CHAPTER 4 -
FACILITY REQUIREMENTS

This chapter focuses on facility requirements and recommendations to accommodate the forecasted level of demand at Salem-Willamette ValleyAirport (SLE or Airport). The recommendations reflect the analysis of demand from the aviation activity forecasts presented in *Chapter 3 - Aviation Activity Forecasts*. Airport facilities are generally divided into airside and landside facilities. Airside facilities include runways, taxiways, navigation aids, required clear areas, aircraft parking and aprons, air cargo, support facilities and hangar areas. Terminal and landside facilities include the passenger terminal, other building areas (non-aeronautical), roads, security, automobile access, and other airport property outside of aircraft movement areas.

Airport facility planning is largely driven by a combination of criteria and standards developed by the Federal Aviation Administration (FAA) that emphasize safety and efficiency while protecting federal investment in airport transportation infrastructure, demand for services, and the airport operator's vision of its aviation and community roles. This chapter is organized into the following sections:

- Airfield System Capacity
- Airport Design Standards
- Runway Length Analysis
- Aeronautical Facilities – Airside
- Aeronautical Facilities – Landside
- Electric Aircraft Facilities and Airspace
- Passenger Terminal Facilities
- Non-Aeronautical Facilities
- Summary

These recommendations and requirements are developed in coordination with SLE management, stakeholders, and guidance from the FAA. FAA guidance includes Advisory Circulars (AC) 150/5070-6B, *Airport Master Plans*; AC 150/5300-13B, *Airport Design*; and AC 150/5060-5, *Airport Capacity and Delay*. The FAA is responsible for the overall safety of civil aviation in the United States; therefore, FAA design standards and policy focus first on safety, with secondary goals including efficiency and utility.

AIRFIELD SYSTEM CAPACITY

This section provides details of each analysis done to calculate the annual service volume (ASV), capacity, and delay at SLE for the planning period of 2021 to 2041.

Airfield Demand and Capacity Analysis

The airfield demand / capacity analysis evaluates the ability of the airfield to handle the expected number of aircraft operations. Consideration is given to annual and peak demand.

Analysis of Annual Service Volume (ASV)

The Airport's ASV and hourly capacity are calculated using the methodology the FAA documented in AC 150/5060-5, *Airport Capacity and Delay*. Calculation in this method requires the mix index and runway-use configuration. The mix index is an equation (C+3D) that determines the percentage of aircraft operations that have a MTOW of over 12,500 pounds. C represents the percent of aircraft over 12,500 pounds but under 300,000 pounds. D represents the percent of aircraft over 300,000 pounds. Data was downloaded from the Traffic Flow Management System Counts (TFMSC) to determine weight categories for operations based on MTOW. **Table 4-1** shows the summary of data from the TFMSC.

Table 4-1: **Operation Weight Categories**

Weight Category (MTOW)	Total Operations	Percent of Operations
Operations <12,500 pounds	3,311	60.7%
C (≥12,500 pounds, ≤ 300,000 pounds)	2,145	39.3%
D (>300,000 pounds)	0	0%
Total Operations	5,456	100%

Source: SLE January to December 2021 TFMSC Operations Data

Based on operations data from TFMSC, 39.3 percent of operations fell within weight category C. This percentage of operations represents the 2021 base year mix index for SLE and was used to determine the ASV. While operations data from TFMSC does not equal the total operations for SLE for 2021, the data provides insight into the larger and heavier aircraft that operate at SLE. The ASV mix calculation is shown in **Table 4-2.**

Table 4-2: **2021 ASV Mix Index Calculations**

Annual Service Volume Factors	Total Operations	Percent of Operations
Operations <12,500 pounds	26,267	60.7%
C (≥12,500 pounds, ≤ 300,000 pounds)	17,006	39.3%
D (>300,000 pounds)	0	0%
Total Operations	43,273	100%
Mix Index (C+3D)	17,006	39.3%

Source: SLE 2021 Operations Data

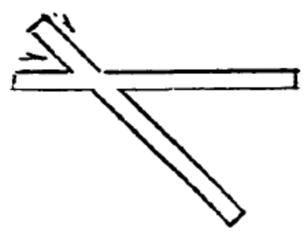
TFMSC data was extrapolated out to equal the 2021 base year operations forecast. Out of the 17,006 operations, the types of operations and totals for each can be broken out into the following categories:

- Eight Air Carrier Operations (SLE Forecast Summary)
- 3,305 Air Taxi Operations (SLE Forecast Summary)
- 13,693 General Aviation Operations (Remaining operations after accounting for Air Carrier and Air Taxi)

With the mix index calculated, the runway-use configuration can be determined from *AC 150/5060-5*. The proper runway-use configuration to use for SLE is configuration 9, the configuration of intersecting runways. Using the mix index and configuration 9, the hourly capacity for operations per hour, and ASV can be determined. **Figure 4-1** shows the runway-use configuration.

Figure 4-1: Runway Use Configuration 9

9.



0 to 20	98	59	230,000
21 to 50	77	**57**	200,000
51 to 80	77	56	**215,000**
81 to 120	76	59	**225,000**
121 to 180	72	60	265,000

Source: AC 150/5060-5, Figure 2-1

The mix index of 39.3 percent falls into the 21 to 50 percent mix index category. This results in the following from runway-use configuration 9:

- Hourly Capacity of 77 VFR Operations Per Hour
- Hourly Capacity 57 IFR Operations Per Hour
- ASV of 200,000 Operations Per Year

When determining if the existing mix index should remain the same for the 2041 forecast year, the increase in the types of operations must be evaluated. From 2021 to 2041, the following operations increase:

- Air Carrier operations increase from 8 to 2,704 operations, a change of 2,696 operations.
- Air Taxi operations increase from 3,305 to 7,521 operations, a change of 4,216 operations.
- Itinerant GA operations increase from 21,723 to 25,069 operations, a change of 3,346 operations.
- Local GA operations increase from 15,575 to 20,511 operations, a change of 4,936 operations.

Due to the increase in operations, the existing mix index is not applicable to 2041. To determine the 2041 mix index, all air carrier and air taxi operations will continue to be counted as Category C aircraft, and the same percentage of GA operations from 2021 that fell into Category C will be used for the mix index calculation. Out of the 37,298 GA operations in 2021, 13,693 GA operations fell into Category C. The GA operations that fall into Category C made up 36.7 percent of all GA operations. The 2041 forecast has a total of 45,580 GA operations, and 36.7 percent of those operations equates to 16,728 GA operations that will be accounted for in the mix index calculation for Category C aircraft. The following are the total operations used in determining the 2041 mix index.

- 2,704 Air Carrier Operations
- 7,521 Air Taxi Operations
- 16,728 GA Operations
- 26,953 Total Category C Operations

Out of the total 59,115 operations in 2041, only 26,953 operations fall into Category C. This equates to 45.9 percent of operations as there are no operations that will fall into Category D. This means that the 2041 mix index will fall within the 21 to 50 percent category. The future ASV, VFR hourly capacity, and IFR hourly capacity will remain the same for SLE for the same runway-use configuration.

There are two assumptions for ASV based on runway-use configurations. The assumptions are:

- IFR Weather Conditions
- Runway-use Configuration

IFR Weather Conditions: IFR weather conditions occur roughly 10 percent of the time. **Table 4-3** shows wind data observation totals for SLE. Based on wind observation totals, IFR conditions occur 8.1 percent of the time. This satisfies this assumption.

Table 4-3: SLE Wind Observations

Weather Conditions	Total Observations	Percent of Observations
All Weather	123,964	52.6%
IFR	19,035	8.1%
VFR	92,454	39.3%
Total Observations	235,453	100%

Source: ADIP, SLE Wind Observations 2013 - 2022

Runway-use Configuration: Roughly 80 percent of the time the airport is operated with the runway-use configuration which produces the greatest hourly capacity. Aircraft operate on both runways annually and there is no information for runway closures that would change the runway-use configuration for SLE to be below 80 percent of the time. The future runway-use configuration will operate as configuration 9 and is not expected to fall below 80 percent. This satisfies this assumption.

With both assumptions satisfied, the existing and future ASV based on runway-use Configuration 9 is accurate for SLE.

Analysis of Capacity

As mentioned in the previous section, the existing condition of SLE falls into runway-use configuration 9, resulting in hourly capacities of 77 VFR operations per hour, and 57 IFR operations per hour. To confirm that these hourly capacities are accurate for SLE, six capacity assumptions from *AC 150/5060-5* need to be evaluated. These six assumptions are:

- Runway-use Configuration
- Percent Arrivals
- Percent Touch and Go's
- Taxiways
- Airspace Limitations
- Runway Instrumentation

Runway-use Configuration: The configuration for SLE will remain as number 9.

Percent Arrivals: There have been no major closures at SLE that could result in the percent of arrivals not equaling the percent of departures. SLE also has a large inventory of based aircraft with the forecast showing a growth in based aircraft. Based aircraft will contribute to local operations. We can assume that these factors will equate to arrivals equaling departures.

Percent Touch and Go's: There were a total of 15,575 local GA operations for SLE in 2021 and this segment of operations is forecasted to increase to 20,511 operations in 2041. All local operations are assumed to be touch and go operations. Touch and go operations make up approximately 36 percent of operations in 2021 and approximately 35 percent of operations in 2041. Touch and Go operations for 2021 to 2041 fall within the 0 to 40 percent range for the 21 to 50 percent mix index category. This data is valid for the assumptions specified in the capacity calculation method used in *AC 150/5060-5.*

Taxiways: Runways 13/31 and 16/34 do not have full length parallel taxiways but each runway has portions of parallel taxiways that provide aircraft with entrances and exits to each runway. Runways are not used for back taxiing operations. SLE has an ATCT that directs aircraft movement on the airfield.

Airspace Limitations: There are no airspace limitations, and there is no curfew in effect at SLE. The presence of an ATC at SLE further enhances the airspace around the Airport.

Runway Instrumentation: The FAA specifies aircraft separation criteria and operational procedures based on aircraft size, availability of radar in the terminal area, availability of instrument procedures, and the presence of an ATCT. The presence of these facilities and procedures improves airfield capacity as traffic can be managed more efficiently. Runway 13/31 is equipped with an Instrument Landing System (ILS), and SLE has an ATCT. The ATCT that operates between the hours of 7 A.M. to 9 P.M.

With each of the six assumptions satisfied, the hourly capacities based on Runway-use Configuration 9 are appropriate for SLE.

Recommendations

SLE is currently operating at 21.6 percent of its annual capacity. SLE is forecasted to handle 59,115 operations in 2041. If the future condition of SLE falls into runway-use configuration 9 (intersecting dual runways), the increase in operations will result in SLE operating at 29.6 percent of annual capacity. No major airfield change will be required for airport capacity purposes.

Analysis of Delay

Per *AC 150/5060 5*, delay is the difference between constrained and unconstrained operating time. As total operations increase, the amount of capacity left at an airport decreases and individual aircraft delay increases. The FAA recommends that planning for additional airfield capacity should start when annual demand reaches 60 percent of the ASV, and construction of additional airfield capacity should begin at 80 percent of ASV. To determine delay, the following information is needed:

- Annual Demand
- Ratio of Annual Demand to ASV
- Average Delay Per Aircraft

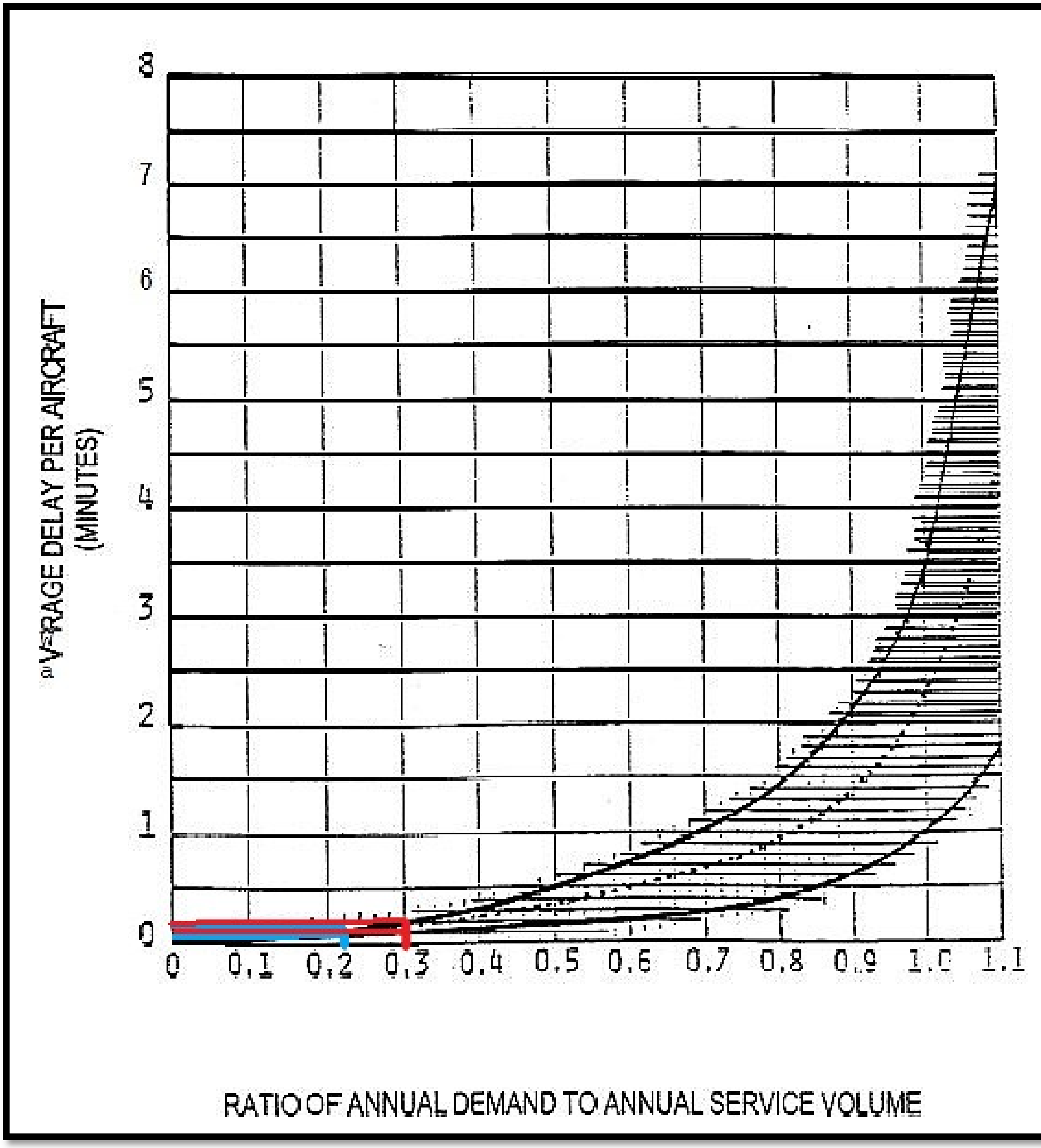
Annual Demand: There were 43,273 operations in 2021, and operations are forecasted to increase to 59,115 annual operations in 2041.

Ratio of Annual Demand to ASV: The existing ASV for SLE is 200,000 annual operations. This results in the ratio of annual demand to ASV to be 0.22 for 2021. If the future runway-use configuration is 9 (see **Figure 4-1:**), the future ASV for SLE is 200,000 annual operations and the ratio of annual demand to ASV will be 0.30 for 2041.

Average Delay Per Aircraft: The ratios for annual demand to ASV for 2021 and 2041 are used to determine average delay per aircraft using *AC 150/5060-5*. **Figure 4-1:** shows the average delay per aircraft graph. The full band of the curve is used for SLE because most operations are GA. The average delay per aircraft in minutes for 2021 is 0.05 on the low band, and 0.1 on the high band. The average delay per aircraft in minutes for 2041 is 0.05 on the low band, and 0.2 on the high band for Runway-use Configuration 9.

Using the previous information, the annual delay for SLE can be calculated. **Table 4-4** lists the breakdown of annual delay at SLE for 2021 and 2041.

Figure 4-2: **Average Delay Per Aircraft**



Source: AC 150/5060 5, Figure 2-2 Average Delay Per Aircraft for Long Range Planning

Note: Base Year 2021 (Blue), Forecast Year 2041 for both runway-use configurations 9 and 1 (Red)

Table 4-4: **SLE Annual Delay**

Year	Average Delay Per Aircraft (Minutes)		Annual Delay (Minutes)	
	Low	High	Low	High
2021	0.05	0.1	2,164	4,327
2041*	0.05	0.2	2,956	11,823

Source: SLE 2021 Operations Data

Note*: Represents data for both runway-use configurations 9 and 1.

Recommendations

All airports experience delay, and delay increases as total operations increase. There are no recommendations for major airfield improvements to increase capacity at SLE because the ratios of annual demand to ASV are under 60 percent for 2021 and 2041 for runway-use configuration 9 (existing). 60 percent is used as a guide for planning and is a target for capacity improvements. Therefore, there are no recommendations to reduce delay as the range of delay is at acceptable levels for the planning period.

Flight Procedures

Existing instrument procedure capabilities are described in *Chapter 1*. No additional improvements have been identified as necessary.

Runway 16/34 Justification

There are two elements to analyze for Runway 16/34 justification, these are capacity and crosswind component. The first element for analysis is capacity. As previously stated in the Analysis of Capacity section, the ASV for SLE is 200,000 annual operations. SLE currently operates at 21.6 percent of ASV and will operate at approximately 30 percent of ASV in 2041 under runway-use configuration 9. There are no recommendations for major airfield improvements for capacity because SLE has enough capacity to handle forecasted operations. There is no justification for Runway 16/34 based on capacity.

The second element for crosswind runway justification is the crosswind component. Per *AC 150/5300-13B*, the desirable wind coverage for a runway is 95 percent of the time based on the total number of weather observations during the recording period of at least ten consecutive years. Primary runways are generally oriented to favor the prevailing wind, minimizing challenges associated with crosswinds. Small, light aircraft are more affected by crosswinds than larger, heavier ones. The existing allowable crosswind component for SLE is 13 knots, which is based on a RDC of B-II to reflect the existing critical aircraft at SLE identified in **Table 4-7**. The future allowable crosswind component for SLE is 16 knots, which is based on a RDC of C-III to reflect the future critical aircraft. **Table 4-5** shows the crosswind component percentages at SLE.

Table 4-5: **SLE Crosswind Component Percentages**

All Weather				
Runway	**Crosswind Components (knots)**			
	10.5	**13**	**16**	**20**
13/31	97.17%	98.96%	99.82%	99.97%
16/34	98.59%	99.31%	99.90%	99.99%
Combined	99.20%	99.72%	99.96%	100.00%
IFR				
Runway	**Crosswind Components (knots)**			
	10.5	**13**	**16**	**20**
13/31	98.92%	99.59%	99.93%	99.98%
16/34	99.63%	99.81%	99.97%	100.00%
Combined	99.71%	99.89%	99.98%	100.00%
VFR				
Runway	**Crosswind Components (knots)**			
	10.5	**13**	**16**	**20**
13/31	96.83%	98.84%	99.81%	99.97%
16/34	98.39%	99.22%	99.89%	99.99%
Combined	99.11%	99.69%	99.96%	100.00%

Source: ADIP, SLE Wind Observations 2013 – 2022

Legacy Crosswind Runway Justification

Based on FAA Memorandum *Reauthorization Program Guidance Letter (R-PGL) 25-01: Runway Projects*, there is potential for Runway 16/34 to be considered a legacy crosswind runway. The designation of a legacy crosswind runway is a new AIP runway type that establishes eligibility for an existing runway previously funded to function as a crosswind runway. The existing runway cannot be parallel to the primary runway, when the primary runway achieves greater than 95 percent wind coverage. There are three criteria for an existing runway to be considered a legacy runway. These criteria are:

- The primary runway alone has greater than 95 percent all weather wind coverage per AC 150/5300-13.
- Justification is limited to a single Legacy Crosswind Runway at an airport. However, if an airport already has a Crosswind Runway, then a Legacy Crosswind Runway is not justified.
- The Legacy Crosswind Runway must have received AIP funding for construction, rehabilitation, or reconstruction in prior fiscal years to be justified under this provision.

The Reauthorization Program Letter also provides guidance on future development of a runway that gains the Legacy Crosswind designation. Per the Reauthorization Program Letter:

- If the ADO determines a Legacy Crosswind Runway is eligible and justified, then typical development associated with a justified runway is also eligible per the project level justification criteria in the AIP Handbook. This includes associated runway safety areas, parallel and exit taxiways, navigation lighting, signage and markings, and obstruction removal associated with the runway. Seal coats and joint resealing *are also eligible on Legacy Crosswind Runways at non-hub airports. For a rehabilitation project, the ADO may fund to current dimensions, or lesser right-sized dimensions, as permitted by the AIP Handbook in Table 3-17. For a reconstruction project, the maximum RDC for a Legacy Crosswind Runway is A-I/B-I. Runway length is determined via the critical aircraft per AC*

150/5325-4. The airport sponsor may use local funding to exceed standards and develop the runway to a higher RDC or longer runway length. Work done under this provision must be to current design standards for the critical aircraft. If the Legacy Crosswind Runway is shown on the approved ALP that was based on outdated standards, then the ALP must first be updated to show that the development will be to standards in AC 150/5300-13 and other applicable ACs.

Runway 16/34 meets the three legacy crosswind criteria as follows:

- Runway 13/31 meets the greater than 95 percent all weather wind coverage;
- Runway 16/34 will be the Airport's only Legacy Crosswind Runway. The airport does not currently have a classified crosswind runway; and
- Runway 16/34 has received AIP funding in previous years for pavement rehabilitation (AIP 6-41-0055-06-1978) and (AIP 3-41-0055-010-2002), and lighting/signs/electrical (3-41-0055-018-2013).

Recommendations

There is no justification for Runway 16/34 on wind coverage or capacity, however, Runway 16/34 meets the criteria to be classified as a Legacy Crosswind Runway. If Runway 16/34 is officially designated under the Legacy Crosswind Runway classification., it will be eligible for funding up to the A-I/B-I design standard. A pavement rehabilitation project would be eligible up to the current dimensions, however for a full reconstruction project, the maximum design standard is A-I/B-1. For a reconstruction project, the Airport would be responsible for self-funding in total any additional width and length above the A-I/B-I standards.

AIRPORT DESIGN STANDARDS

Design standards, which are presented in ACs, heavily influence the planning and design of airport facilities. AC 5300-13B, *Airport Design,* uses a coding system to determine standards for designing airports based on the operational and physical characteristics of the aircraft that operate or are expected to operate at an airport. For evaluating the airfield, the critical aircraft is used which is based upon the aircraft that regularly use an airport and is identified as a combination of the Aircraft Approach Category (AAC), which is based on aircraft approach speed, and Airplane Design Group (ADG), which is based on the wingspan and tail height.

The Runway Visual Range (RVR) adds a third component to the Runway Design Code (RDC) based on runway approach visibility minimums. The RDC, which is the FAA classification for the airfield design, determines the scale and setbacks of airfield facilities based on the design aircraft. RDC coding classifications are shown in **Table 4-6**.

Table 4-6: **Runway Design Code Designations**

Aircraft Approach Category (AAC)		
AAC	**Approach Speed**	
A	Approach Speed less than 91 knots	
B	Approach speed 91 knots or more but less than 121 knots	
C	Approach speed 121 knots or more but less than 141 knots	
D	Approach speed 141 knots or more but less than 166 knots	
E	Approach speed 166 knots or more	
Airplane Design Group		
Group Number	**Wingspan (in feet)**	**Tail Height (in feet)**
I	< 49’	< 20’
II	49’ - < 79’	20’ - < 30’
III	79’ - < 118’	30’ - < 45’
IV	118’ - < 171’	45’ - < 60’
V	171’ - < 214’	60’ - < 66’
VI	214’ - < 262’	66’ - < 80’
Approach Visibility Minimums		
RVR (Feet)	**Flight Visibility Category (statute miles)**	
VIS	Runways designed for visual approach use only	
5,000	Not lower than 1 mile	
4,000	Lower than 1 mile but not lower than ¾ mile	
2,400	Lower than ¾ mile but not lower than ½ mile	
1,600	Lower than ½ mile but not lower than ¼ mile	
1,200	Lower than ¼ mile	

Source: FAA Advisory Circular 150/5300-13B

Critical Aircraft

The existing and future critical aircraft from the forecast are shown in **Table 4-7** below. Runway 13/31 is currently serving routine operations by Boeing 737-700 aircraft operated by Avelo Airlines, with their initiation of air service in October 2023. Accordingly, the primary runway and its associated taxiway infrastructure will be planned for C-III and Taxiway Design Group 3 (TDG 3) requirements.

Table 4-7: **Summary of Critical Aircraft by Runway**

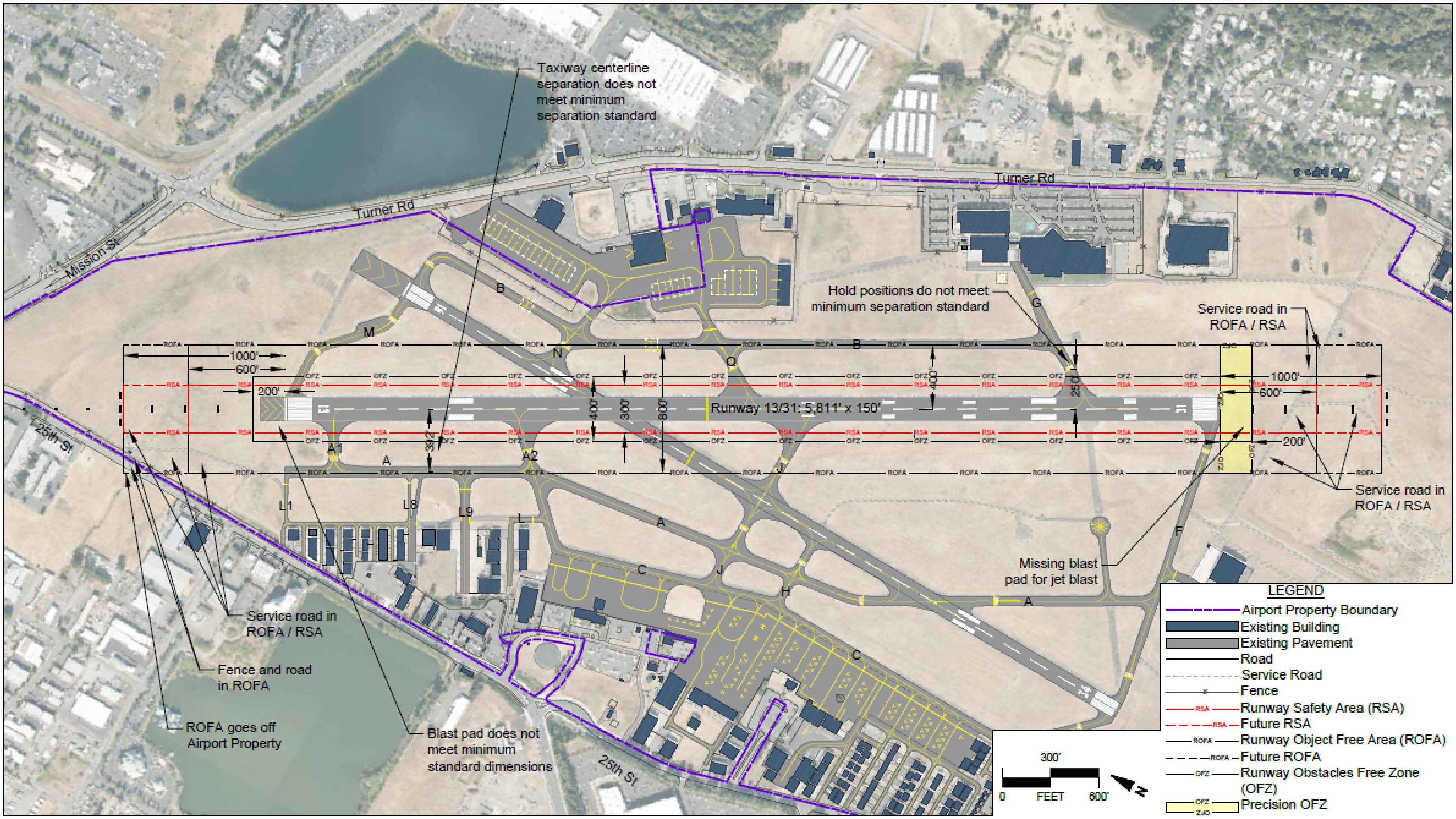
Runway	Existing Critical Aircraft		Future Critical Aircraft	
	RDC	Representative Aircraft	RDC	Representative Aircraft
13/31	B-II	Cessna Citation II/V, Embraer Phenom 300, Beech King Air 90	C-III	Boeing 737-700, -800
16/34	B-II	Cessna Citation II/V, Embraer Phenom 300, Beech King Air 90	B-II	Cessna Citation II/V, Embraer Phenom 300, Beech King Air 90

Source: Mead & Hunt analysis of TFMSC data.

RUNWAY 13/31 DESIGN STANDARDS

Runway design standards include Runway Safety Areas (RSAs), Runway Object Free Areas (ROFAs), Runway Obstacle Free Zones (ROFZs), Runway Protection Zones (RPZs), and setback distances for taxiways and other airport facilities. Runway length has additional design criteria and will be assessed in a separate section of this chapter. **Table 4-8** reports how Runway 13/31's existing condition compares to that which is required for the future critical aircraft associated with C-III requirements.

Figure 4-3: **Runway 13/31 Surfaces That Require Mitigation**



Source: Mead & Hunt, 2023

Table 4-8: Future Runway 13/31 Design Standards Compliance

Runway Design	FAA Standards C-III[1,2,3]	Existing Runway 13/31 13	Existing Runway 13/31 31
Runway Width	150'	150'	
Shoulder Width	25'	10'	
Blast Pad Width	200' / 200’	150’	None
Blast Pad Length	200' / 200’	150’	None
Runway Protection			
Runway Safety Area (RSA)			
Length Beyond Departure End	1,000'	600'	
Length Prior to Threshold	600'	600'	
Width	500'	300'	
Runway Object Free Area (ROFA)			
Length Beyond Departure End	1,000'	600'	
Length Prior to Threshold	600'	600’	
Width	800'	800'	
Runway Obstacle Free Zone (ROFZ)			
Length Beyond End	200’	200’	
Width	400’	400’	
Precision Obstacle Free Zone (POFZ)			
Length	200'	not applicable	200’
Width	800'	not applicable	800’
Approach Runway Protection Zone (RPZ)			
Length	1,700’ / 2,500’	1,700’	2,500’
Inner Width	1,000’ / 1,000’	1,000’	1,000’
Outer Width	1,510’ / 1,750’	1,510’	1,750’
Departure RPZ			
Length	1,700’ / 1,700’	1,000’	1,000’
Inner Width	500’ / 500’	500’	500’
Outer Width	1,010’ / 1,010’	700’	700’
Runway Separation, Runway Centerline to:			
Holding Position	252'	250'	250'
Parallel Taxiway	400'	392’ (Taxiway A)	
Aircraft Parking Area	N/A	N/A	

Highlighted cells do not meet FAA standards.

Note 1: Visibility Minimums for Runway 13, 3/4-mile; for Runway 31, 1/2 mile.

Note 2: The 737-700 variations have a Maximum Takeoff Weight (MTOW) greater than 150,000 pounds. Footnote 12 from 13B for the C-III RDC states that airplanes with a maximum certificated takeoff weight greater than 150,000 pounds, the standard runway width is 150 feet, the shoulder width is 25 feet, and the runway blast pad width is 200 feet.

Note 3: The Airport is at minimum 200 feet above sea level. Footnote 8 from Table G-12 from AC 150/5300-13B for the C-III RDC states the separation for distance a holding position increases by 1 foot for each 100 feet above sea level.

Source: AC 150/5300-13B

Runway Design

Runway 13/31 is 150 feet wide and 5,811 feet long. In the current Airport Layout Plan (ALP), the future critical aircraft was identified as a B-III. Accordingly, past efforts had been made to comply with ADG III standards. As shown in **Table 4-8**, the following areas should be addressed:

- Runway shoulders and blast pads: the shoulders of the runway should be 25 feet wide and the blast pads for both ends should be 200 feet by 200 feet.
- Runway Safety Area: the RSA is currently 600 feet in length and should be 1,000 feet beyond the runway ends.
- Runway Object Free Area: coincidental with the RSA, the ROFA should also extend 1,000 feet from the runway ends.
- Departure Runway Protection Zone: the departure RPZ for both ends of the runway should be 1,700 feet in length and have an outer width of 1,010 feet.

Runway Safety Area

The FAA requires the RSA for runways with a C-III design classification to extend 1,000 feet beyond the departure end of the runway. The FAA also requires the RSA to extend a minimum length of 600 feet prior to the runway threshold and have a minimum width of 500 feet. The future RSA will encompass the vehicle service road, which should be planned for realignment.

Runway Object Free Area

AC 150/5300-13B, *Airport Design,* requires the ROFA for runways with a C-III design classification to extend 1,000 feet beyond the departure end of the runway. The FAA also requires the ROFA to extend a minimum length of 600 feet prior to the runway threshold and have a minimum width of 800 feet.

The future ROFA will have the following items inside of the boundaries:

- 25th Street
- Service Roads
- Fence
- Uncontrolled land (ROFA goes off Airport property)

Runway 13 End will need to shift 236 feet to prevent the ROFA penetrations.

Obstacle Free Zone

AC 150/5300-13B*, Airport Design,* requires the ROFZ to extend 200 feet beyond the runway end and measure 400 feet wide for a runway with large aircraft operations. Large aircraft operations are aircraft that weigh more than 12,500 pounds. The OFZ for Runway 13/31 meets these requirements and has no penetrations. The size of the ROFZ will remain the same in the future with the change in RDC.

Precision Obstacle Free Zone

AC 150/5300-13B*, Airport Design,* requires the POFZ to extend 200 feet beyond the runway end and measure 800 feet wide. The POFZ for Runway 31 meets these requirements and has no penetrations. The size of the POFZ will remain the same in the future with the change in RDC.

Runway Protection Zones

The RPZs for Runway 13/31 are shown in **Figure 4-1: and Figure 4-1: 5**. As shown, both RPZ have facilities (buildings and roads) within them that may not be compatible land use. No changes to the approach RPZs would be required. However, the departure RPZ for both runways would need to be lengthened and widened to meet the C-**III** standards reported in **Table 4-8**.

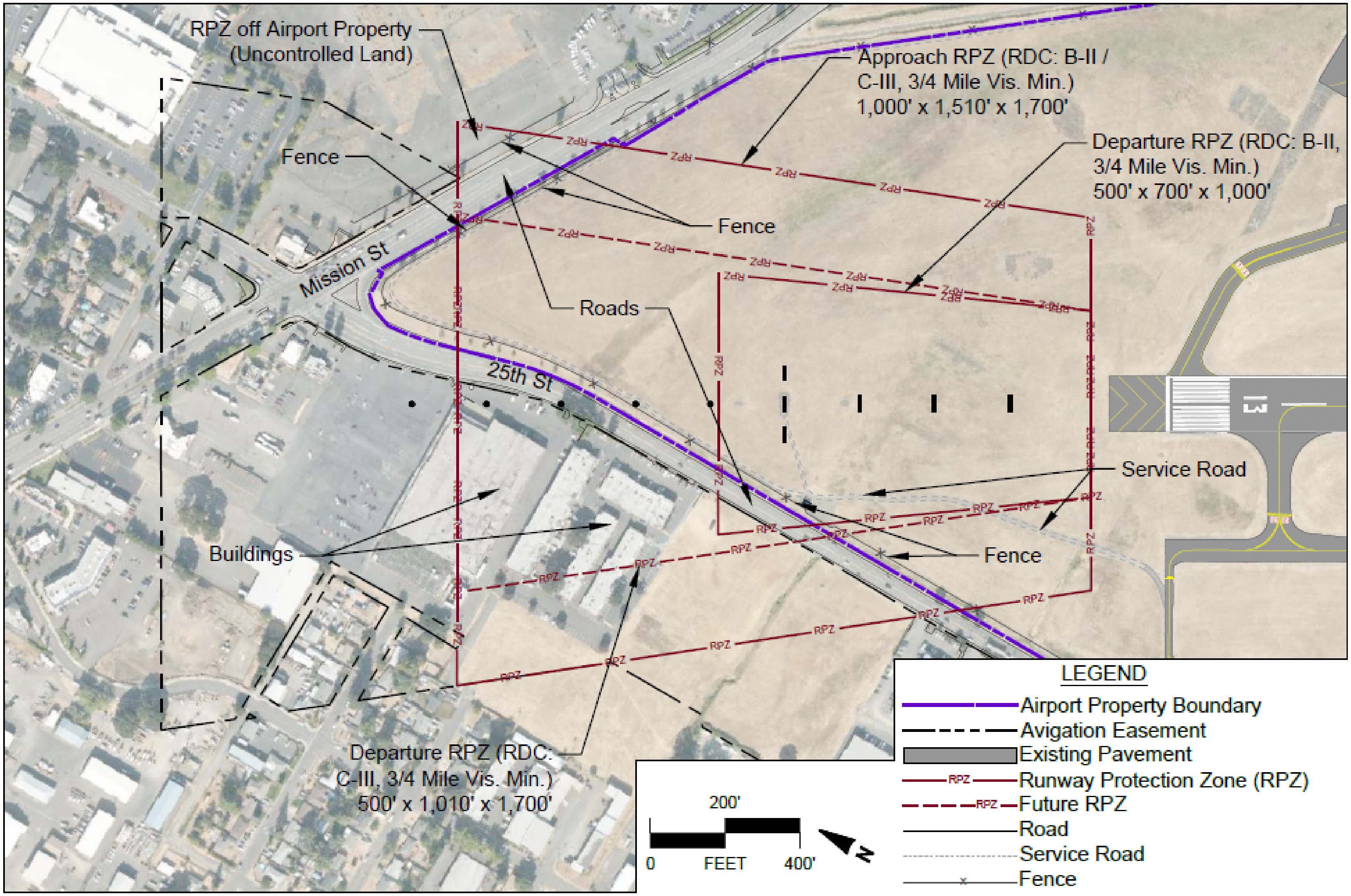
The Runway 13 RPZ has the following items inside of the boundaries:

- 25th Street
- Mission Street
- Airport Service Roads
- Fences

The Runway 31 RPZ has the following items inside of the boundaries:

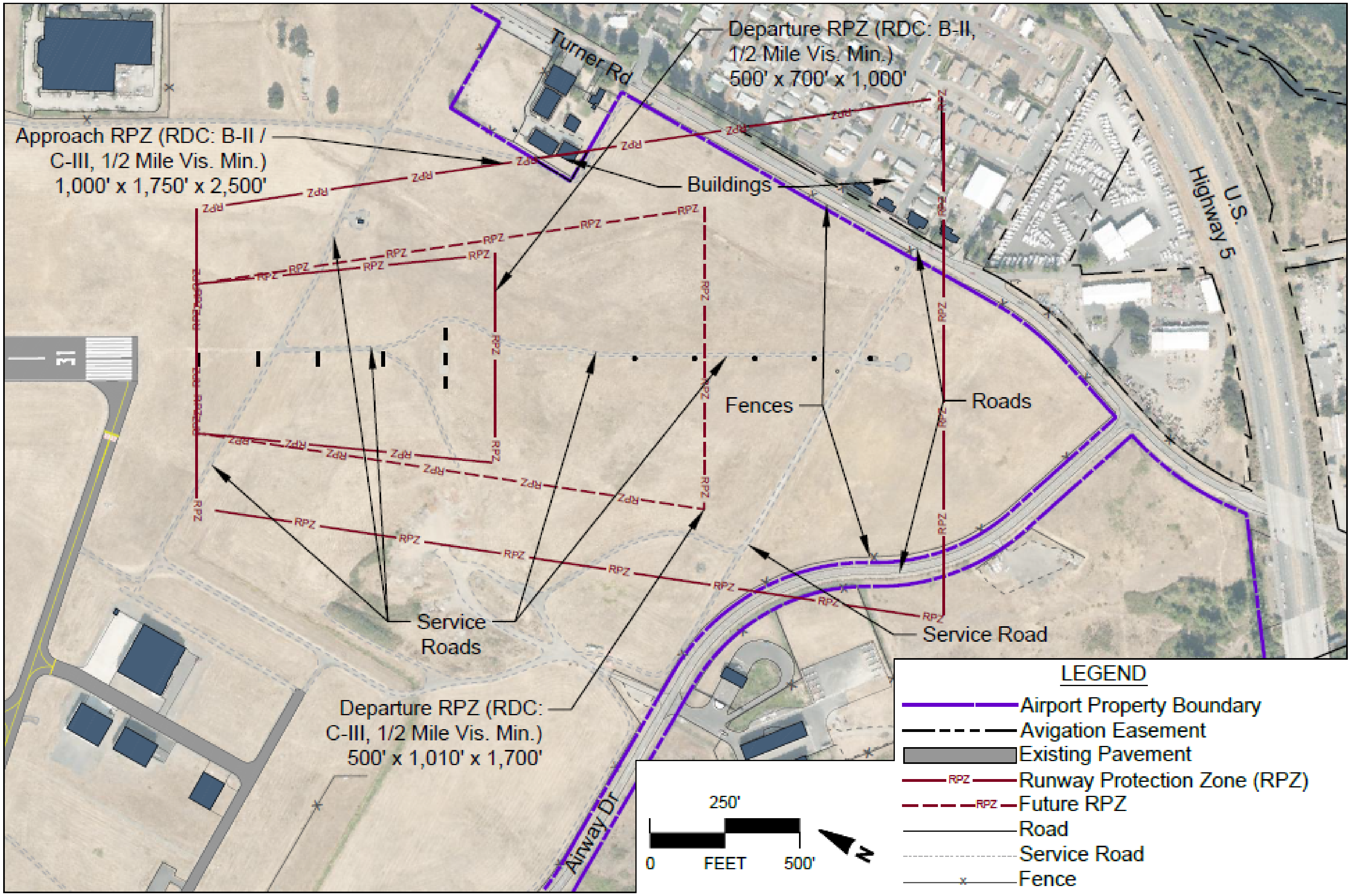
- Airway Drive
- Turner Road
- Airport Service Roads
- Fences

Figure 4-4: **Runway 13 RPZ**



Source: Mead & Hunt, 2023.

Figure 4-5: Runway 31 RPZ



Source: Mead & Hunt, 2023

Runway Separation from Taxiway Centerline

AC 150/5300-13B*, Airport Design,* requires the holding position for a C-III runway to measure at least 250 feet. Additionally, footnote 8 from Table G-12 in AC 13B requires a C-III runway to increase the holding position separation an additional 1 foot for every 100 feet above sea level that the Airport resides at. The Airport breaks 195.7 feet above sea level and an additional 2 feet is required for the holding position separation. Both runway ends have holding positions which are 250 feet away from the runway centerline and will need to shift the additional 2 feet to meet design standards. The parallel taxiway centerline separation from runway centerline separation increases to 400 feet for C-III. The runway centerline to the parallel Taxiway A is 392 feet, which is eight feet short of the 400-foot FAA requirement. A future shift in the parallel Taxiway A by eight feet will be required to meet standards.

Runway Designation

Runways designations are based on magnetic bearing. The magnetic bearing of a runway changes based on the magnetic declination at an airport reference point. This magnetic declination has an annual rate of change. The annual rate of change can be extrapolated to future years to determine when it is appropriate to change runway designations. A change in runway designations is appropriate when the magnetic bearing of a runway is closer to the next whole number that represents a magnetic heading. For SLE, the magnetic bearing for Runway 13/31 in 2023 is 135.23 degrees. Since the magnetic bearing for Runway 13/31 exceeds 135 degrees, it is appropriate to change the runway designation to 14/32 because numbers above 135 degrees are closer to 140 degrees. This represents the magnetic heading of 140 degrees, which is a runway designation of 14. The magnetic bearing for Runway 13/31 will continue to change over the planning period of this master plan and align closer to 14/32, meaning the runway designation can be updated now or in the future with another runway pavement project.

Recommendations

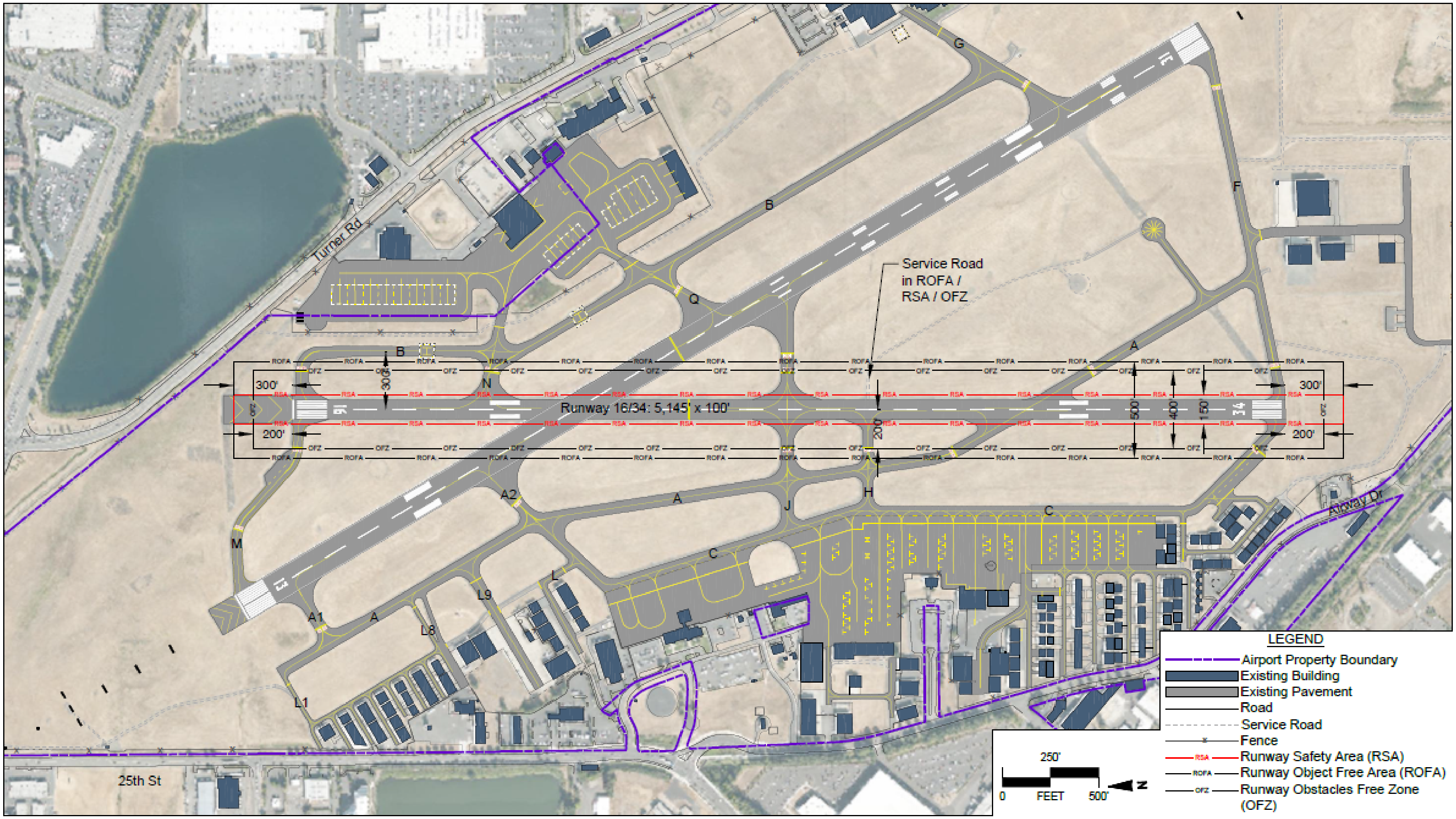
The following list provides recommendations for Runway 13/31.

- Maintain width of Runway 13/31 to preserve the ability of the Airport to handle any variation of the Boeing 737.
- Increase the sizes of the existing Runway 13 blast pad and runway shoulder widths to meet design standards.
- Add a blast pad to Runway 31 for future jet traffic.
- Shift Runway 13 by 236 feet to prevent any penetrations to the future ROFA.
- Shift holding positions parallel to Runway 13/31 from 250 feet to 252 feet to meet design standards.
- Shift Taxiway A by 8 feet to meet the 400-foot parallel taxiway centerline to runway centerline separation design standard.
- Relocate service roads out of RPZs or relocate service roads to feasible locations to maximize mitigation.
- Update runway designation to 14/32 during next runway pavement project or when feasible.
- If Runway 13/31 shifts or extends, acquire easements or property for RPZs that are off Airport property to help mitigate potentially uncontrolled land.

RUNWAY 16/34 DESIGN STANDARDS

Runway design standards include RSAs, ROFAs, ROFZs, RPZs, and setback distances for taxiways and other airport facilities. Runway length has additional design criteria and will be assessed in a separate section of this chapter. Design criteria for the existing and future standards of Runway 16/34 are shown in **Table 4-9**. **Figure 4-6** shows the surfaces for Runway 16/34 and areas requiring mitigation.

Figure 4-6: Runway 16/34 Surfaces Area That Require Mitigation



Source: Mead & Hunt, 2023

Table 4-9: **Runway 16/34 Design Standards Compliance**

Runway Design	FAA Standards		Runway 16/34	
	B-II[1]	A-I/B-I[1]	16	34
Runway Width	75'	60'	100'	
Shoulder Width	10'	10'	10'	
Blast Pad Width	95'	80'	145'	None
Blast Pad Length	150'	100'	353'	None
Runway Protection				
Runway Safety Area (RSA)				
Length Beyond Departure End	300'	240'	300'	
Length Prior to Threshold	300'	240'	300'	
Width	150'	120'	150'	
Runway Object Free Area (ROFA)				
Length Beyond Departure End	300'	240'	300'	
Length Prior to Threshold	300'	240'	300'	
Width	500'	400'	500'	
Runway Obstacle Free Zone (ROFZ)				
Length Beyond End	200'	200'	200'	
Width	400'	400'	400'	
Precision Obstacle Free Zone (POFZ)				
Length	200'	N/A	N/A	N/A
Width	800'	N/A	N/A	N/A
Approach Runway Protection Zone (RPZ)				
Length	1,000' / 1,000'	1,000' / 1,000'	1,000'	1,000'
Inner Width	500' / 500'	500' / 500'	500'	500'
Outer Width	700' / 700'	700' / 700'	700'	700'
Departure RPZ				
Length	1,000' / 1,000'	1,000' / 1,000'	1,000'	1,000'
Inner Width	500' / 500'	500' / 500'	500'	500'
Outer Width	700' / 700'	700' / 700'	700'	700'
Runway Separation, Runway Centerline to:				
Holding Position	200'	200'	200'	200'
Parallel Taxiway	240'	225'	300' (Taxiway B)	
Aircraft Parking Area	N/A	N/A	N/A	

Highlighted cells do not meet FAA standards.
Note 1: Visibility Minimums for Runway 16/34 are Visual.
Source: AC 150/5300-13B

Runway Design

Runway 16/34 is 100 feet wide, is 5,145 feet long, and is classified as B-II. This classification means the runway can accommodate an aircraft with a wingspan between 49 and 79 feet and tail height between 20 and less than 30 feet, with an approach speed between 91 and 121 knots. The FAA requires a runway width of 75 feet for B-II runways with visibility minimums that are visual. Runway shoulders with this design classification must be a minimum of 10 feet wide, and runway blast pads must be a minimum of 95 feet wide and 150 feet long for runway ends with visibility minimums set to visual. The shoulder width on Runway 16/34 measures 10 feet wide and meets the design standard. The Runway 16 blast pad measures 145 feet wide and 353 feet long. The Runway 16 blast pad exceeds the blast pad length standard by 203 feet and exceeds the blast pad width standard by 50 feet. There is no blast pad on Runway 34. Runway 16/34 is 25 feet wider than the minimum required width of a B-II runway.

Runway Safety Area and Runway Object Free Area

The RSA and ROFA standards are met for the existing and future conditions of Runway 16/34. No changes are required.

Obstacle Free Zone

The FAA requires the ROFZ to extend 200 feet beyond the runway end and measure 400 feet wide for a runway with large aircraft operations. Large aircraft operations are aircraft that weigh more than 12,500 pounds. The OFZ for Runway 16/34 meets these requirements and has no penetrations.

Runway Protection Zones

The FAA requires that the RPZ for a B-II runway with visual visibility minimums have an inner width of 500 feet, an outer width of 700 feet, and a length of 1,000 feet. The RPZs for both ends of Runway 16/34 meet design standards but have objects and roads that are inside the boundaries of each RPZ that are not standard. See **Figure 4-7 and Figure 4-8** for the Runway 16/34 RPZs.

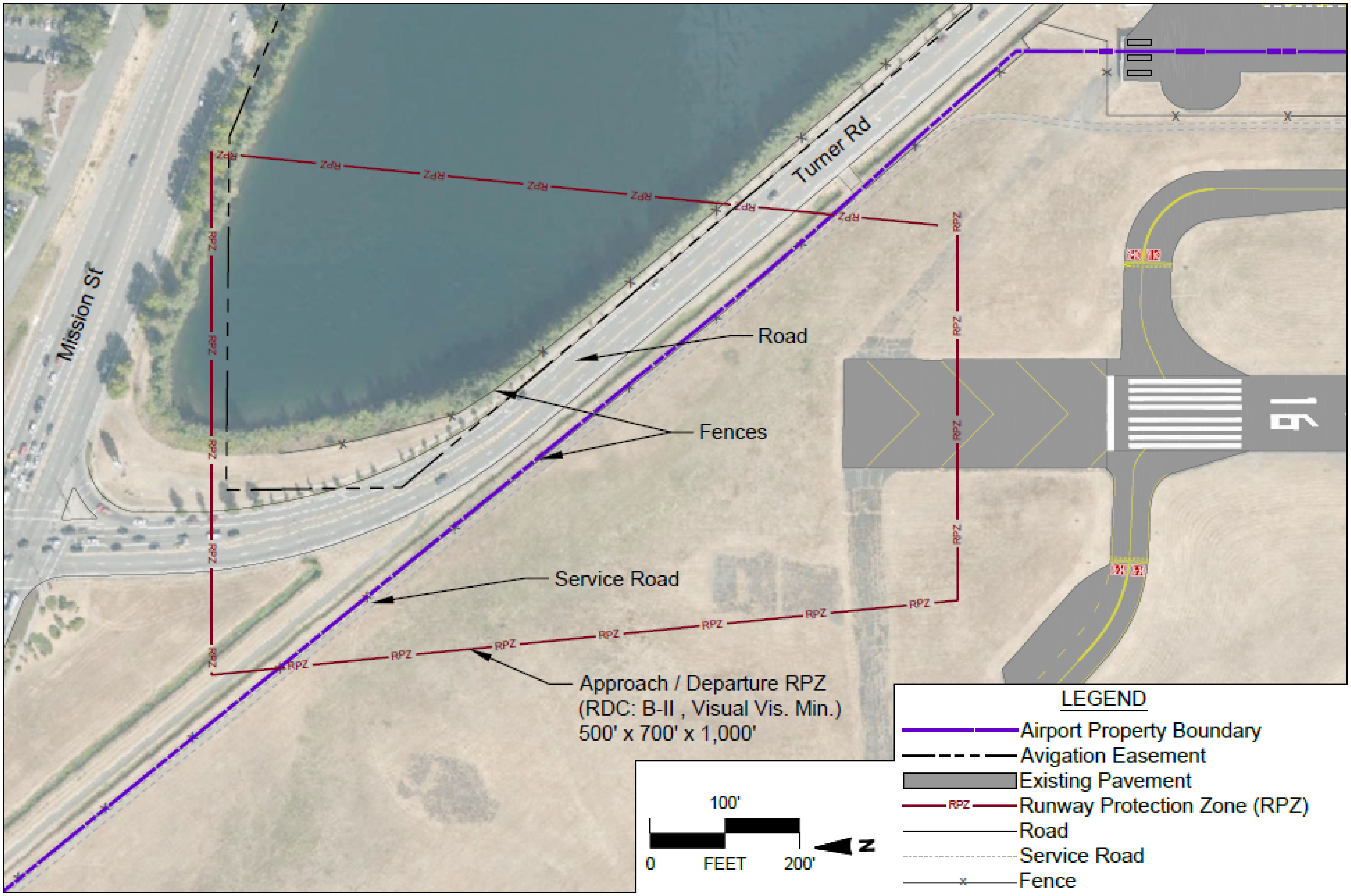
The Runway 16 RPZ has the following items inside of the boundaries:

- Turner Road
- Fences
- Airport service roads

The Runway 34 RPZ has the following items inside of the boundaries:

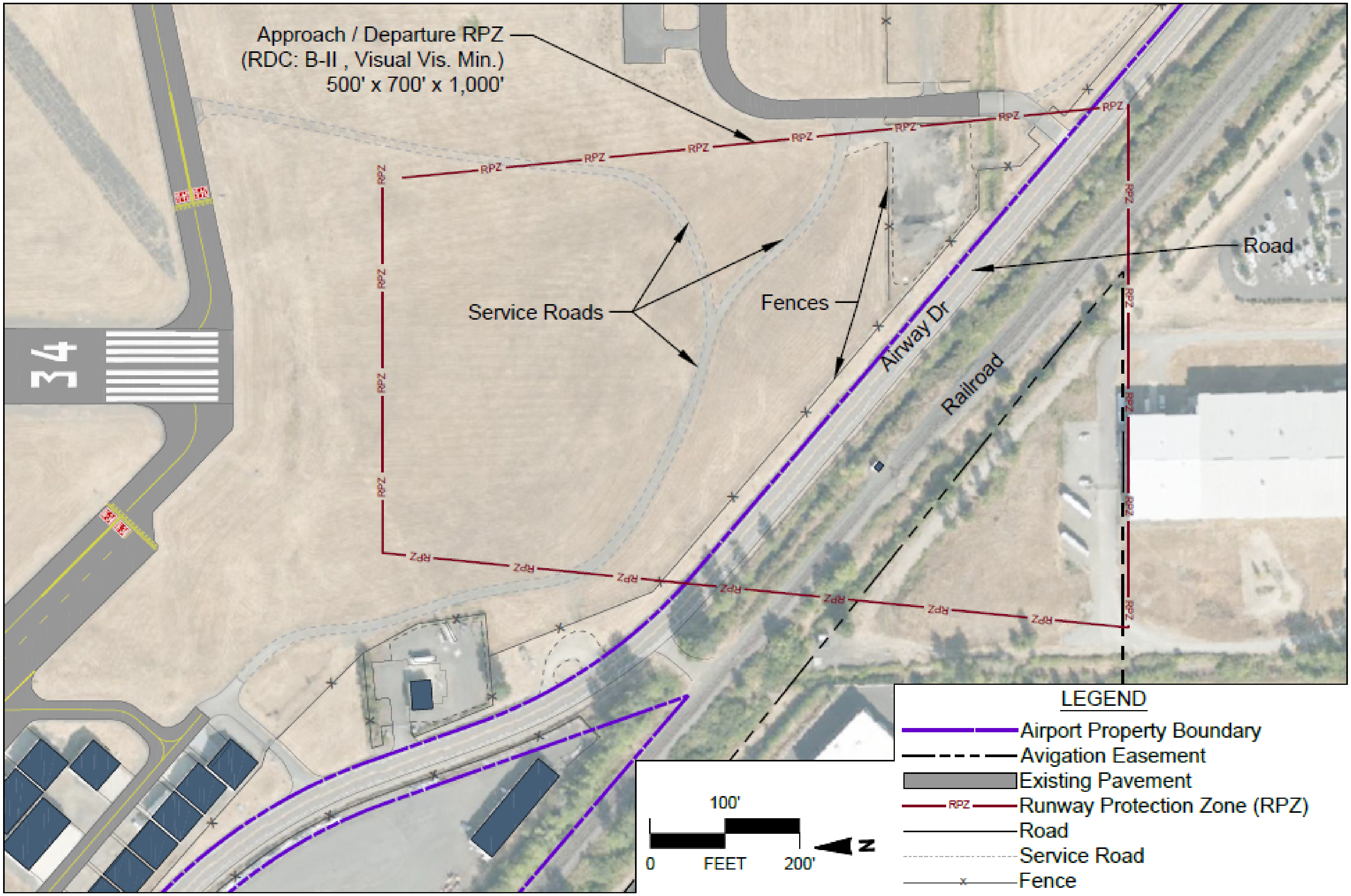
- Airway Drive
- Railroad
- Airport service roads
- Fences

Figure 4-7: Runway 16 RPZ



Source: Mead & Hunt, 2023

Figure 4-8: **Runway 34 RPZ**



Source: Mead & Hunt, 2023

Runway Separation from Taxiway Centerline

The FAA requires the holding position for a B-II runway with visual visibility minimums to measure at least 200 feet; both runway ends have holding positions which are 250 feet and therefore meet FAA requirements. Additionally, runway centerline to the parallel taxiway centerline separation is 300 feet for Taxiway B, which meets the FAA 240-foot requirement.

Runway Designation

The magnetic bearing for Runway 16/34 is 166.23 degrees. Since the magnetic bearing for Runway 16/34 exceeds 165 degrees, it is appropriate to change the runway designation to 17/35 because numbers above 165 degrees are closer to 170 degrees. This represents the magnetic heading of 170 degrees, which is a runway designation of 17. The magnetic bearing for Runway 16/34 will continue to change over the planning period of this master plan and align closer to 17/35, meaning the runway designation can be updated now or in the future with another runway pavement project.

Recommendations

Recommendations for Runway 16/34 are to reduce the width of the runway by 25 feet or analyze alternatives for Runway 16/34. If there is notable jet blast, the construction and implementation of a blast pad should be considered. The designation of Runway 16/34 will change to 17/35, and the marking update for the runway should occur during the next runway pavement project or when feasible.

Wind Coverage

Existing wind coverage is documented in *Chapter 1*. No additional improvements have been identified as necessary. There is no justification for a crosswind runway or secondary runway based on wind coverage.

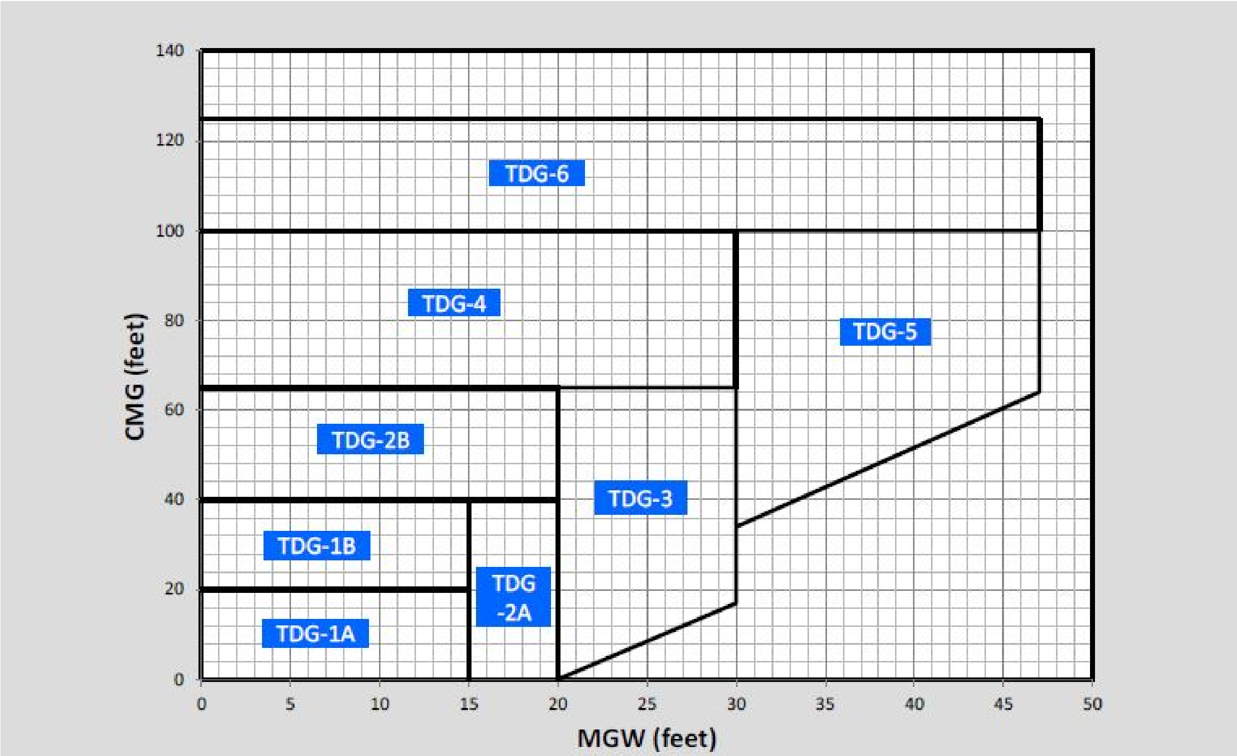
TAXIWAY DESIGN AND STANDARDS

AC 150/5300-13B provides taxiway design concepts and methodologies, described below. This section identifies taxiway system recommendations to meet expected demand and FAA standards.

Overview of Standards

The Taxiway Design Group (TDG) criteria is defined in *AC 150/5300-13B*. The TDG considers the dimensions of the aircraft landing gear to determine taxiway widths and pavement fillets to be provided at taxiway intersections. The width of the main gear and wheelbase (the distance from nose gear to main gear) defines the TDG classifications. The existing critical aircraft falls into TDG 1A and the future critical aircraft falls into TDG 3. TDG classifications are presented in **Figure 4-9.** TDG 1A and 3 standards are shown in **Table 4-10.**

Figure 4-9: **TDG Classifications**



Source: AC 150/5300-13B

Table 4-10: **TDG Standards**

Item	TDG							
	1A	1B	2A	2B	3	4	5	6
Taxiway/Taxilane Width[1]	25 ft (7.6 m)	25 ft (7.6 m)	35 ft (10.7 m)	35 ft (10.7 m)	50 ft (15.2 m)	50 ft (15.2 m)	75 ft (22.9 m)	75 ft (22.9 m)
Taxiway Edge Safety Margin	5 ft (1.5 m)	5 ft (1.5 m)	7.5 ft (2.3 m)	7.5 ft (2.3 m)	10 ft (3 m)	10 ft (3 m)	14 ft (4.3 m)	14 ft (4.3 m)
Taxiway Shoulder Width[2]	10 ft (3 m)	10 ft (3 m)	15 ft (4.6 m)	15 ft (4.6 m)	20 ft (6.1 m)	20 ft (6.1 m)	30 ft (9.1 m)	30 ft (9.1 m)
Taxiway/Taxilane Centerline to Parallel Taxiway/Taxilane Centerline w/180 Degree Turn	See **Table 4-1** and **Table 4-2**							

Source: AC 150/5300-13B

The existing airfield system has various TDG's due to some taxiways and taxilanes that serve or do not serve the existing critical aircraft and will not serve the future critical aircraft.

- All taxiways, with the exceptions of Taxiways C1, C2, L, L1, and L8 meet or exceed the 50-foot taxiway width for the future TDG 3 standard.

- Taxiways C1, C2, and L are all 25 to 32 feet wide, and are wide enough to accommodate the existing critical aircraft TDG of 1A and serve only aircraft in the same TDG, and there will be no change in the future for the types of aircraft using these taxiways.
- Taxiways L1 and L8 only serve aircraft that fall into TDG 1A. Taxiways L1 and L8 are only 20 feet wide and will need to expand by 5 feet each to meet TDG 1A taxiway design standard width of 25 feet.
- Taxiway A runs parallel to Runway 13/31 and meets the minimum runway centerline separation distance required for a B-II runway design. Taxiway A will need to be relocated 8 feet to meet the minimum 400 feet to comply with a C-III runway design.
- Taxiway B runs parallel to Runway 13/31 and already meets the minimum 400-foot separation standard for a C-III runway design. A portion of Taxiway B also runs parallel to Runway 16/34 and has a separation of 300 feet, meeting the design standards for B-II design.

Taxiway Standards

The Taxiway Object Free Area (TOFA) and Taxiway Safety Area (TSA) are defined in the criteria of *AC 150/5300-13B*. These areas should provide separation from the taxiway centerline to an object. Below are the design standards for ADG I, ADG II and ADG III taxiway surfaces.

- ADG I Taxiway: 89-foot TOFA, 49-foot TSA.
- ADG I Taxilane: 79-foot TOFA, 49-foot TSA.
- ADG II Taxiway: 124-foot TOFA, 79-foot TSA.
- ADG II Taxilane: 110-foot TOFA, 79-foot TSA.
- ADG III Taxiway: 171-foot TOFA, 118-foot TSA.
- ADG III Taxilane: 158-foot TOFA, 118-foot TSA.

Taxiways C1, C2, L, L1, and L8 have enough separation from the centerlines to serve only ADG I aircraft, and L9 has enough separation from the centerline to serve only ADG II aircraft or smaller. All other taxiways can serve the critical aircraft design groups of ADG II and III. Existing taxiway and taxilane surface penetrations include the following:

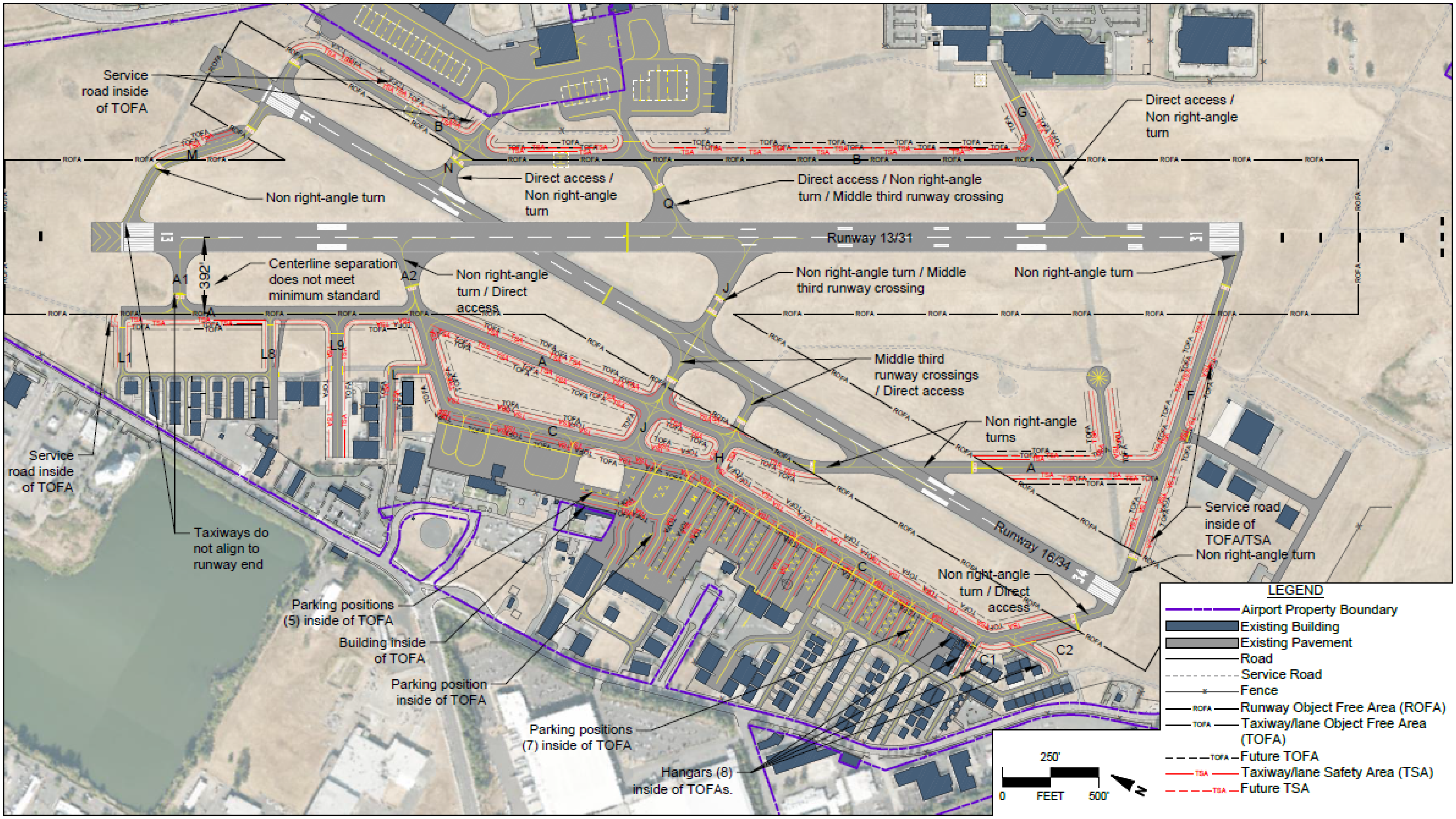
- 13 aircraft parking positions on the GA terminal apron penetrate apron taxilane TOFAs. The positions serve ADG I aircraft and ADG I TOFAs.
- One building inside of a taxilane TOFA that is south of the terminal building.
- Four hangars inside of the Taxiway C1 TOFA.
- Two hangars inside of the Taxiway C2 TOFA.
- Four areas where Vehicle Service Roads (VSR) are within TOFAs / TSAs.

Based on FAA requirements, vehicles may operate within the TOFA provided they give right away to oncoming aircraft by either maintaining a safe distance from the aircraft or by exiting the TOFA. All parking positions must also remain outside of TOFA and TSA surfaces. Future taxiway and taxilane surface penetrations include existing penetrations and the following:

- Two hangars inside the Taxiway C TOFA west of the Taxiway C connector to Runway 34.
- Additional area of a VSR inside of a TOFA.

Non-Standard Taxiway Conditions are portrayed in **Figure 4-10.**

Figure 4-10: **Non-Standard Taxiway Conditions**



Source: Mead & Hunt

Runway Crossings

Risk of error can be reduced by limiting runway crossings, especially within the middle third of runways. FAA guidance identifies the middle third of a runway as the place where pilots are least able to maneuver to avoid collision. Solutions to this situation will be evaluated in *Chapter 4.* Middle third runway crossings include the following:

- Taxiway Q connecting to Runway 13/31.
- Taxiway J connecting to Runways 13/31 and 16/34.
- Taxiway H connecting to Runway 16/34.

Visibility

Right-angle intersections provide the best visibility for a pilot. A right-angle turn clearly indicates the pilot is approaching a runway. Below is a list of taxiways that do not have right-angle intersections:

- Taxiway M connecting to Runway 13/31.
- Taxiway A2 connecting to Runway 13/31.
- Taxiway J connecting to Runway 16/34
- Taxiway A connecting two high speed exits from Runway 16/34.
- Taxiway C connecting to Runway 34 End.
- Taxiway F connecting to Runway 31 and 34 Ends.
- Taxiway G connecting to Runway 13/31.
- Taxiway Q connecting to Runway 13/31.
- Taxiway N connecting to Runway 16/34.

Direct Access

Taxiways should not lead directly from an apron to a runway without requiring a turn. Direct access from the apron to the runway may lead to runway incursions. The design could cause confusion to a pilot that normally would be expecting a parallel taxiway but instead encounters a runway. Below is a list of taxiways that provide direct access to a runway.

- Taxiway N connecting to Runway 13/31.
- Taxiway Q connecting to Runway 13/31.
- Taxiway G connecting to Runway 13/31.
- Taxiway H connecting to Runway 13/31.
- Taxiway J connecting to Runway 16/34.
- Taxiway A2 connecting to Runway 16/34.
- Taxiway C connecting to Runway End 34.

Taxiway A1 and Taxiway M Intersection

As previously identified, Taxiway M connects to Runway 13 End, but at a non-90-degree turn. Pilots crossing Runway 13 End will taxi to Taxiway A1 on the opposite side of Runway 13/31. Taxiway A1 is a standard 90-degree turn but does not connect to the physical end of Runway 13 like Taxiway M does. This requires pilots to taxi on Runway 13/31 to then be able to turn on to Taxiway A1. This is a nonstandard condition, and the taxiways need to align with Runway 13 End to prevent pilot confusion while taxiing.

Recommendations

Taxiway recommendations are below:

- All taxiways will meet ADG III taxiway standards for TOFAs and TSAs to provide clearance for commercial and jet GA aircraft. Taxiways that will not serve commercial, jet traffic, or the future critical aircraft will meet smaller standards that are appropriate for aircraft operating on identified taxiways. The smaller standards will include ADG I, II, and TDG 1A where appropriate.
- Middle third of runway – All taxiways identified as having middle third of runway intersections will be removed or relocated out of the middle third of the runways.
- Visibility – All taxiways identified as not having right angle turns will be updated to 90-degree turns with proper TDG fillets.
- Taxiway Surface Penetrations – Penetrations will be relocated out of surfaces, or other means of increasing separation will be evaluated. VSRs that penetrate TOFAs, and TSAs will be relocated or realigned where possible. If relocation or realignment is not feasible, then ensuring proper holding positions on VSRs is recommended.
- Direct Access – All taxiways identified as having direct access from an apron to a runway will have direct access broken by relocating or removing pavement.
- Fillets – Taxiways that do not meet TDG 3 fillet design will be updated to allow commercial and GA jet traffic the ability the move around the entire airfield. Taxiways that only serve aircraft smaller than the critical aircraft will have fillets adjusted to an appropriate smaller design, which will fall into TDG 1A.
- Runway Centerline to Parallel Taxiway Centerline – Taxiway A centerline to runway centerline separation will be increased to meet the minimum 400 feet separation.
- Taxiway A1 and Taxiway M Intersection – Taxiways A1 and M need to align with Runway 13 End. If Runway 13 End remains at the existing position for the planning period, then Taxiway M must be updated to a standard 90-degree turn, and Taxiway A1 must be relocated to Runway 13 End, which will result in Taxiway L1 requiring relocation to avoid direct access. If Runway 13 End shifts position based on the runway length analysis, then Taxiways A1 and M must be realigned to Runway 13 End and follow standard taxiway design.

RUNWAY LENGTH ANALYSIS

Business jets and large general aviation aircraft use Runway 13/31 most often. Runway 13/31 has a precision approach on Runway 31 End and a non-precision approach on Runway 13 End. Runway 16/34 is used predominately by small general aviation aircraft and has visual approaches. The length of each runway is:

- Primary Runway 13/31: 5,811 feet.
- Additional Runway 16/34: 5,146 feet

This length analysis considers the recommended length for Runway 13/31 and Runway 16/34 based on FAA guidance contained in AC 150/5325-4B, *Runway Length Requirements for Airport Design*. The runway length analysis for each runway includes the following steps:

- Identify the critical aircraft.
- Define applicable design guidance using AC 150/5325-4B, *Runway Length Requirements for Airport Design* (AC 5325-4B).
- Perform analysis and identify the recommended runway length.
- Recommend revisions to runway length.

Three factors contribute to calculating an aircraft's takeoff requirements:

- Takeoff weight as it relates to a specific aircraft's maximum takeoff weight.
- Airport Elevation: The elevation at SLE is 213 feet.
- Mean daily maximum temperature of the hottest month of the year.

The *AC 150/5325-4B* includes a reference table for use in determining which methodology to apply for a specific airport's runway length study based on the critical aircraft weight. A section of the table is included in **Table 4-11**.

Table 4-11: Airplane Weight Categorization for Runway Length Requirements

Airplane Weight Category Maximum Certificated Takeoff Weight (MTOW)	Design Approach	Location of Design Guidelines
12,500 pounds (5,670 kg) or less Approach speeds of 50 knots or more With less than 10 passengers	Family grouping of small airplanes	Chapter 2; Paragraph 205 Figure 2-1
60,000 pounds (27,200 kg) or more or Regional Jets	Individual large airplanes	Chapter 4; Airplane Manufacturer Websites (Appendix 1)

Table Notes:
1. When the design airplane/s APM shows a longer runway length than what is shown in figure 3-2, use the airplane manufacturer's APM. However, users of an APM are to adhere to the design guidelines found in Chapter 4.
2. All regional jets regardless of their MOTW are assigned to the 60,000 pounds (27,200 kg) or more weight category.
3. For a full reference of the categories and where to find the associated guidance, see Table 1-1 in AC 150/5325-4B.

Source: Table 1-1 in AC 150/5325-4B

The critical aircraft at SLE is runway dependent. The future critical aircraft for the primary runway, 13/31 is a Boeing 737-700. This aircraft falls into the “60,000 pounds (27,200 kg) or more or Regional Jets” weight category. Aircraft with MTOW greater than 60,000 pounds have aircraft performance information provided by airport planning manuals (APMs) produced by the aircraft manufacturers.

The future critical aircraft for Runway 16/34 is a B-II, such as the Cessna Citation II. This aircraft falls into the “12,500 pounds (5,670 kg) or less; Approach speeds of 50 knots or more; With less than 10 passengers” weight category. The runway length analysis for Runway 16/34 will be based on a family grouping of aircraft within the same weight category.

Climate Data at SLE

Wind direction and speed determine which runways are used at airports. Aircraft takeoff and land into the wind whenever possible. Understanding wind patterns at airports is instrumental in order to maintain runways and ensure efficiency of flights.

According to TimeandDate.com, Salem, Oregon has an average high of the hottest month (August) of 83 degrees Fahrenheit and an average low temperature of 54 degrees Fahrenheit. On average, the area accumulates 26.60 inches of precipitation annually, with an average of 2.2 inches of rainfall per month. November through March tend to produce the most precipitation throughout the year. The average wind speed in Salem, Oregon is 5.3 miles per hour, with January being the windiest month averaging speeds of 6.0 miles per hour. The velocity and direction of the wind is important in aviation – particularly during takeoff and landing.

Runway Length Design Aircraft and Demand Aircraft

Runway length analysis includes C-III and D-III aircraft to assess the range of the most demanding and commonly used aircraft. A summary of the aircraft each of the airline’s use is shown in **Table 4-12**. The following aircraft were considered for the runway length analysis:

- Boeing 737-700 (C-III)
- Boeing 737-800 (D-III)

Table 4-12: **Aircraft Operated by Airline**

Airline	Aircraft	
	B737-700	B737-800
Avelo Airlines	✈	✈
Avelo Airlines initiates commercial service at SLE in October 2023 and has a fleet comprised of Boeing 737-700s and Boeing 737-800.		

Source: Mead & Hunt, 2023.

Analysis and Results of Runway 13/31

Each aircraft has different ranges depending on the load configuration. The recommended runway length will vary based on payload (passengers and cargo) and fuel load. An assessment of aircraft range, payload assumptions and the existing runway length is summarized below.

AC 5325-4B requires consideration of the typical length of haul. The future destinations SLE expects to serve within the 20-year forecast period are all located within 1,000 nautical miles. Destinations greater than 1,000 nautical miles, will require aircraft to carry more fuel, increasing takeoff weight and runway length required. The load factors used within this runway length analysis are 83 percent and 100 percent. Load factors were formed by an evaluation of several different airport markets that have seen the introduction of service by airlines with business models including the Airline that plans to initiate commercial service at SLE. The 83 percent load factor is based on the projected average load factor for air carriers in 2041, while the 100 percent load factor represents a conservative scenario with aircraft operating at full capacity.

The benefits of a runway extension vary from aircraft to aircraft. The Boeing aircraft operated by the Airline serving SLE will not benefit from a runway extension if they operate a 737-700 with a load factor of 83 percent or less and plan to serve destinations within 1,000 nautical miles. **Appendix A**

It is important to note that aircraft performance will vary by individual airline based on aircraft configuration and airline operating specifications. The numbers presented are based on manufacturer aircraft weight variants, which may differ slightly from airline weight variants.

Runway 13/31 Recommendations

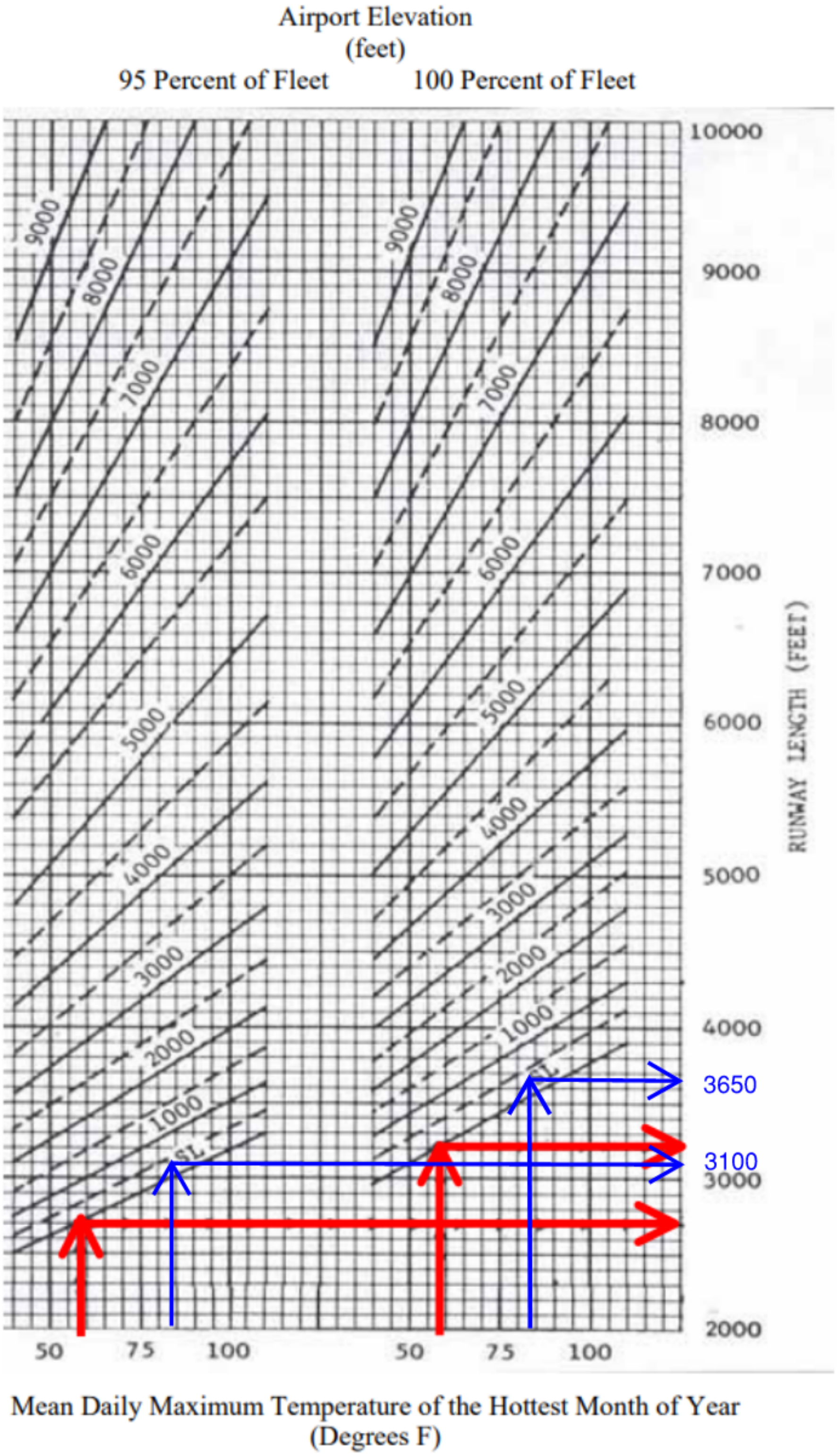
The analysis concludes that if the current Airline intends to provide service to various airports within 1,000 nautical miles (NM), using a 737-700 or a 737-800, with a load factor of 83 percent or less, that the existing runway length of Runway 13/31 is sufficient. The commercial airline providing service at SLE as of October 2023, serves two routes: SLE to Bob Hope Airport (BUR) and SLE to Harry Reid International Airport (LAS), which are both within 1,000 nautical miles. If the Airport intends to provide service to airports exceeding 1,000 nautical miles, it is recommended that the existing runway length be re-analyzed to ensure the length is adequate to meet more demanding routes.

Analysis and Results of Runway 16/34

To conduct the runway length analysis for 16/34 based on the family grouping of small airplanes, *AC150/5325-4B,* includes several charts for estimating a runway length necessary for a percentage of the general aviation fleet. The appropriate chart for the family grouping of small aircraft based on the number of passengers is designated in *AC150/5325-4B*. This chart (**Figure 4-11** below) is based on a fleet of similar small airplanes certificated in the United States.

A majority of B-II category aircraft currently using Runway 16/34 fall into the 95 percent of fleet category. For that reason, the recommendation is to use the runway length recommended for the 95 percent of fleet. For reference, analysis is also included for the 100 percent of fleet category. In **Figure 4-11** below, the blue lines represents SLE’s specifics and shows how the runway lengths are calculated for the 95 percent of fleet and 100 percent of fleet categories. (The red lines represent an example included in the source figure from the AC.)

Figure 4-11: **Small Airplanes with Fewer than 10 Passenger Seats**



Source: Figure 2-1 in AC 150/5325-4B

The results are as follows:

- 95 percent of fleet = 3,100-foot runway
- 100 percent of fleet = 3,650-foot runway

Local pilots prefer Runway 16/34 to the primary runway. Runway 16/34 does not meet the wind criteria to be designated as a crosswind runway or the capacity criteria to be designated as a secondary runway for funding eligibility. However, Runway 16/34 could be eligible under the legacy crosswind designation for funding up to A-I/B-I standards. The City of Salem would be responsible for additional cost to maintain additional width . The airport could consider shortening the runway to what is required for the small aircraft.

Runway 16/34 Recommendations

The general aviation fleet that uses runway 16/34 could still utilize the runway if it were shortened to 3,650 feet. *Chapter 4, Alternatives,* will consider shortening the runway and will provide qualitative assessments for the alternatives based on a fixed set of criteria.

AIRCRAFT PARKING APRON DESIGN STANDARDS

AC 150/5300-13B provides aircraft parking and apron design standards, described below. This section identifies aircraft parking and apron recommendations to meet expected demand and FAA design standards. Military aprons at SLE are not included in this narrative. There are two main aprons at SLE, the terminal apron and the general aviation (GA) apron.

Terminal Apron

The terminal apron is approximately 165,000 square feet in size, is parallel to Taxiway C, and adjacent to the ATCT. There are currently three areas on the apron that allow for air taxi or commuter operations to park on.

The terminal apron will require changes in the future to handle airline operations using the 737-700. The change in aircraft using the terminal apron not only changes how aircraft can park on the apron, SLE is certified under Title 14 of the Code of Federal Regulations (CFR) Part 139 and meets all requirements of Part 139 to allow airlines the ability to operate at the Airport. SLE must also follow guidance in *AC 13B*, and any practices by airlines operating at the Airport. Below is a list of common apron elements that should be considered from *AC 150/5300-13B*:

- **Stabilized surface**: Apron surface can accommodate the weight of aircraft used by airlines.
- **Taxilanes**: Apron should have taxilane centerlines as needed to allow pilot to park the aircraft at a parking position or gate.
- **Parking positions**: SLE currently has three parking positions that can accommodate 737 model aircraft. Additional parking positions on the apron should be sized accordingly to the aircraft being used by the airlines operating at SLE and positions be marked outside of any taxiway surfaces.
- **Passenger loading and off-loading areas**: Designated areas should be marked on the apron so ground crews can properly place boarding bridges.

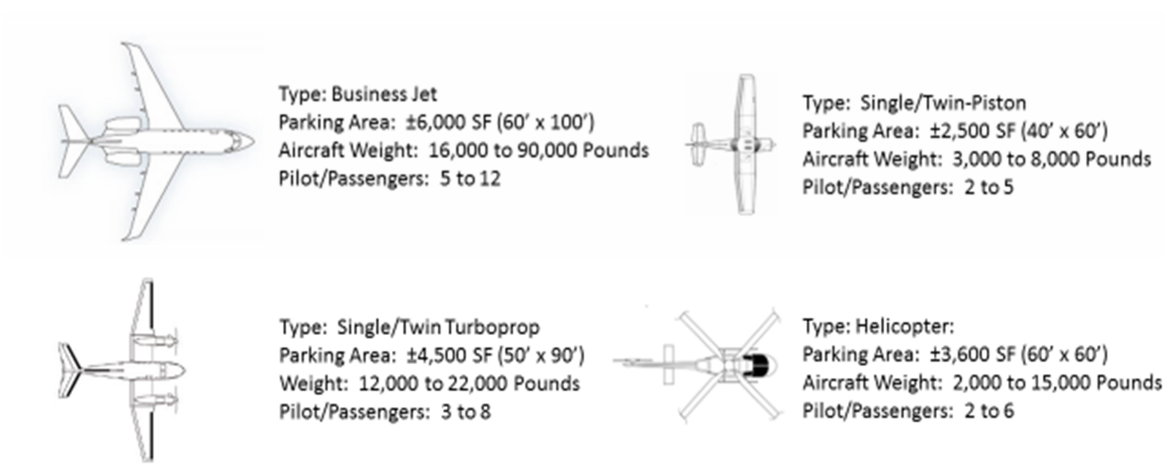
- **Ground Service Equipment (GSE) areas**: Apron must be able to accommodate the additional equipment used by airlines to service their aircraft. Some examples of GSE include fueling truck and fuel tanks, ground boarding bridge storage area, and any other serve vehicles used to service an aircraft between flights.
- **Vehicle service roads**: The apron should provide access for ground equipment to travel to and from their storage area and aircraft, while also maintain clear separations from centerlines and aircraft.
- **Utility areas**: Apron should provide areas as needed for any utilities for both the terminal and aircraft.
- **Pavement markings**: Apron should have proper markings per *AC 13B* and Part 139.
- **Stormwater drainage system**: Apron should have proper storm water drainage system in place to prevent the apron from being flooded.

Fixed-Wing Aircraft Parking and Storage

Tie-downs are provided for based and transient aircraft stored outside of hangars. *AC 150/5300-13B, Appendix E,* General Aviation (GA) Facilities states that tie-down aprons at GA airports usually are designed to accommodate aircraft in Airplane Design Groups (ADGs) I, II, and III. However, according to GeoGebra, Inc.'s base map there are approximately 660,000 square feet of apron space with 97 tie-downs and two helicopter parking spaces located on the west side of the Airport. **Figure 4-12** shows the recommended area and pavement strength for business jets, single / twin turboprop, single / twin-piston and helicopters.

The existing tie-down spaces exceed the needs for the expected growth in based and itinerant aircraft. Itinerant aircraft owners are more likely to use tie-downs than based aircraft owners, who are likely to prefer hangars. The GA apron will be used for business jet traffic parking until hangars are constructed.

Figure 4-12: **General Aviation Aircraft Parking Area – Aircraft Type**



Source: Mead & Hunt, 2023.

Hangars include box hangars, which can store larger and multiple aircraft, and T-hangars, which store a single, smaller aircraft. There are not enough existing hangars to meet current demand. According to Airport management, there is a hangar waitlist with approximately twelve individuals on it. Hangar development includes provision of vehicular access and parking. The number and size of future hangars will depend on the needs of the individual aircraft owners and developers.

Fixed-Wing Aircraft Parking and Storage Recommendations

Aircraft parking and apron recommendations are as follows:

- Relocate tie-downs positions out of TOFA for the GA apron. According to information provided by the Airport, only about 10 percent of existing tie-downs are used and it is anticipated that approximately 25 tie-downs are needed over the next 20 years, which is fewer than existing. It is recommended that the tie-downs to the apron be located near the Fixed Base Operator (FBO).
- Adjust the nonmovement boundary markings to meet the future Taxiway C, ADG III TOFA width.
- Evaluate the size of the GA apron to determine if it can accommodate future based aircraft and GA operations.
- Terminal apron must be updated to FAA Airport Design *AC 150/5300-13B*, and airline operational standards to accommodate future commercial aircraft.

AERONAUTICAL FACILITIES – AIRSIDE

Air Cargo / Freight Facilities

The preferred air cargo forecast depicted in *Chapter 3, Aviation Forecasts,* shows that air cargo tonnage is projected to increase at a compound annual growth rate (CAGR) of 0.9 percent in the forecast period 2021 through 2041. The cargo tonnage numbers are stated in *Chapter 3, Aviation Forecasts*. Historically, air cargo at SLE has remained relatively steady, and the number of aircraft operations is expected to remain relatively consistent with air taxi operations. There is no air cargo on the passenger airline that serves SLE.

FedEx has an approximately 25,000 square foot sorting facility on the west side of the Airport. FedEx utilizes an aircraft parking spot on the existing terminal apron. The company does not have plans to expand their cargo sorting facility. The existing facilities are adequate.

Air Cargo / Freight Facilities Recommendation

No changes have been identified as necessary to meet projected demand in air cargo or freight activities throughout the 20-year planning period.

Aircraft Fuel Storage and Dispensing Systems

Aircraft fuel storage and dispensing facilities at SLE are operated by the FBO, and as such, it is the decision of a private business to increase the volume of fuel storage on the Airport. The FBO has indicated the existing fuel storage is inadequate for their needs and plan to add capacity in 2023. Operations forecasts in *Chapter 3* indicate that the total number of operations is expected to increase with the initiation of air service. Future air service will possibly be to destinations within 1,000 nautical miles from SLE, which will require additional fuel beyond what the FBO typically dispenses today. Additional fuel storage tanks will need to be added in order to accommodate projected increases in demand from airlines.

Aircraft Fuel Storage Recommendation

It is recommended that SLE utilize existing fuel storage and increase the number of fuel storage tanks as demand for fuel increases. Options for additional aircraft fuel storage are to be addressed in *Chapter 5, Alternatives*.

Air Traffic Control Tower

The Air Traffic Control Tower (ATCT) is located on the north side of the Oregon Department of Aviation's parcel. ATCT requirements are included in *FAA Order 6480, Airport Traffic Control Tower Siting Process*, and *AC 150/5300-13B*. Key requirements are that the ATCT:

- Be high enough to provide unobstructed views of all controlled movement areas of an airport, air traffic patterns, and runway approaches, with a perpendicular line of sight (LOS) to the runway.
- Avoid the impairment of visibility by direct or indirect external light sources such as ramp lights, parking area lights, rising or setting sun, and reflective surfaces. A shield will be added to prevent glare from the Airport Beacon.
- Avoid adverse impacts to any current or planned terminal instrument procedures.
- Comply with 14 CFR Part 77, *Objects Affecting Navigable Airspace,* and airport design surface clearance requirements.

The ATCT has a clear line of sight to the existing movement areas; however, new buildings may block the LOS. A new ATCT siting study has been completed and a new 95-foot-tall tower will be located east of Taxiway B in an empty parcel between the Oregon National Guard and Garmin. It is expected that the new ATCT will be constructed in the next 5-7 years.

ATCT Recommendation

Beyond construction of the new tower, there are no additional recommendations related to the ATCT.

NAVAIDs

Existing Navigational Aids (NAVAIDS) are documented in *Chapter 1*. With the exception of items discussed below, no other deficiencies or additional improvements have been identified, as necessary.

Precision Approach Path Indicators (PAPI)

The PAPIs on both Runway 16 and Runway 34 are currently turned off due to tree obstructions in the PAPI Obstacle Clearance Surface (OCS). Removal of obstructions and reactivating the PAPIs should be considered if Runway 16/34 remains operational.

Instrument Landing Systems

An Instrument Landing System (ILS) provides pilots with electronic guidance for aircraft alignment, descent gradient, and position for landing safely under conditions of reduced ceilings and visibility. Equipment that makes up an ILS includes a localizer, glideslope, and Approach Lighting System (ALS). A localizer is paired with Distance Measuring Equipment (DME), which provides pilots with a slant range measurement of distance to the runway in nautical miles. An ALS is a lighting system positioned symmetrically along the extended runway centerline to help lower visibility minimums and supplement electronic NAVAIDs. Runway 13/31 has a CAT I ILS for Runway 31 and an ALS for Runway 13. The ALS on Runway 13 is an Omnidirectional Airport Lighting System (ODAL). The ILS for Runway 31 includes a localizer, DME, glideslope, and Medium Intensity Approach Light System with Sequenced Flashing Lights (MALSF).

Figure 4-13 shows the Localizer Critical Area (LCA) dimensions that apply to the localizer in the Runway 31 ILS. **Figure 4-14** shows the Glideslope Critical Area (GCA) dimensions that apply to the glideslope in the Runway 31 ILS.

The siting and critical area for the localizer meets the standards for a CAT I localizer and can be used as back course. The LCA has a fence line and service road inside of the boundary. Per 13B, the LCA must be clear of objects. The siting and critical area for the glideslope meets the standards in 13B. The GCA has service roads that are within the bounds of the critical area. Per meetings with the Airport, the glideslope location does meet *AC 150/5300-13B* standards but prohibits Taxiway B from extending to the Runway 31 End.

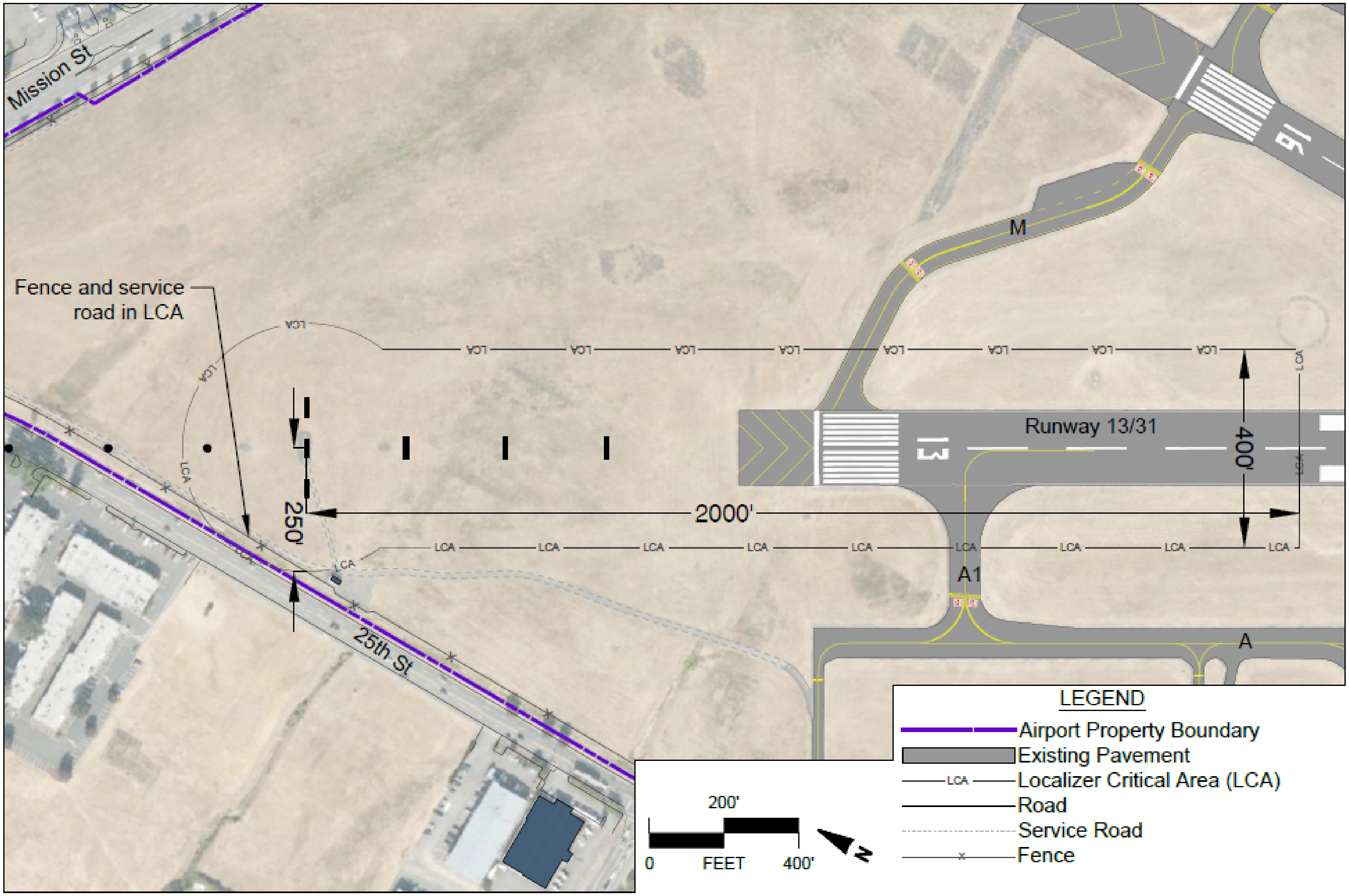
Per *FAA Order Jo 8550.2C*, no objects may protrude in the approach light plane. The approach light plane is a horizontal plane at the elevation of the runway threshold centerline. The approach light plane is 400 feet wide, centered on the extended runway centerline, and extends 200 feet beyond the last light in the ALS. The approach light plane has a 50:1 slope that must remain clear of objects. Objects such as roads and parking areas, highways, and railroads all have additional vertical clearance that must be met to verify that vehicles will not penetrate the approach light plane. Roads and parking areas have 15 feet, highways 17 feet, and railroads 23 feet of additional clearance added to their elevations. The existing light planes do not have any known penetrations.

NAVAID Location and Setback Recommendations

The recommendations for the NAVAID locations and setbacks are as follows:

- There is no need for additional NAVAID equipment to serve the future demand at SLE.
- Evaluate removal of obstructions on Runway 16/34 to restore operation of the PAPIs.
- Evaluate potential areas of relocation for the glideslope to allow an extension of Taxiway B.
- Maintain unobstructed approach light planes for both ALSs.
- Evaluate potential relocation spots for the localizer so the LCA is not penetrated by the fence line or service road.
- Realign or relocate service roads out of the GCA where feasible.
- Evaluate potential areas of relocation for NAVAID equipment if there are proposed changes to the runway ends.

Figure 4-13: ILS and Localizer Siting and Critical Area

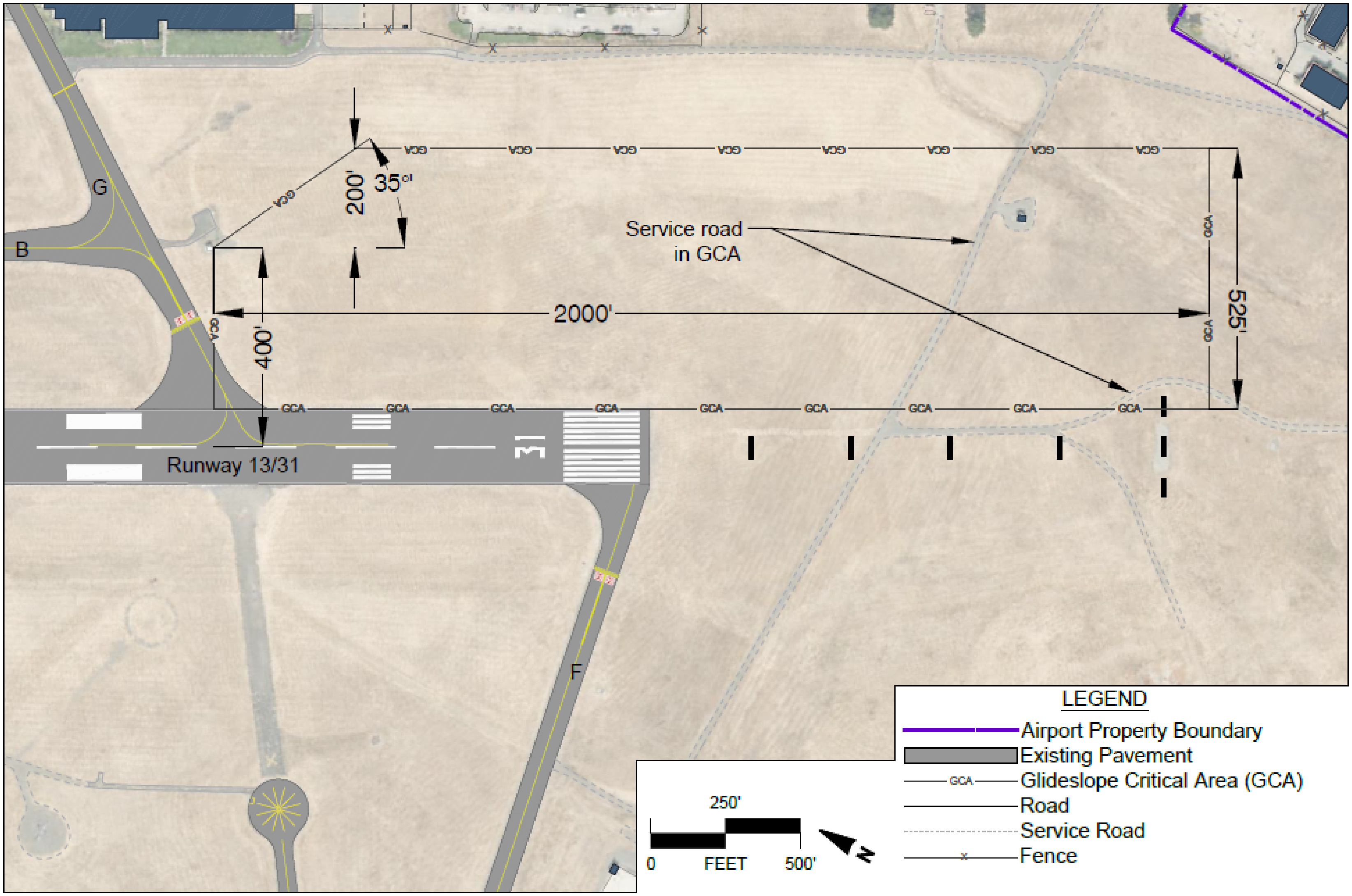


Source: AC 150/5300-13B

Note 1: Additional critical area when back course localizer is available.

Note 2: Dimensions apply when aircraft length is equal to or less than 135 feet.

Figure 4-14: **Glideslope Siting and Critical Area**



Source: AC 150/5300-13B

Note: FAA ATO engineering services is the authoritative source for ILS critical area dimensions.

General Aviation Terminal Facilities

The following section describes the facility improvements recommended to support general aviation activity. Itinerant general aviation and local general aviation traffic was approximately 86 percent of total operations in 2021 and is expected to be approximately 80 percent of total operations in 2041. *Chapter 3* projects an increase in the number of based aircraft from 189 in 2021 to increase to 249 based aircraft in 2041. This growth includes an additional 57 single-engine aircraft, two jets, one multiple-engine aircraft, no additional helicopters, and no additional experimental aircraft.

AERONAUTICAL FACILITIES – LANDSIDE

Snow Removal Equipment

AC 150/5200-30D-2, Airport Field Condition Assessments and Winter Operations Safety (AC 5200-30D-2), states that the classification of airports to determine SRE needs is based on the total paved runway area identified in a winter storm management plan for the removal of snow, ice, and / or slush. Runway 13/31 has about 872,000 square feet of pavement, which makes SLE a "very large airport" by *AC 150/5200-30D-2* standards.

Commercially certificated airports that have more than 40,000 operations should have equipment to clear the Priority 1 surfaces of one inch of snow weighing up to 25 pounds per cubic foot in 30 minutes. The Airport's Snow and Ice Control Plan outlined in *AC 15/5220-20A, Airport Snow Ice Control Equipment,* shows the Priority 1 areas as the existing runways, taxiways, passenger terminal apron, and critical access routes for aircraft rescue and firefighting (ARFF). The FAA's online snow removal equipment calculator provides the recommended amount of SRE equipment. It is possible for equipment to be multi-purpose. As an example, a plow truck may also double as a hopper spreader, and an assortment of quick-change attachments allow a vehicle to convert from one function to another. The three-step process to determine the amount of equipment necessary is found in *AC 150/5220-20A*:

1. Determine the square footage of the critical paved areas and supporting paved facilities.
2. Determine the "airfield clearance time" using *AC 150/5200-30D-2* (30 minutes for SLE).
3. Use the airfield clearance time and the square footage of area to be cleared to determine the amount and size of snow removal equipment needed to meet snow removal requirements.

SRE Recommendation

It is recommended that SLE obtain adequate snow removal equipment to clear Priority 1 Areas, including but not limited to the primary runway, Taxiway A, Taxiway Connector A1, Taxiway C, Taxiway J, Taxiway F, and the passenger terminal apron. Any critical access routes that need to be accessed for ARFF should also be maintained.

Aircraft Deicing

SLE currently does not have a deicing program since the weather conditions rarely require deicing. In the near-term, commercial service aircraft could be diverted to Eugene. A long-term development plan for a deicing pad is to be included in the Alternatives chapter.

- Recommendation is to develop a deicing program to support commercial operations that use Priority 1 areas outlined in SLE's Snow and Ice Control Plan. No formal recommendation for a deice facility are made. Regulations on water quality and deicing fluid application are subject to change. It is recommended that SLE encourage operators to track volumes used and to determine trend for when deice fluid use does reach significant levels.

Airport Rescue Firefighting (ARFF) Station and Equipment

The 14 CFR Part 139 Certification of Airports determines the ARFF Index based on the longest passenger aircraft that has an average of five daily departures. SLE on flight days has an ARFF Index B capability and on a non-flight day the Airport fluctuates between ARFF Index A and B capabilities. The ARFF Index and the associated aircraft lengths are summarized in **Table 4-13.**

Table 4-13: ARFF Airport Index

ARFF Index	Aircraft Length	Representative Aircraft
A	less than 90 feet	C208
B	at least 90 feet but <126 feet	B737-700
C	at least 126 feet but <159 feet	B737-800
D	at least 159 feet but <200 feet	B757; B767; A330
E	at least 200 feet	B747-400; B777
Note: The ARFF Index is based on the length of transport aircraft, but listed aircraft do not necessarily operate at SLE.		

Source: 14 CFR Part 139.

There are currently two ARFF trucks and based on discussions with the Fire Department, they plan to maintain ownership and operation of two ARFF trucks. The Fire Department noted that it takes less than two minutes to reach the primary runway.

ARFF Recommendation

It is recommended that SLE acquire equipment to meet ARFF Index C requirements based on the length of the future critical aircraft. It is also recommended that ARFF station design, Index C equipment capacity and alternate locations be evaluated in *Chapter 5, Alternatives*.

Fencing and Airfield Access

The existing perimeter fence ties into the buildings on the Garmin campus on the east side of the airport. With the introduction of commercial service in October 2023, the Transportation Security Administration (TSA) would like to see the entire facility removed from the AOA. Additionally, the perimeter road is not paved. During rainy weather, the perimeter road becomes muddy, and it is difficult for Airport employees to navigate. If the Airport intends to continue commercial service, security upgrades at the Garmin campus and a perimeter fence that surrounds the entirety of the Airport will be necessary.

Fencing and Airfield Access Recommendation

It is recommended that the Airport restrict direct access from the Garmin campus and upgrade the existing perimeter road to improve access. TSA has informed the Airport that they would like to see the security improvements to the Garmin campus in 2024.

ELECTRIC AIRCRAFT FACILITIES AND AIRSPACE

Trends revolving around Advanced Air Mobility (AAM) are creating the potential to introduce new modes of transportation for goods and people, new infrastructure such as vertiports, and new aircraft. AAM is an emerging concept to the transportation system that can help to increase access to areas that are underserved by the current aviation industry. AAM use-cases will vary depending on Airport and community needs. When the market matures, AAM will allow passengers access to air mobility, goods delivery, and emergency services through an integrated and connected multimodal transportation network.

Takeoff and Landing Requirements

There are several original equipment manufacturers (OEMs) that have conceptual aircraft in development and are waiting for certification. The conceptual aircraft fall into three general categories:

- Electric Short Take-off and Land (eSTOL) Aircraft: Require a short runway for take-off and landing. eSTOLs will have the capability to use existing taxiway and runway systems as they operate like traditional aircraft.
- Electric Vertical Take-off and Land (eVTOL) Aircraft: Can take off, hover, and land vertically. eVTOLs will require a significant amount of energy to hover and potentially new air route corridors.
- Electric Conventional Take-off and Landing (eCTOL) Aircraft: Also known as horizontal takeoff and landing aircraft, conventional aircraft use fixed wings rather than rotors to take off and land and require runways. eCTOLs will have the capability to use existing taxiway and runway systems since they operate like traditional aircraft.

It is important to note that the majority of electric aircraft will be fully electrical or hybrid electric, but there are OEMs that have conceptual aircraft with propulsion systems powered by petroleum and hydrogen.

AAM Use Cases at SLE

SLE has the potential to play a significant role in the implementation of AAM. Several use-cases of AAM have potential due to existing infrastructure such as the ATCT, FBOs, terminals, hangars, runway systems, heliports, and parking aprons. SLE will need to identify designated areas for AAM facilities such as a charging infrastructure, vertiport(s), and a utility infrastructure.

AAM has the potential to help airports obtain their sustainability and equity goals by providing another alternative for transportation using environmentally friendly modes of transportation.

Potential Benefits of AAM at SLE

- Reduction in emergency response times / natural disaster response capabilities.
- Increased access to various destinations (rural and urban).
- Economic opportunities.
- Increased utilization of GA infrastructure.
- Lower emissions and noise pollution to surrounding communities.

Aircraft Parking and Circulation

To replenish electric and hybrid-electric aircraft batteries, electric charging infrastructure will be required to support electric aircraft operations. Like their jet fuel counterparts, each aircraft model will have different operating requirements and need different ground resources. Commercial aviation flies to a schedule and will need fast charging capabilities to meet short turnaround requirements. General aviation is less scheduled and charging needs will be on a more impromptu basis.

Fixed and Mobile Chargers

- Small commuter aircraft and hybrid regional aircraft may benefit from electric power supplied to the aircraft from the gate. Gates have the ability to provide 400 hertz (Hz) power units connected to the grid or ground operated mobile ground power unit (GPUs) which can be used for charging. Other general aviation facilities could elect to equip part of their aircraft aprons / parking positions with chargers. High density tie-down parking layouts could be supplied with built-in or pop-up charging stations. Airport hangars can be equipped as well.
- Commercial aircraft operations (commuter, light air cargo, and regional air carrier) will benefit from the installation of more powerful charging systems. A quick turn-around time can be achieved by using high powered fast chargers.

Battery Swap

Changing batteries at the gate can allow for faster turn-around time at peak hours, as long as ground handlers and FBOs have adequate inventory of fully charged batteries. Battery swap operations would require equipment and trained personnel to load and unload batteries from the aircraft, inventory of batteries compatible with fleet and activity, and infrastructure to store and charge batteries.

Aircraft Charging Stations

According to one OEM with nationwide electric charging installations, charging locations for aviation may consist of a charging dispenser adjacent to the ramp and a nearby transformer unit that takes AC power from the electrical grid and converts it to DC power; each transformer supports up to two chargers. A charger connects to the aircraft using a Combined Charging System (CCS) standard plug and 50-ft. retractable reel. There are four key steps when it comes time to plan and build aircraft charging infrastructure:

- Step 1 – Site Evaluation
- Step 2 – Considerations
- Step 3 – Construction and Design
- Step 4 – AAM Operations

Step 1 – Site Evaluation

Key considerations in the implementation of electric aircraft consist of the following:

- Proximity to electrical utility lines,
- Connectivity between the landing area and charging stations,
- Availability of facilities and services for operators and cargo,
- Sensitivity of impacted environmental resources, and
- Compatibility with airspace surfaces for the charger and aircraft.

According to several original equipment manufacturers (OEMs), a majority of electric aircraft will have wingspans of 50 feet or less. Setbacks and object free areas will need to be verified, and aircraft will need adequate apron area for parking when charging is complete.

Strategically placed chargers can boost airport revenue as operators may purchase additional services while the aircraft is charging. Siting chargers near a Fixed Based Operator (FBO) or General Aviation (GA) terminal are ways to provide many of the services aircraft operators utilize. Installing automobile chargers in adjacent parking lots can help bring in additional airport revenue and leverage any investment in utility extension.

Step 2 – Environmental Considerations

Construction on a federally obligated airport requires some level of environmental review. The FAA will determine its level of environmental oversight through the NEPA process. Chargers are generally unintrusive and environmental review is minimal; however, consideration should be given to extensions of utility lines to the charging site. There may be environmentally sensitive areas between existing utility locations and future charger locations. This could lead to a more significant environmental review process. Surrounding communities at SLE have enacted zoning ordinances or codes that regulate environmental issues in relation to air and noise pollution. AAM operators or sponsors at SLE should contact the FAA before conducting AAM operations.

Step 3 – Construction and Design

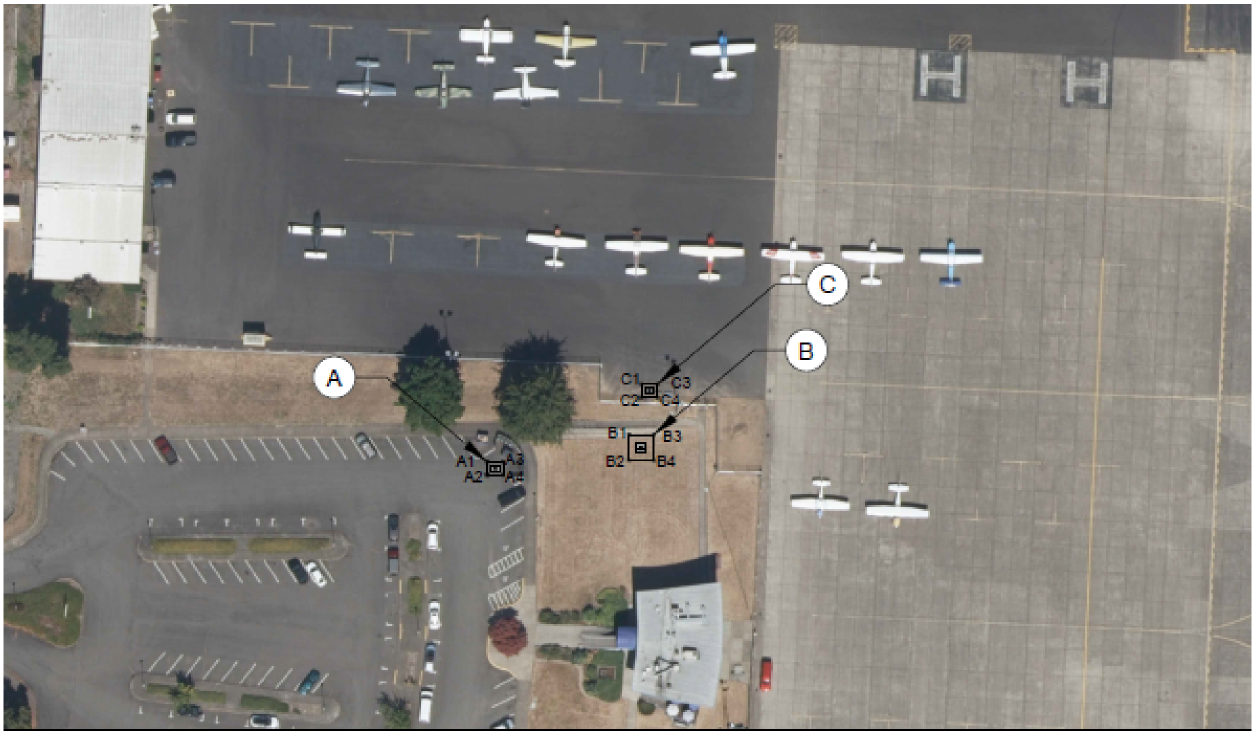
Installation of electric aircraft chargers follows the same principles as any other type of airport construction. FAA Form 7460-1 needs to be submitted for airspace review, the proposed project should be shown on an updated Airport Layout Plan (ALP), a construction safety and phasing plan is needed, and notice should go out to any tenants and users that may be affected by construction activities.

AAM Developments at SLE

In calendar year 2022, Mead & Hunt proposed a site for charging infrastructure for electric aircraft and automobile charging. The aircraft charger is intended to serve multiple types of electric aircraft with a range in size from an ADG I to ADG II, in line with other users at SLE. The charger is intended to be available for any electric aircraft that wishes to use it, rather than be proprietary to specific make or model. As such, planning considered ingress and egress for aircraft up to ADG II, which represent the largest electric aircraft currently in design. The apron where the charger is proposed includes tie-downs with separation for ADG I aircraft. To meet FAA taxilane object free area requirements, up to 13 of the existing tie-down parking spaces will need to be removed. The Airport will have sufficient remaining tie-down spaces after the removal of up to 13 for this project to meet existing and future demand. Therefore, negative impact on other users of the Airport is not expected through this improvement.

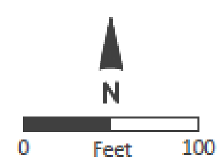
Going forward, open communication is important during the four steps to implementing electric aircraft charging infrastructure. The future of aviation is rapidly changing, understanding the processes and procedures will lead to efficient electric aircraft operations alongside with its implementation process.

Figure 4-15: **Proposed Charging Infrastructure Site**



DATA

	LATITUDE	LONGITUDE	AGL (ft)	MSL (ft)
A	44° 54' 26.38"N	123° 0' 26.21"W	8	216
A1	44° 54' 26.42"N	123° 0' 26.28"W	0.5	208
A2	44° 54' 26.34"N	123° 0' 26.27"W	0.5	208
A3	44° 54' 26.42"N	123° 0' 26.15"W	0.5	208
A4	44° 54' 26.34"N	123° 0' 26.15"W	0.5	208
B	44° 54' 26.52"N	123° 0' 25.06"W	6.83	211
B1	44° 54' 26.59"N	123° 0' 25.16"W	0.5	204
B2	44° 54' 26.45"N	123° 0' 25.15"W	0.5	204
B3	44° 54' 26.60"N	123° 0' 24.96"W	0.5	204
B4	44° 54' 26.45"N	123° 0' 24.95"W	0.5	204
C	44° 54' 26.85"N	123° 0' 25.01"W	8	211
C1	44° 54' 26.88"N	123° 0' 25.07"W	0.5	203
C2	44° 54' 26.81"N	123° 0' 25.07"W	0.5	203
C3	44° 54' 26.89"N	123° 0' 24.94"W	0.5	203
C4	44° 54' 26.81"N	123° 0' 24.94"W	0.5	203



LEGEND

(A) Dual Port Public Dispenser
46" X 46" Concrete Pad
(B) DCFC Power Box
65" X 65" Concrete Pad
(C) DCFC Private Dispenser
46" X 46" Concrete Pad

Source: Mead & Hunt, 2022.

Step 4 – AAM Operations

Guidance from *ACRP Research Report 236, Preparing Your Airport for Electric Aircraft and Hydrogen Technologies*, states the main cost of electric aircraft implementation at airports will be for airport owners, their stakeholders, or new third parties to procure and maintain electric aircraft charging systems. The Airport should note that existing infrastructure including existing runways, parking aprons, and approach / departure paths will likely accommodate AAM operations according to *FAA Engineering Brief 105 (EB 105)*. For operations that cannot be conducted using existing infrastructure, EB 105 recommends planning for additional approach / departure paths based on the assessment of the prevailing winds or separate operations from the preferred flight path by 135 degrees or more.

PASSENGER TERMINAL FACILITIES

Planning Activity Levels

Planning Activity Levels (PALs) were identified to represent future levels of activity at which airport improvements would be necessary. Recognizing that actual activity could deviate from the forecast, PALs allow for facility planning to be tied to realized traffic levels, rather than arbitrary milestone years.

Terminal requirements are primarily driven by passenger loads and aircraft operations during peak times. Therefore, peak hour enplanements and operations for an average day of the peak month were calculated for each PAL to be used as inputs to the requirements model. The forecasting inputs are summarized in **Table 4-14** below.

Table 4-14: Planning Activity Levels

Metric	PAL 1	PAL 2	PAL 3	PAL 4
Year				
Baseline Scenario	2025	2041	Beyond planning horizon	
High Scenario	<2024	2027	2031	2041
Commercial operations				
Annual	1,500	2,700	5,000	6,200
Peak Hour Departures	1	2	3	3
Enplanements				
Annual	70,000	180,000	300,000	425,000
PMAD Peak Hour	110	225	330	350
Deplanements				
Annual	70,000	180,000	300,000	425,000
PMAD Peak Hour	100	260	370	410
Total passengers				
Annual	140,000	360,000	600,000	850,000

Source: Mead & Hunt.

Gate Requirements

Determining gate requirements is critical to the terminal planning process because the number and size of aircraft parking positions is a primary driver for the terminal space requirements and the terminal building layout.

Gate demand is determined by analyzing the total passenger activity, the air service characteristics, the traffic peaking patterns, and the type of aircraft expected to serve the Airport. Gate requirements were developed for PALs 1 through 4.

Assumptions

It was assumed that gates would be operated as common use gates, i.e., gates would not be assigned to a specific airline and instead would be allocated to airlines on an as-needed basis. This is typical of airports with ultra low-cost carrier traffic, or airports with carriers who do not operate daily flights. Common use facilities typically result in a higer use of the gates and fewer gates being required to handle forecast traffic.

Aircraft gates can either be contact gates or ground loading gates. Contact gates are directly connected to the passenger terminal building via a passenger boarding bridge, while ground loading gates require the passengers to walk to the aircraft and use mobile boarding ramps to enplane and deplane the aircraft. Passenger boarding bridges provide a higher level of service for passengers by limiting level changes and protecting passengers from weather conditions. They also allow for more efficient operations, enabling faster turnaround times and therefore more passenger handling at the same gate. It was assumed that in PAL 1, all gates will be ground loading gates. However, by PAL 2, the possibility of providing passenger boarding bridges should be investigated during the alternative development phase of the master plan.

Gate Requirements Analysis Results

Gate requirements were calculated to ensure that all aircraft in the peak hour could be gated. The results also include a buffer gate, i.e., a gate in addition to the gates strictly required to accommodate the flight schedule to account for diversions, charters, disruptions in airline flight schedules, and boarding bridges being out of service for maintenance / repair. All gates should be sized to handle ADG III narrowbody aircraft such as the Airbus A320 or the Boeing 737.

In PAL 1, two gates will be required to handle projected aircraft activity. By PAL 2, three gates will be required, increasing to four gates by PALs 3 and 4. It is not anticipated that the Airport will need remain overnight parking in addition to the gates provided at the terminal building.

PASSENGER TERMINAL BUILDING REQUIREMENTS

Methodology

Passenger terminal requirements were calculated using research and models developed by the Airport Cooperative Research Program (ACRP). ACRP is an industry-driven research program managed by the Transportation Research Board and sponsored by the Federal Aviation Administration. Specifically, ACRP Report 25, Airport Passenger Terminal Planning and Design, was used to calculate requirements for the main terminal processing areas:

- Airline check-in
- Outbound baggage screening and baggage makeup
- Security screening checkpoint
- Passenger holdrooms
- Baggage claim and inbound baggage handling

Requirements for terminal functions not addressed by ACRP Report 25 were calculated using the following methodologies:

- Concession spaces were calculated using the planning factors and space allowances detailed in ACRP *Report 54 - Resource Manual for Airport In-Terminal Concessions*.
- Restroom needs were calculated using the methodology, planning factors, and space allowances detailed in ACRP *Report 226 - Planning and Design of Airport Terminal Restrooms and Ancillary Spaces.*
- Secondary functions and other areas such as airline and airport support spaces, building structure, utilities, etc. were developed based on industry guidelines and benchmarks.

Assumptions

The major assumptions driving the requirements are detailed below.

Airline Check-in

Requirements for the airline check-in area are a function of the passenger loads, check-in mode split, desired wait times, and passenger processing times.

It is expected that all passenger traffic in the early planning years will be generated by one or potentially several ultra low-cost carriers (ULCC). Assumptions pertaining to check-in functions in PAL 1 were therefore developed to reflect ULCCs' operating procedures, passenger profiles, and desired level of service. It was assumed that self-service kiosks would initially not be provided, and that all passengers checking in at the Airport would require full-service counters. Curbside check-in will not be provided. In PAL 1, it was assumed that 62 percent of the departing passengers will require full-service counters. The remaining passengers will check in online, either at home or on a smartphone. As the market matures and as passengers become more used to self-service technologies, it is expected that self-service kiosks will be installed, gradually reducing the number of passengers requiring full-service counters. It was assumed that by PAL 4, 35 percent of passengers would use the full-service counters, 27 percent would use self-service kiosks and bag drops, and the remaining passengers would check in remotely.

There are three check-in counters, each with two positions. One check-in counter is assigned to Avelo Airlines. The remaining counters are unassigned. In the future, these could be assigned to an airline or allocated dynamically on an as-needed basis. This is typical for airlines that may not operate daily flights. Common use also typically leads to a more efficient use of airport facilities, as opposed to preferential or exclusive use operating scenarios, in which airlines are granted the use of certain facilities in priority over other airlines for the handling of their flights.

Check-in processing times, maximum wait times, and space allowance per passenger were defined based on the recommendations made in the International Air Transport Association (IATA) Airport Development Reference Manuel (ADRM). A 20-minute maximum wait time and a 3-minute processing time per passenger were used in PAL 1. Those processing and wait times correspond to an optimum level of service, defined in the ADRM as having “sufficient space to accommodate the necessary functions in a comfortable environment” and “acceptable processing and waiting times”. It is to be noted that a 20-minute maximum wait time is at the higher end of the optimal range, but it is consistent with accepted levels of service for ULCCs. By PAL 2 until the end of the planning period, it was assumed that the maximum desired wait time would be 10 minutes, consistent with industry standards at an airport with more mature service.

Outbound Baggage Screening

Space needed for outbound baggage screening is a function of the baggage screening equipment configuration, processing rates, and clear / alarm bag rates.

Level 1 screening is performed with explosives detection system (EDS) equipment. For an airport the size of Salem Municipal Airport, level 1 screening can either be done using stand-alone screening units or with mini-inline systems. The traffic levels at SLE will not require a Level 2 on-screen resolution room and therefore alarmed bags will go straight to Level 3 inspection. Level 3 screening is the manual screening of bags using explosives trace detection (ETD) technology. Oversize bags that do not fit into EDS machines are sent directly to ETD screening. Three percent of the peak hour baggage screening demand was assumed to consist of oversized bags.

The following values, consistent with ACRP recommendations and industry standards, were used:

- Percent of passengers checking bags: 62 percent
- Average bags per passenger: 1.1
- Percent of oversized bags too large for Explosive Detection System (EDS): 3 percent
- Level 1 EDS screening (performed using EDS equipment) process rate: 150 bags / hour
- Level 1 EDS screening unit area: 800 square feet
- Level 3 ETD screening process rate: 24 bags / hour / screener
- Level 3 ETD screening unit area: 100 square feet

Outbound Baggage Makeup

Outbound baggage makeup requirements are a function of the number of gates, the number of turns per gate, and the number of baggage carts per gate. The following assumptions and space allowances were used in this analysis:

- **Number of gates:** the Equivalent Aircraft (EQA) was calculated for each planning activity level. EQA normalizes each gate based on the seating capacity of the aircraft which can be accommodated at that gate. One EQA corresponds to an ADG III narrowbody aircraft.
- **Estimated number of turns per gate:** turns per gate were calculated based on forecast data.
- **Number of carts per gate:** each cart can accommodate between 40 and 50 bags. It was calculated that three carts would be required for a narrowbody aircraft.

- **Space allowances:** each cart / container was assumed to occupy 600 square feet at the baggage carousel. A 10 percent space allowance was added for baggage train circulation.

It is to be noted that outbound baggage makeup facilities are typically covered to protect personnel and bags from weather events, but they do not need to be enclosed.

Security Screening Checkpoint

Security screening checkpoint requirements are a function of passenger loads and peaking patterns, passenger throughputs at the checkpoint, desired maximum wait times, and equipment space requirements. The following assumptions were used for this analysis:

- **Forecast passenger loads:** the peak hour enplaned passenger loads were used in the model, with a 15 percent factor added to account for employees and crews going through the checkpoint.
- **Regular vs. PreCheck passengers:** passengers were divided into two groups, regular and PreCheck. For planning purposes, a conservative assumption was made that 30 percent of passengers would have PreCheck status. It is unlikely that future traffic levels at Salem Municipal Airport will justify a dedicated PreCheck lane. Therefore, the security lanes will be operated as blended lanes, where regular and PreCheck passengers go through the same lanes, but PreCheck passengers will be given the option to keep their shoes / jackets on, and they will leave laptops and allowable liquids and gels in their carry-on luggage.
- **Passenger throughputs:** typically, throughputs of 150 passengers per hour per lane for standard lanes, and 250 passengers per hour per lane for PreCheck lanes can be achieved at the checkpoint. In the case of SLE, an overall throughput rate of 170 passengers per hour per lane was used, which is slightly higher than the rate for a standard lane to account for the fact that PreCheck passengers can move faster through the checkpoint than standard passengers.
- **Maximum wait times:** a desired maximum wait times of 10 minutes was used, consistent with the recommendations delineated in the IATA Airport Development Reference Manual for an optimum level of service.
- **Equipment space requirements:** standard space allowances from the ACRP Report 25 were used. A standard two-lane security screening module occupies 2,800 square feet. The Transportation Security Administration (TSA) also recommends providing a minimum of 300 square feet of queue per lane.

Passenger Holdrooms

Space requirements for passenger holdrooms are a function of the number of gates, aircraft seating capacity, average load factor, the physical layout of the concourse, and the number of seated vs. standing passengers. The following assumptions were used:

- **Load factor**: the load factors calculated in the forecast were used, starting at 65 percent in PAL 1 and increasing to 85 percent by PAL 4.
- **Number of seated vs. standing passengers:** it was assumed that 70 percent of passengers would be seated in the lounge area, while 30 percent would be standing or in other areas of the terminal such as amenities or concessions, consistent with recommendations delineated in the IATA ADRM for an optimum level of service.

- **Space allowances:** standard values provided in the ACRP Report 25 were used for square footage per passenger and equipment such as podium and boarding / egress corridors.
- **Amenities and circulation space:** a 10 percent allowance was provided to accommodate passenger amenities, such as workstations and electronic charging stations. Additional space was included to account for circulation.

All gates and holdrooms will be operated as common use gates. Common use equipment such as counters and boarding pass scanners will be provided so that any airline can use the equipment when boarding aircraft. By the end of the planning period, self-boarding solutions could allow passengers to scan their own boarding passes and board automatically. These technologies would reduce the number of airline personnel required to process a flight, but they would not impact holdroom space requirements.

Baggage Claim and Inbound Baggage Handling

Baggage claim requirements are calculated using the following variables:

- **Peak 20-minute deplaned passengers**: the total number of passengers using the claim device during peak times was calculated based on the forecast.
- **Passenger characteristics:** it was assumed that 62 percent of passengers would be checking bags, with an average of 1.1 bags per passenger.
- **Space allowances:** a standard allowance of 1.5 linear feet of bag claim per passenger was used.
- **Bag claim unit size:** a space allowance of 3,000 square feet per bag claim device was used. This allowance includes space for the device itself, as well as space for passengers actively claiming luggage.

Additional space was added to the arrivals area for circulation, baggage service offices, and meeter / greeter lobby.

An allowance of 2,600 square feet per bag claim was included in the program for inbound baggage handling. Similar to outbound bag makeup facilities, the inbound bag belts are typically covered but not necessarily enclosed.

Concessions

A benchmarking exercise was performed to estimate the appropriate amount of concessions in PAL 1. Airports with annual enplanements ranging from 10,000 to 200,000 were included in the data set. Information on concessions was collected for these airports and showed that airports with fewer than 80,000 enplanements typically have vending machines or small grab and go kiosks. Airports with more than 80,000 annual enplanements are more likely to have a more robust concessions program, including full-service restaurants.

It was therefore assumed that at PAL 1, concessions would be limited, with a vending area or a small kiosk.

For PALs 2 to 4, concession requirements are based on the planning factors recommended in ACRP Report 54. Assumptions are as followed:

- Ten square feet per 1,000 annual enplaned passengers for food and beverage facilities
- Four square feet per 1,000 annual enplaned passengers for news / gift and other retail space
- 30 percent of total concessions space located pre-security and 70 percent located post-security.
- Concession circulation is assumed to be 15 percent of total concession space.
- Concession support space needs, defined as a separate and independent storage area that is not contiguous with the concessions space serving passengers, were calculated assuming that 30 percent of the food and beverage concession space is used for food and beverage support and that 20 percent of the retail concession space is used for retail support. Kitchen and storage spaces that are integral to the food and beverage concession space are considered part of the food and beverage concessions area.

A rental car company currently occupies 370 square feet of space in the existing terminal. It was assumed that the existing rental car counters would be sufficient through PAL 1. For PALs 2 to 4, it was assumed that rental car counter frontage would increase in proportion to growth in the number of enplaned passengers.

Restrooms

Public restroom requirements were calculated separately for the secure and non-secure sides of the terminal building. The methodology followed the guidance from ACRP Report 226, *Planning and Design of Airport Terminal Restrooms and Ancillary Spaces*, and used the following assumptions and planning parameters:

- Pre-security requirements are based on the peak hour demand and include an allowance for visitors (well-wishers and meeters and greeters).
- Post-security requirements are based on the peak 20-minute activity levels.
- A restroom proportion of 40 percent men to 60 percent women was used.
- An allowance for janitor space and family restrooms was included in each restroom block.

Support Functions

Secondary functions, such as airline operations, TSA administration and staff support spaces, airport operations / maintenance, and other spaces such as building structures and utilities are generally based on a percentage or factor of space required. The following planning factors were used based on industry standards and guidelines:

- Pet relief area: an allowance for pet relief area was included in the program as airports with 10,000 or more annual enplanements are required to provide wheelchair accessible animal relief areas for service animals that accompany passengers departing or arriving at the Airport.
- Airline operations: 1,000 square feet per EQA
- TSA administration and staff support: 400 square feet of space for the first security screening checkpoint lane, then increasing with the expansion of the checkpoint area
- Ground handling services: 4 percent of total departure and arrival areas
- Airport operations and maintenance: 4 percent of total departure and arrival areas

- Loading dock / trash / recycling: 2 percent of total departure and arrival areas
- Building structure: 6 percent of total departure, arrival, and secondary areas
- Utilities: 10 percent of total departure, arrival, and secondary areas
- Allowance for design variations: 5 percent of total departure, arrival, and secondary areas

Requirements Analysis Results

The terminal space requirements are summarized in **Table 4-15.** The existing terminal was sized to accommodate smaller regional jets and encompasses 13,800 square feet of space. To handle projected demand, 30,000 square feet of terminal space will be required by PAL 1, increasing to 79,000 square feet by PAL 4. These requirements will serve as the basis for the development of terminal alternatives in the following phase of the master plan.

Table 4-15: **Summary of Facility Terminal Requirements**

		Terminal requirements			
Terminal functions	**Units**	**PAL 1**	**PAL 2**	**PAL 3**	**PAL 4**
Check-in / Ticketing					
Full-service counter positions	ea	3	5	6	6
Check-in area (includes active check-in)	sf	300	500	600	600
Check-in queue area	sf	110	200	210	170
Self-service kiosk positions	ea	0	2	4	5
Kiosks footprint area	sf	0	10	20	30
Kiosks queue area	sf	0	0	40	60
Bag drop positions (for kiosk users)	ea	0	1	2	3
Bag drop area	sf	0	10	10	20
Airline ticket office area	sf	300	560	720	750
Circulation	sf	180	320	400	400
Subtotal	**sf**	**890**	**1,600**	**2,000**	**2,030**
Outbound bag screening and make up					
Number of Level 1 EDS units	ea	1	2	2	3
Level 1 EDS area	sf	800	1,600	1,600	2,400
Number of Level 2 OSR stations	ea	0	0	0	0
Level 2 OSR area	sf	0	0	0	0
Number of Level 3 ETD units	ea	1	2	2	2
Level 3 ETD area	sf	100	200	200	200
Baggage screening circulation	sf	230	450	450	650
Conveyors and sorting matrices	sf	900	1,800	1,800	2,600
Baggage make-up area [1/]	sf	1,980	3,960	5,940	5,940
Subtotal	**sf**	**3,110**	**6,210**	**8,190**	**9,190**
Security screening checkpoint					
Checkpoint lanes	ea	1	2	3	3
Checkpoint screening area	sf	1,400	2,800	4,200	4,200
Checkpoint queue area	sf	300	600	900	900
Allowance for future equipment changes	sf	280	560	840	840
Subtotal	**sf**	**1,980**	**3,960**	**5,940**	**5,940**
Holdrooms					
Equivalent gate (EQA)	EQA	2	3	4	4
Holdroom seating area	sf	3,800	7,200	8,800	9,600
Holdroom circulation	sf	1,330	2,520	3,080	3,360
Subtotal	**sf**	**5,130**	**9,720**	**11,880**	**12,960**
Baggage claim and inbound baggage handling					
Claim frontage required	lf	50	120	170	190
Number of carousels	ea	1	1	2	2
Claim area	sf	3,000	3,000	6,000	6,000
Baggage service offices	sf	200	400	400	400
Meeter / greeter lobby	sf	450	450	900	900
Circulation	sf	910	960	1,830	1,830

Inbound baggage offload area [1/]	sf	2,600	2,600	5,200	5,200
Subtotal	**sf**	**7,160**	**7,410**	**14,330**	**14,330**
Concessions					
Pre-secure concessions					
Food and Beverage	sf	0	540	880	1,280
Retail	sf	0	220	350	510
Post-secure concessions					
Food and Beverage	sf	0	1,260	2,060	2,990
Retail	sf	0	500	830	1,200
Concessions support and storage					
Food and Beverage support	sf	0	540	880	1,280
Retail support	sf	0	140	240	340
Circulation	sf	0	380	620	900
Rental cars	sf	360	450	740	1,060
Subtotal	**sf**	**360**	**4,030**	**6,600**	**9,560**
Restrooms					
Pre-security restroom fixtures	fixtures	11	21	24	24
Pre-security restroom area	sf	850	1,600	1,810	1,810
Post-security restroom fixtures	fixtures	9	16	24	24
Post-security restroom area	sf	790	1,280	1,890	1,890
Subtotal	**sf**	**1,640**	**2,880**	**3,700**	**3,700**
	fixtures	**20**	**37**	**48**	**48**
Secondary functions					
Pet relief area	sf	100	100	100	100
Airline operations	sf	2,000	3,000	4,000	4,000
Airport support					
TSA administration and staff support	sf	400	500	600	600
Ground handling services	sf	730	1,160	1,690	1,780
Operations and maintenance	sf	730	1,160	1,690	1,780
Loading dock, trash / recycling	sf	370	580	850	890
Subtotal		**4,330**	**6,500**	**8,930**	**9,150**
Other areas					
Building structure	sf	1,450	2,300	3,300	3,440
Vertical circulations - stairs, elev., etc.	sf	0	0	0	0
Mechanical / electrical / utility	sf	2,420	3,830	5,500	5,730
Allowance for design variations	sf	1,210	1,910	2,750	2,860
Subtotal		**5,080**	**8,040**	**11,550**	**12,030**
TOTAL AREA	**sf**	**29,680**	**50,330**	**73,120**	**78,870**

Note: [1/] These areas are typically covered but do not need to be enclosed.
Source: JMG Consulting, LLC.

NON-AERONAUTICAL FACILITIES

Properties available for non-aeronautical uses are south of the airport fence and Airway Drive SE and north of the rail line as identified in *Chapter 1*. A summary of the assessment of market opportunities for non-aeronautical facilities is included in this section. The broader analysis that looks at economic and demographic trends in the area, site characteristics, and potential supportable uses is included in **Appendix B**.

Summary of Land Sales

All the properties are in South Salem in industrial, commercial, and employment zones. The site sizes range from 3.8 to 21.9 acres in size. Sales recorded in the last two years ranged from $3.40 to $8.16 per square foot.

Table 4-16: **Summary of Land Sales Transactions**

#	Buyer	Address	Zoning	Ac.(gr.)	Date	Price	Price / Ac.	Price / SF
1	Qualinost	5695 Gaffin Rd	IBC	5.5	7/29/2021	$814,572	$148,104	$3.40
2	Phelan	4375 Turner Rd SE	IG	10.12	5/19/2022	$356,486	$356,486	$8.18
3	Cordon	1800 Cordon Rd LLC	UT-5	19.26	8/6/2021	$124,611	$124,611	$2.86
4	Harrison	Cordon Rd & Hwy 22	IP	21.93	1/6/2022	$232,370	$232,370	$5.33
5	Planet Argon	Fairview Industrial Dr SE	IC	12.14	4/5/2022	$148,270	$148,270	$3.40
6	Makarenko	Turner Rd SE	IC	3.83	4/15/2023	$304,697	$304,697	$6.99

Source: Marion County, CoStar, Johnson Economics

Achievable Pricing

For the two airport-owned properties available for non-aeronautic uses, these are considered viable industrial sites but poor commercial sites due to limited exposure. The 4.0-acre eastern site would be expected to be marginally more marketable due to its' extensive exposure to Airway Drive SE. The somewhat larger site to the east could potentially utilize the property impacted by the approach zone for parking or access, which could increase the overall effective site utilization. However, the site appears to be impacted by the 100-year floodplain.

For industrial users, Turner Road SE to the east links the site to Kuebler Road SE and the North Santiam Highway, providing access to multiple full interchanges with Interstate 5. The scale of the sites is likely too small for regional distribution users but could accommodate flex space and smaller distribution uses.

The estimate of achievable pricing in the current market ranges from $4.00 to $8.00 per square foot. This configuration of the available sites is not ideal, and pricing is expected to be discounted vis-à-vis a rectangular site due to less efficient layout options. This estimate assumes that the sites are development-ready, and without significant off-site infrastructure costs.

As outlined in *Chapter 1* there are no identified limitations to utility access that would limit future development. The City has sewer connections available in the southern portion of the site, as well as water main in Airway Drive.

SUMMARY

A summary of recommendations included in this chapter is below:

Airfield Recommendations

Runways

- Pursue the Legacy Crosswind Runway justification for Runway 16/34. If approved, reconstruction of the runway could be eligible for funding up to A-I/B-I design standards.
- Maintain width of Runway 13/31 to preserve the ability of the Airport to handle any variation of the Boeing 737.
- Shift Runway 13 by 236 feet to prevent any penetrations to the future ROFA.
- Shift holding positions parallel to Runway 13/31 from 250 feet to 252 feet to meet design standards.
- Shift Taxiway A 8 feet to meet the 400-foot parallel taxiway centerline to runway centerline separation design standard.
- Increase the sizes of the existing Runway 13 blast pad and runway shoulder widths to meet design standards.
- Add a blast pad to Runway 31 for future jet traffic.
- Relocate service roads out of RPZs or relocate service roads to feasible locations to maximize mitigation.
- Update runway designation to 14/32 during next runway pavement project or when feasible.
- If Runway 13/31 shifts or extends, acquire easements or property for RPZs that are off Airport property to help mitigate potentially uncontrolled land.

Taxiways

- All taxiways will meet ADG III taxiway standards for TOFAs and TSAs to provide clearance for commercial and jet GA aircraft. Taxiways that will not serve commercial, jet traffic, or the future critical aircraft will meet smaller standards that are appropriate for aircraft operating on identified taxiways. The smaller standards will include ADG I, II, and TDG 1A where appropriate.
- Middle third of runway – All taxiways identified as having middle third of runway intersections will be removed or relocated out of the middle third of the runways.
- Visibility – All taxiways identified as not having right angle turns will be updated to 90-degree turns with proper TDG fillets.

- Taxiway Surface Penetrations – Penetrations will be relocated out of surfaces, or other means of increasing separation will be evaluated. VSRs that penetrate TOFAs, and TSAs will be relocated or realigned where possible. If relocation or realignment is not feasible, then ensuring proper holding positions on VSRs is recommended.
- Direct Access – All taxiways identified as having direct access from an apron to a runway will have direct access broken by relocating or removing pavement.
- Fillets – Taxiways that do not meet TDG 3 fillet design will be updated to allow commercial and GA jet traffic the ability the move around the entire airfield. Taxiways that only serve aircraft smaller than the critical aircraft will have fillets adjusted to an appropriate smaller design, which will fall into TDG 1A.
- Runway Centerline to Parallel Taxiway Centerline – Taxiway A centerline to runway centerline separation will be increased to meet the minimum 400 feet separation.
- Taxiway A1 and Taxiway M Intersection – Taxiways A1 and M need to align with Runway 13 End. If Runway 13 End remains at the existing position for the planning period, then Taxiway M must be updated to a standard 90-degree turn, and Taxiway A1 must be relocated to Runway 13 End, which will result in Taxiway L1 requiring relocation to avoid direct access. If Runway 13 End shifts position based on the runway length analysis, then Taxiways A1 and M must be realigned to Runway 13 End and follow standard taxiway design.

NAVAIDS

- Evaluate removal of obstructions on Runway 16/34 to restore operation of the PAPIs.
- Evaluate potential areas of relocation for the glideslope to allow an extension of Taxiway B.
- Maintain unobstructed approach light planes for both ALSs.
- Evaluate potential relocation spots for the localizer so the LCA is not penetrated by the fence line or service road.
- Realign or relocate service roads out of the GCA where feasible.
- Evaluate potential areas of relocation for NAVAID equipment if there are proposed changes to the runway ends.

Aeronautical Support Recommendations

- Consider options for additional aircraft fuel storage to support future operations.
- Consider and protect ATCT line-of-sight to movement areas when planning new facilities.
- Develop a deicing program to support commercial operations that use Priority 1 areas outlined in SLE's Snow and Ice Control Plan. Obtain adequate snow removal equipment to clear Priority 1 Areas.
- Plan to meet ARFF Index C requirements based on the length of the future critical aircraft.
- Restrict direct access from the Garmin campus and upgrade the existing perimeter road to improve access.

Apron and Hangar Recommendations

- Relocate tie-downs positions out of TOFA for the GA apron. According to information provided by the Airport, about 10 percent of existing tie-downs are used. About 25 tie-downs are needed. It is recommended that the relocation of the existing tie-downs to the apron near the FBO be considered.
- Adjust the nonmovement boundary markings to meet the future Taxiway C, ADG III TOFA width.
- Evaluate the size of the GA apron to determine if it can accommodate future based aircraft and GA operations.
- There is demand for box hangars. Ramp space on the southern general aviation area would be adequate and could support the demand for box hangars from business jet operators.

Terminal Recommendations

- Terminal apron must be updated to FAA Airport Design *AC 150/5300-13B*, and airline operational standards to accommodate future commercial aircraft.
- Increase rental car counter frontage in proportion to growth in the number of enplaned passengers.
- Upgrade baggage handling and terminal facilities in proportion to growth in the number of enplaned passengers.

Non-Aeronautical Facilities Recommendation

- The two airport owned properties available for non-aeronautic uses south of Airway drive are considered viable industrial sites but poor commercial sites due to limited exposure. Achievable pricing in the current market ranges from $4.00 to $8.00 per square foot for industrial use. The Airport grants long-term leases for development within the airport boundary. Long-term lease rates of return are based on market rates.