from a designated track followed by a turn in an opposite direction to permit an aircraft to intercept the track in the opposite direction (usually inbound).

Area Navigation (RNAV) - is a method of instrument flight navigation that allows an aircraft to choose a course within a network of navigation beacons rather than navigating directly to and from the beacons. Originally developed in the 1960, RNAV elements are now being integrated into GPS-based navigation.

Relocated Threshold – A runway threshold (takeoff and landing point) that is located at a point other than the (original) runway end. Usually provided to mitigate nonstandard runway safety area (RSA) dimensions beyond a runway end. When a runway threshold is relocated, the published length of the runway is reduced and the pavement between the relocated threshold and to the original end of the runway is not available for aircraft takeoff or landing. This pavement is typically marked as taxiway, marked as unusable, or is removed.

Required Navigation Performance (RNP) – A type of performance-based navigation system that that allows an aircraft to fly a specific path between two 3-dimensionally defined points in space. RNP approaches require on-board performance monitoring and alerting. RNP also refers to the level of performance required for a specific procedure or a specific block of airspace. For example, an RNP of .3 means the aircraft navigation system must be able to calculate its position to within a circle with a radius of 3 tenths of a nautical mile. RNP approaches have been designed with RNP values down to .1, which allow aircraft to follow precise 3 dimensional curved flight paths through congested airspace, around noise sensitive areas, or through difficult terrain.

Rigid Pavement – Typically constructed of Portland cement concrete (PCC), consisting of a slab placed on a prepared layer of imported materials.

Rotorcraft - A helicopter.

Runway – A defined area intended to accommodate aircraft takeoff and landing. Runways may be paved (asphalt or concrete) or unpaved (gravel, turf, dirt, etc.), depending on use. Water runways are defined takeoff and landing areas for use by seaplanes.

Runway Bearing – The angle of a runway centerline expressed in degrees (east or west) relative to true north.

Runway Design Code (RDC) – The RDC is comprised of the AAC, ADG, and approach visibility minimums of a particular runway. The RDC provides the information needed to determine applicable design standards. The AAC is based on aircraft approach speed. The ADG is based on either the aircraft wingspan or tail height; (whichever is most restrictive) of the largest aircraft expected to operate on the runway and taxiways adjacent to the runway. The approach visibility minimums represent RVR values in feet of 1,200, 1,600, 2,400, 4,000, and 5,000 (corresponding to lower than 1/4 mile, lower than 1/2 mile but not lower than 1/4 mile, lower than 3/4 mile but not lower than 1/2 mile, lower than 1 mile but not lower than 3/4 mile, and not lower than 1 mile, respectively).

Runway Designation Numbers – Numbers painted on the ends of a runway indicating runway orientation (in degrees) relative to magnetic north. “20” = 200 degrees magnetic, which means that the final approach for Runway 20 is approximately 200 degrees (+/- 5 degrees).

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Runway End Identifier Lights (**REILs**) - Two high-intensity sequenced strobe lights that help pilots identify a runway end during landing in darkness or poor visibility.

Runway Object Free Area (OFA) – A defined area surrounding a runway that should be free of any obstructions that could in interfere with aircraft operations. The dimensions for the OFA increase for runways accommodating larger or faster aircraft.

Runway Protection Zone (RPZ) – A trapezoid-shaped area located beyond the end of a runway that is intended to be clear of people or built items. The geometry of the RPZ often coincides with the inner portion of the runway approach surface. However, unlike the approach surface, the RPZ is a defined area on the ground that does not have a vertical slope component for obstruction clearance. The size of the RPZ increases as runway approach capabilities or aircraft approach speeds increase. Previously defined as “clear zone.”

Runway Safety Area (RSA) – A symmetrical ground area extending along the sides and beyond the ends of a runway that is intended to accommodate inadvertent aircraft passage without causing damage. The dimensions for the RSA increase for runways accommodating larger or faster aircraft. FAA standards include surface condition (compaction, etc.) and absence of obstructions. Any items that must be located within an RSA because of their function (runway lights, airfield signage, wind cones, etc.) must be frangible (breakable) to avoid significant aircraft damage.

Segmented Circle - A system of visual indicators designed to show a pilot in the air the direction of the traffic pattern at that airport.

Small Aircraft - An aircraft that weighs 12,500 lbs. or less.

Straight-In Approach – An instrument approach that directs aircraft to a specific runway end.

Statute Mile – 5,280 feet (a nautical mile = 6,080 feet).

Stop and Go – An aircraft operation where the aircraft lands and comes to a full stop on the runway before takeoff is initiated.

T-Hangar – A rectangular aircraft storage hangar with several interlocking "T" units that minimizes - building per storage unit. Usually two-sided with either bi-fold or sliding doors.

Takeoff Distance Available (TODA) – the length of the takeoff run available plus the length of clearway, if available.

Takeoff Run Available (TORA) – the length of runway available and suitable for the ground run of aircraft when taking off.

Taxilane – A defined path used by aircraft to move within aircraft parking apron, hangar areas and other landside facilities.

Taxiway – A defined path used by aircraft to move from one point to another on an airport.

Threshold – The beginning of that portion of a runway that is useable for landing.

Taxiway Design Group (TDG) – The TDG is based on the undercarriage dimensions of the aircraft. TDG is used to determine taxiway/taxilane width and fillet standards, and in some instances, runway to taxiway and taxiway/taxilane separation requirements.

Threshold Lights – Components of runway edge lighting system located at the ends of runways and at displaced thresholds. Threshold lights typically have split lenses (green/red) that identify the beginning and ends of usable runway.

Through-the-Fence – Term used to describe how off-airport aviation users (private airparks, hangars, etc.) access an airport “through-the-fence,” rather than having facilities located on airport property.

Tiedown - A place where an aircraft is parked and "tied down." Surface can be grass, gravel or paved. Tiedown anchors may be permanently installed or temporary.

Touch and Go – An aircraft operation involving a landing followed by a takeoff without the aircraft coming to a full stop or exiting the runway.

Traffic Pattern - The flow of traffic that is prescribed for aircraft landing and taking off from an airport. Traffic patterns are typically rectangular in shape, with upwind, crosswind, base and downwind legs and a final approach surrounding a runway.

Traffic Pattern Altitude - The established altitude for a runway traffic pattern, typically 800 to 1,000 feet above ground level (AGL).

Transitional Surfaces - One of the FAR Part 77 Imaginary Surfaces, the transitional surface extend outward and upward at right angles to the runway centerline and the extended runway centerline at a slope of 7:1 from the sides of the primary surface and from the sides of the approach surfaces.

Universal Communications (UNICOM) is an air-ground communication facility operated by a private agency to provide advisory service at uncontrolled airports.

Utility Runway – As defined under FAR Part 77, a runway designed and constructed to serve small planes (aircraft with maximum takeoff weights of 12,500 pounds or less).

Vertical Navigation (VNAV) – Vertical navigation descent data or descent path, typically associated with published GPS instrument approaches. The use of any VNAV approach technique requires operator approval, certified VNAV-capable avionics, and flight crew training.

VOR - Very High Frequency Omnidirectional Range – A ground based electronic navigational aid that transmits radials in all directions in the VHF frequency spectrum. The VOR provides azimuth guidance to aircraft by reception of radio signals.

VORTAC – VOR collocated with ultra-high frequency tactical air navigation (TACAN).

Visual Approach Slope Indicator (VASI) - A system of lights located by the approach end of a runway which provides visual approach slope guidance to aircraft during approach to landing. The lights typically show some combination of green and white if a pilot is on the correct flight path, and turn red of a pilot is too low.

Visual Flight Rules (VFR) - Rules that govern the procedures to conducting flight under visual conditions. The term is also used in the US to indicate weather conditions that are equal to or greater than minimum VFR requirements. In addition, it is used by pilots and controllers to indicate type of flight plan.

Visual Guidance Indicator (VGI) – Equipment designed to provide visual guidance for pilots for landing through the use of different color light beams. Visual Approach Slope Indicators (VASI) and Precision Approach Path Indicators (PAPI) defined above are examples.

Waypoint – A specified geographical location used to define an area navigation route or the flight path of an aircraft employing area navigation.

Wide Area Augmentation System (WAAS) – GPS-based instrument approach that can provide both vertical (glideslope) and horizontal (course) guidance. WAAS-GPS approaches are able to provide approach minimums nearly comparable to a Category I Instrument Landing System (ILS).

Wind Rose - A diagram that depicts observed wind data direction and speed on a 360-degree compass rose. Existing or planned proposed runway alignments are overlain to determine wind coverage levels based on the crosswind limits of the design aircraft.

Wind Cone – A device located near landing areas used by pilots to verify wind direction and velocity. Usually manufactured with brightly colored fabric and may be lighted for nighttime visibility. Also referred to as “wind sock.”

LIST OF ABBREVIATIONS

AC – Advisory Circular

AC – Asphaltic Concrete

ACM – Airport Certification Manual

ADG – Airplane Design Group

ADO – Airport District Office

AGL – Above Ground Level

AIP – Airport Improvement Program

ALP – Airport Layout Plan

ALS – Approach Lighting System

AOA – Airport Operations Area

APL – Aircraft Parking Line

APRC – Approach Reference Code

ARC – Airport Reference Code

ARFF – Aircraft Rescue and Fire Fighting

ARP - Airport Reference Point

ASDA – Accelerate-Stop Distance Available

ASV – Annual Service Volume

ATC –Air Traffic Control

ATCT – Airport Traffic Control Tower

ASOS – Automated Surface Observation System

AWOS – Automated Weather Observation System

BRL – Building Restriction Line

CFR – Code of Federal Regulations

CTAF – Common Traffic Advisory Frequency

DPRC – Departure Reference Code

DME – Distance Measuring Equipment

FAA – Federal Aviation Administration

FAR – Federal Air Regulation

FBO – Fixed Base Operator

GIS – Geographic Information System

GS – Glide Slope

GPS – Global Positioning System

HIRL – High Intensity Runway Lighting

IFR – Instrument Flight Rules

ILS – Instrument Landing System

IMC – Instrument Meteorological Conditions

LDA – Landing Distance Available

LDA - Localizer Directional Aid

LIRL – Low Intensity Runway Lighting

LOC – Localizer

MALSR – Medium Intensity Approach Lighting System (MALS) with Runway Alignment Indicator Lights (RAIL)

MIRL – Medium Intensity Runway Lighting

MITL - Medium Intensity Taxiway Lighting

MTOW – Maximum Takeoff Weight

NAVAID – Navigation Aid

NDB – Non-Directional Beacon

NEPA – National Environmental Policy Act

NGS – National Geodetic Survey

NPIAS – National Plan of Integrated Airport Systems

OCS – Obstacle Clearance Surface

ODALS – Omnidirectional Airport Lighting System

OFA – Object Free Area

OFZ – Obstacle Free Zone

PAPI – Precision Approach Path Indicator

PCC – Portland Cement Concrete

PCI – Pavement Condition Index

PCN – Pavement Condition Number

POFZ – Precision Obstacle Free Zone

RAIL – Runway Alignment Indicator Lights

RDC – Runway Design Code

REIL – Runway End Identifier Lights

RNAV – Area Navigation

ROFA – Runway Object Free Area

ROFZ – Runway Obstacle Free Zone

RPZ – Runway Protection Zone

RSA – Runway Safety Area

RVR – Runway Visual Range

RVZ – Runway Visibility Zone

TDG – Taxiway Deign Group

TSA- Taxiway Safety Area

TSA – Transportation Security Administration

TODA – Takeoff Distance Available

TOFA – Taxiway/Taxilane Object Free Area

TORA – Takeoff Run Available

TSS – Threshold Siting Surface

TVOR – Terminal Very High Frequency Omni-directional Range

UAS – Unmanned Aircraft Systems

UGA – Urban Growth Area

UGB – Urban Growth Boundary

LIST OF ABBREVIATIONS

UHF – Ultra-High Frequency

USDA – United States Department of Agriculture

USGS – U. S. Geological Survey

UNICOM – Universal Communications

VASI – Visual Approach Slope Indicator

VFR – Visual Flight Rules

VGI - Visual Guidance Indicators

VOR – Very High Frequency Omni-Directional Range

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