
Chapter Three

# FACILITY REQUIREMENTS

The objective of this section is to identify, in general terms, the adequacy of the existing facilities at the Treasure Valley Executive Airport at Caldwell (EUL) and outline what facilities may be needed to accommodate future demands. Airport facilities include both airside and landside components. Airside components include the runway system (runways and taxiways), navigational aids, lighting, and marking. The landside components include terminal facilities, storage and maintenance hangars, auto parking, access, and support facilities. Having established these facility needs, alternatives for providing these facilities will be evaluated in the following chapter.

Recognizing that facility needs are based upon demand (rather than a point in time), the requirements may be expressed in short-, intermediate-, and long-range planning horizons, which correlate generally to 2024, 2029, and 2039 projections as developed in the previous chapter. This chapter will examine several components of the Airport and their respective capacities to determine future facility needs over the planning period. The identified deficiencies will then be examined in the alternative's evaluation.

The facility requirements were evaluated using guidance contained in Federal Aviation Administration (FAA) publications, including:

- Advisory Circular (AC) 150/5300-13A (as amended), *Airport Design*
- AC 150/5060-5, *Airport Capacity and Delay*
- AC 150/5325-4B, *Runway Length Requirements for Airport Design*
- 14 Code of Federal Regulations (CFR) Part 77, *Objects Affecting Navigable Airspace*
- FAA Order 5090.5, *Formulation of the National Plan of Integrated Airport Systems* (NPIAS) *and the Airports Capital Improvement Plan (ACIP)*

## *PLANNING HORIZONS*

An updated set of aviation demand forecasts for the Airport has been established, with a summary of the primary forecasting elements presented previously on Exhibit 2G. These activity forecasts include annual operations, based aircraft, based aircraft fleet mix, and peak activity periods. With this information, specific components of the airfield and landside systems can be evaluated to determine their capacity to accommodate future demand.

Cost-effective, efficient, and orderly development of an airport should rely more upon actual demand at an airport than on a time-based forecast figure. To develop a study that is demand-based rather than time-based, a series of planning horizon milestones are established. The planning horizons presented in **Table 3A** are segmented as the Short Term (approximately years 1-5), the Intermediate Term (approximately years 6-10), and the Long Term (years 11-20).

**TABLE 3A | Planning Horizon Activity Levels**
**Treasure Valley Executive Airport**

| | | PLANNING HORIZON | | |
|---|---|---|---|---|
| | **Base Year 2019** | **Short Term** | **Intermediate Term** | **Long Term** |
| **ANNUAL OPERATIONS** | | | | |
| *Itinerant* | | | | |
| General Aviation | 46,765 | 49,257 | 51,948 | 57,681 |
| Air Taxi | 2,032 | 2,189 | 2,358 | 2,737 |
| Military | 325 | 325 | 325 | 325 |
| Total Itinerant Operations | 49,122 | 51,771 | 54,631 | 60,743 |
| *Local* | | | | |
| General Aviation | 98,244 | 103,205 | 104,924 | 108,524 |
| Total Local | 98,244 | 103,205 | 104,924 | 108,524 |
| **Total Annual Operations** | **147,366** | **154,976** | **159,555** | **169,267** |
| **BASED AIRCRAFT** | | | | |
| Based Aircraft | 400 | 421 | 444 | 493 |

*Source: Coffman Associates analysis*

Actual activity at the Airport may be higher or lower than what the annualized forecast portrays. By planning according to activity milestones, the resultant plan can accommodate unexpected shifts or changes in the area's aviation demand so that Airport officials can respond to unexpected changes in a timely fashion.

Utilizing milestones allows Airport management the flexibility to make decisions and develop facilities according to needs generated by actual demand levels. The demand-based schedule provides flexibility in development, as development schedules can be slowed or expedited according to demand at any given time over the planning period. The resultant plan provides Airport officials with a financially responsible and needs-based program.

## AIRFIELD CAPACITY

An airfield's capacity is expressed in terms of its annual service volume (ASV). ASV is a reasonable estimate of the maximum level of aircraft operations that can be accommodated in a year without incurring significant delay factors. As operations near, or surpass, the ASV, delay factors increase exponentially. Guidance on calculating ASV is found in FAA Advisory Circular (AC) 150/5060-5, *Airport Capacity and Delay*.

For this capacity analysis, only those operations regularly utilizing the runway system were considered. At EUL, this includes all fixed-wing aircraft (both local and itinerant) and itinerant helicopters. Local helicopter operations are excluded from the runway capacity analysis because most of these will operate from a taxiway or an apron area. **Table 3B** presents the operations data utilized in the capacity model.

**TABLE 3B | Annual Operations for Capacity Calculations**
**Treasure Valley Executive Airport**

| | 2019 | Short Term | Intermediate Term | Long Term |
|---|---|---|---|---|
| **ITINERANT OPERATIONS** | | | | |
| General Aviation | 46,765 | 49,257 | 51,948 | 57,681 |
| Military | 325 | 325 | 325 | 325 |
| Air Taxi | 2,032 | 2,189 | 2,358 | 2,737 |
| **LOCAL OPERATIONS** | | | | |
| Local | 65,472 | 67,705 | 68,224 | 69,524 |
| **TOTAL OPERATIONS FOR CAPACITY ANALYSIS** | | | | |
| **Total Operations** | **114,594** | **119,476** | **122,855** | **130,267** |
| **PEAKING CHARACTERISTICS FOR CAPACITY ANALYSIS** | | | | |
| Peak Month (10.0%) | 11,459 | 11,948 | 12,286 | 13,027 |
| Design Day (31) | 370 | 385 | 396 | 420 |
| Design Hour (15.0%) | 55 | 58 | 59 | 63 |

Note: Local helicopter operations are excluded.

### FACTORS AFFECTING ANNUAL SERVICE VOLUME (ASV)

Many factors are included in the calculation of an airport's ASV. These include airfield characteristics, meteorological conditions, aircraft mix, and demand characteristics (aircraft operations). These factors are described in the following paragraphs and illustrated on **Exhibit 3A**.

#### Airfield Characteristics

The layout of runway and taxiways directly affects an airfield's ASV. This not only includes the orientation of the runway, but also the percentage of time that a runway is in use. Additional airfield characteristics include the length, width, load bearing strength, and instrument approach capability of each runway at an airport, all of which determine the type of aircraft that may operate on the runway and if operations can occur during poor weather conditions.


AIRFIELD LAYOUT
Runway Configuration
Runway Use
Number of Exits
WEATHER CONDITIONS
VMC- Visual Meteorological Conditions
IMC- Instrument Meteorological Conditions
PVC- Poor Visibility Conditions
OPERATIONS
Arrivals
Departures
Touch-and-Go Operations
Total Annual Operations
7
6
5
4
3
2
1
J F M A M J J A S O N D
AIRCRAFT MIX
Class A & B Aircraft
Single Engine
Small Turboprop
Twin Piston
Class C Aircraft
Business Jet
Regional Jet
Commuter
Commercial Jet
Class D Aircraft
Wide Body Jets

- **Runway Configuration -** The existing runway configuration at EUL consists of a single runway, oriented northwest-southeast with designation 12-30. Non-precision instrument approaches are available to both runway ends with the lowest visibility minimum being 1-mile.

- **Runway Use -** Runway use is normally dictated by wind conditions. The direction of takeoffs and landings is generally determined by the speed and direction of wind. It is generally safest for aircraft to depart and land into the wind, avoiding a crosswind or tailwind component during these operations. Prevailing winds favor the use of Runway 30 in all-weather conditions and account for an estimated two-thirds of total operations.

- **Exit Taxiways -** Exit taxiways have a significant impact on airfield capacity since the number and location of exits directly determines the occupancy time of an aircraft on the runway. Based upon the aircraft mix using the airport, taxiways located between 2,000 and 4,000 feet from the landing threshold and separated by at least 750 feet are factored in the exit rating for the airfield. The greater the number of taxiway exits that are appropriately spaced, the lower the runway occupancy time for an aircraft, which contributes to a higher overall capacity for the airfield. Runway 12-30 has the maximum number of qualifying taxiways, which is two.

- **Meteorological Conditions -** Weather conditions have a significant effect on airfield capacity. Airfield capacity is usually highest in clear weather when flight visibility is at its best. Airfield capacity is diminished as weather conditions deteriorate and cloud ceilings and visibility are reduced. As weather conditions deteriorate, the spacing of aircraft must increase to provide allowable margins of safety. The increased distance between aircraft reduces the number of aircraft which can operate at the airport during any given period. Consequently, this reduces overall airfield capacity.

  There are three categories of meteorological conditions, each defined by the reported cloud ceiling and flight visibility. Visual Flight Rule (VFR) conditions exist whenever the cloud ceiling is greater than 1,000 feet above ground level and visibility is greater than three statute miles. VFR flight conditions permit pilots to approach, land, or take-off by visual reference, and to see and avoid other aircraft.

  Instrument Flight Rule (IFR) conditions exist when the reported cloud ceiling is less than 1,000 feet above ground level and/or visibility is less than three statute miles. Under IFR conditions, pilots must rely on instruments for navigation and guidance to the runway. Safe separations between aircraft must be assured by following air traffic control rules and procedures. This leads to increased distances between aircraft, which diminishes airfield capacity.

  Poor Visibility Conditions (PVC) exist when cloud ceilings are less than 500 feet above ground level or visibility is less than one mile.

  Meteorological data was collected for a continuous 10-year period from the on-airport weather station. According to the meteorological data summarized in **Table 3C**, VFR conditions exist 94.63 percent of the time, IFR conditions (down to a 500-foot cloud ceiling) 3.06 percent of the time, and PVC conditions (below a 500-foot cloud ceiling) 2.31 percent of the time.

**TABLE 3C | Meteorological Conditions**
**Treasure Valley Executive Airport**

| Condition | CRITERIA | | CALDWELL AWOS | | | |
|---|---|---|---|---|---|---|
| | Cloud Ceiling | Visibility | Time (minutes) | Percent | Observations | Percent |
| VFR | Greater than 1,000' and | Greater than 3-miles | 4,976,737 | 94.63% | 167,561 | 93.70% |
| IFR | Between 1,000' and 500' or | Between 1-3 miles | 160,747 | 3.06% | 5,404 | 3.02% |
| PVC | Less than 500' or | Less than 1-mile | 121,392 | 2.31% | 5,860 | 3.28% |
| | | **Total** | **5,258,876** | **100.00%** | **178,825** | **100.00%** |

[1] January 1, 2010 - December 31, 2019
AWOS - Automated Weather Observing System; VFR - Visual Flight Rules; IFR - Instrument Flight Rules; PVC - Poor Visibility Conditions

- **Aircraft Mix -** Aircraft mix refers to the speed, size, and flight characteristics of aircraft operating at the airport. As the mix of aircraft operating at an airport increases to include larger aircraft, airfield capacity begins to diminish. This is due to larger separation distances that must be maintained between aircraft of different speeds and sizes.

  Aircraft mix for the capacity analysis is defined by the FAA in terms of four aircraft classes (although only three are reflected in the mix at EUL). Classes A and B consist of single and multi-engine aircraft weighing less than 12,500 pounds. Aircraft within these classifications are primarily associated with general aviation operations, but this classification also includes some air taxi aircraft. Class C consists of multi-engine aircraft weighing over 12,500 pounds (but not exceeding 300,000 pounds).

  For the capacity analysis, the percentage of Class C aircraft operating at the airport impacts the ASV, as these classes include the larger and faster aircraft in the operational mix. The existing and projected operational fleet mix for EUL is summarized in **Table 3D**. Consistent with projections prepared in the previous chapter, the operational fleet mix at the Airport is expected to realize an increasing percentage of Class C aircraft. The percentage of Class C aircraft is expected to be higher during IFR conditions, as operations by smaller general aviation aircraft typically avoid poor weather conditions.

**TABLE 3D | Aircraft Operational Mix**
**Treasure Valley Executive Airport**

| Weather | Term | A & B[1] | C[2] |
|---|---|---|---|
| VFR (Visual) | Existing | 99.67% | 0.33% |
| | Short Term | 99.48% | 0.52% |
| | Intermediate Term | 99.29% | 0.71% |
| | Long Term | 99.06% | 0.94% |
| IFR (Instrument) | Existing / Future | 90.00% | 10.00% |

[1] Aircraft 12,500 lbs. or less.
[2] Aircraft greater than 12,500 lbs. and less than 300,000 lbs.

*Source: Coffman Associates analysis using FAA AC 150/5060-5, Airport Capacity and Delay.*

## Demand Characteristics

Operations--not only the total number of annual operations but also the way they are conducted--have an influence on airfield capacity. Peak operational periods, touch-and-go operations, and the percent of arrivals impact the number of annual operations that can be conducted at the airport.

- **Peak Period Operations -** For the airfield capacity analysis, average daily operations during the peak month are calculated based upon data which was estimated and presented previously in **Table 3B.** Typical operational activity is important in the calculation of an airport's ASV, as "peak demand" levels occur sporadically. The peak periods used in the capacity analysis are representative of normal operational activity and can be exceeded at various times through the year.

- **Touch-and-Go Operations -** A touch-and-go operation involves an aircraft making a landing and then an immediate takeoff without coming to a full stop or exiting the runway. Touch-and-go activity is counted as two operations, as there is an arrival and a departure involved. A high percentage of touch-and-go traffic normally results in a higher operational capacity because one landing and one takeoff occurs within a shorter time period than individual operations. These operations are normally associated with general aviation training operations and are included in local operations data. Touch-and-go operations at the Airport have historically averaged approximately 52 percent of total annual operations.

- **Percent Arrivals -** Under most circumstances, the lower the percentage of arrivals, the higher the hourly capacity. Except in unique circumstances, the aircraft arrival-departure split is typically 50-50.

## CALCULATION OF ASV

The preceding information was used in conjunction with the airfield capacity methodology developed by the FAA to determine airfield capacity for EUL.

**Table 3E** shows the calculation of the Annual Service Volume, which is C (x) D (x) H. Following this formula, the current airfield capacity is estimated at 252,000 annual operations. With the increase of operations projected over time and the increasing number of operations by larger aircraft (requiring greater separation distances on landing), the future ASV is estimated at 245,000 annual operations.

**TABLE 3E | Annual Service Volume Calculation**
**Treasure Valley Executive Airport**

| ASV Calculation Input | 2019 | Short Term | Intermediate Term | Long Term |
|---|---|---|---|---|
| C = Weighted hourly capacity | 122 | 121 | 120 | 119 |
| D = Ratio of annual demand to average daily demand during the peak month | 114,594 annual operations/370 design day operations = 310 | 119,476 annual operations/385 design day operations = 310 | 122,855 annual operations/396 design day operations = 310 | 130,267 annual operations/420 design day operations = 310 |
| H = Ratio of average daily demand to peak hour demand during the peak month | 370 design day operations/55 design hour operations = 6.67 | 385 design day operations/58 design hour operations = 6.67 | 396 design day operations/59 design hour operations = 6.67 | 420 design day operations/63 design hour operations = 6.67 |
| **Annual Service Volume = C x D x H** | **252,000** | **250,000** | **247,000** | **245,000** |

Note: ASV is rounded to nearest 1,000 and C/D/H ratios have fractions.

**Delay**

As the number of aircraft operations approaches the airfield's capacity, increasing amounts of delay begin to occur to arriving and departing aircraft in all-weather conditions. Arriving aircraft delays result in aircraft holding outside the airport traffic area, while departing aircraft delays result in aircraft holding at the runway end until they can safely takeoff.

Currently, total annual delay at the Airport is estimated at 458 hours (0.24 minutes per aircraft) (reference Figure 2.2, FAA AC 150/5060-5). If no capacity improvements are made, total annual delay can be expected to reach 695 hours (0.32 minutes per aircraft) by the long-term planning horizon. At times, delays five to ten times the average could be experienced by individual aircraft.

**Conclusion**

**Table 3F** provides a comparison of the Annual Service Volume at the operational levels for each planning horizon. The level of operations represents 46 percent of the Annual Service Volume. In 20 years, the percentage is projected to reach 53 percent of the ASV.

**TABLE 3F | Annual Service Volume Summary**
**Treasure Valley Executive Airport**

| | Annual Capacity Operations (rounded) | Weighted Hourly Capacity | Annual Service Volume (rounded) | Percent of Capacity |
|---|---|---|---|---|
| **EXISTING CONFIGURATION** | | | | |
| Existing | 114,900 | 122 | 252,000 | 46% |
| Short Term | 119,500 | 121 | 250,000 | 48% |
| Inter. Term | 122,900 | 120 | 247,000 | 50% |
| Long Term | 130,300 | 119 | 245,000 | 53% |

*Source: Coffman Associates analysis using FAA AC 150/5060-5, Airport Capacity and Delay.*

FAA Order 5090.3B, *Field Formulation of the National Plan of Integrated Airport Systems* (NPIAS), indicates that improvements for airfield capacity should be considered when operations reach 60 percent of the Annual Service Volume. Therefore, no projects specifically intended to improve capacity are necessary at this time.

## *AIRSIDE REQUIREMENTS*

The following section will examine the projected airside requirements, including runway length, runway width, pavement strength, line-of-sight, and gradient. The taxiway system will be examined with respect to current design standards for safety, including separation and wingtip clearances.

## RUNWAY CONFIGURATION

Runway 12-30 is the single runway on the airfield and is oriented in a northwest/southeast manner. For the operational safety and efficiency of an airport, it is desirable for the primary runway to be oriented as close as possible to the direction of the prevailing winds, which reduces the impact of wind components perpendicular to the direction of travel of an aircraft that is landing or taking off.

FAA AC 150/5300-13A, *Airport Design,* recommends a crosswind runway when the primary runway orientation provides for less than 95 percent wind coverage for specific crosswind components. The 95 percent wind coverage is computed based on wind not exceeding a 10.5-knot (12 mph) component for runway design code (RDC) A-I and B-I, 13-knot (15 mph) component for RDC A-II and B-II, 16-knot (18 mph) component for RDC A-III, B-III, C-I through C-III, and D-I through D-III, and 20 knots for larger wingspans.

It is preferable to analyze weather data that is local to the airport being studied. For airport planning studies, weather sensor data is available from the National Oceanic and Atmospheric Administration (NOAA), including the automated weather observing system (AWOS) at Caldwell.

**Exhibit 3B** presents both the all-weather and IFR wind roses as developed from the AWOS data. A wind rose is a graphic tool that gives a succinct view of how wind speed and direction are historically distributed at a location. The table at the top of the wind rose indicates the percent of wind coverage for the runway at specific wind intensity. The wind rose is constructed based on the most recent 10 years of data from the nearest available weather sensor recording system. Runway 12-30 provides 97.89 percent coverage (10.5-knot maximum crosswind component); therefore, crosswind coverage is adequate for aircraft in the Airport's runway design group and a crosswind runway is not required.

## RUNWAY DESIGN STANDARDS

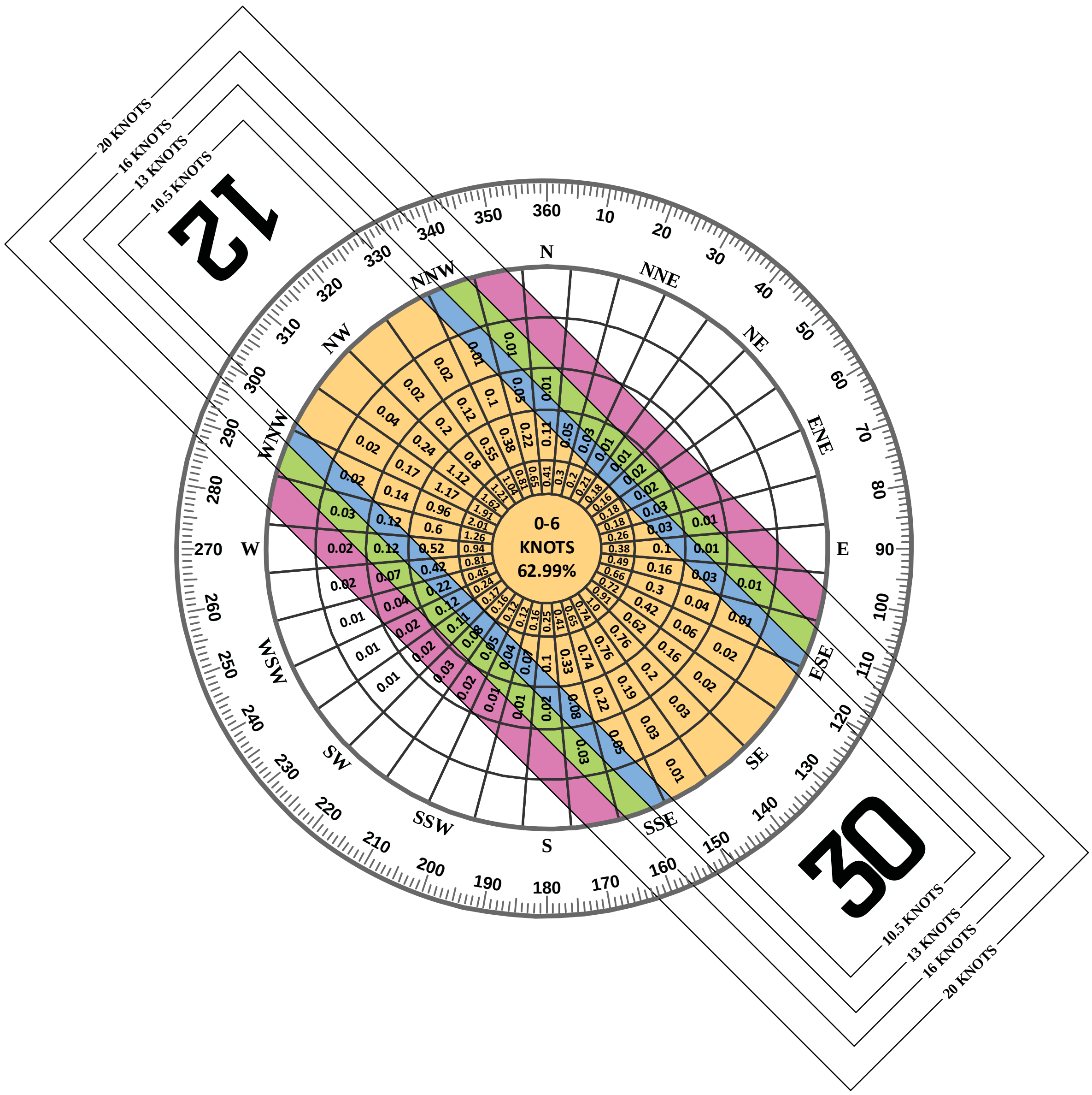
The FAA has established several imaginary surfaces to protect aircraft operational areas and keep them free from obstructions that could affect their safe operation. These include the runway safety area (RSA), runway object free area (ROFA), runway obstacle free zone (OFZ), and runway protection zone (RPZ).

The entire RSA, ROFA, OFZ, and RPZ should be under the direct ownership of the airport sponsor to ensure these areas remain free of obstacles and can be readily accessed by maintenance and emergency personnel. It is not required that the RPZ be under airport ownership, but it is strongly recommended by the FAA. An alternative to outright ownership of the RPZ is the purchase of avigation easements (acquiring control of designated airspace within the RPZ) or having land use control measures in place (i.e., zoning) to ensure the RPZ remains free of incompatible development. Currently, the Airport has direct ownership of all the surfaces except for the roads passing through the RPZs.

Dimensional standards for the various safety areas associated with the runways are a function of the type of aircraft expected to use the runways, as well as the instrument approach visibility minimums. Currently, Runway 12-30 should meet the design standards for a runway design code (RDC) of B-II-5000 (and future RDC of C-II-4000 if visibility minimums are lowered to ¾-mile). **Table 3G** presents the runway design standards and the current deficiencies.

# ALL WEATHER WIND COVERAGE

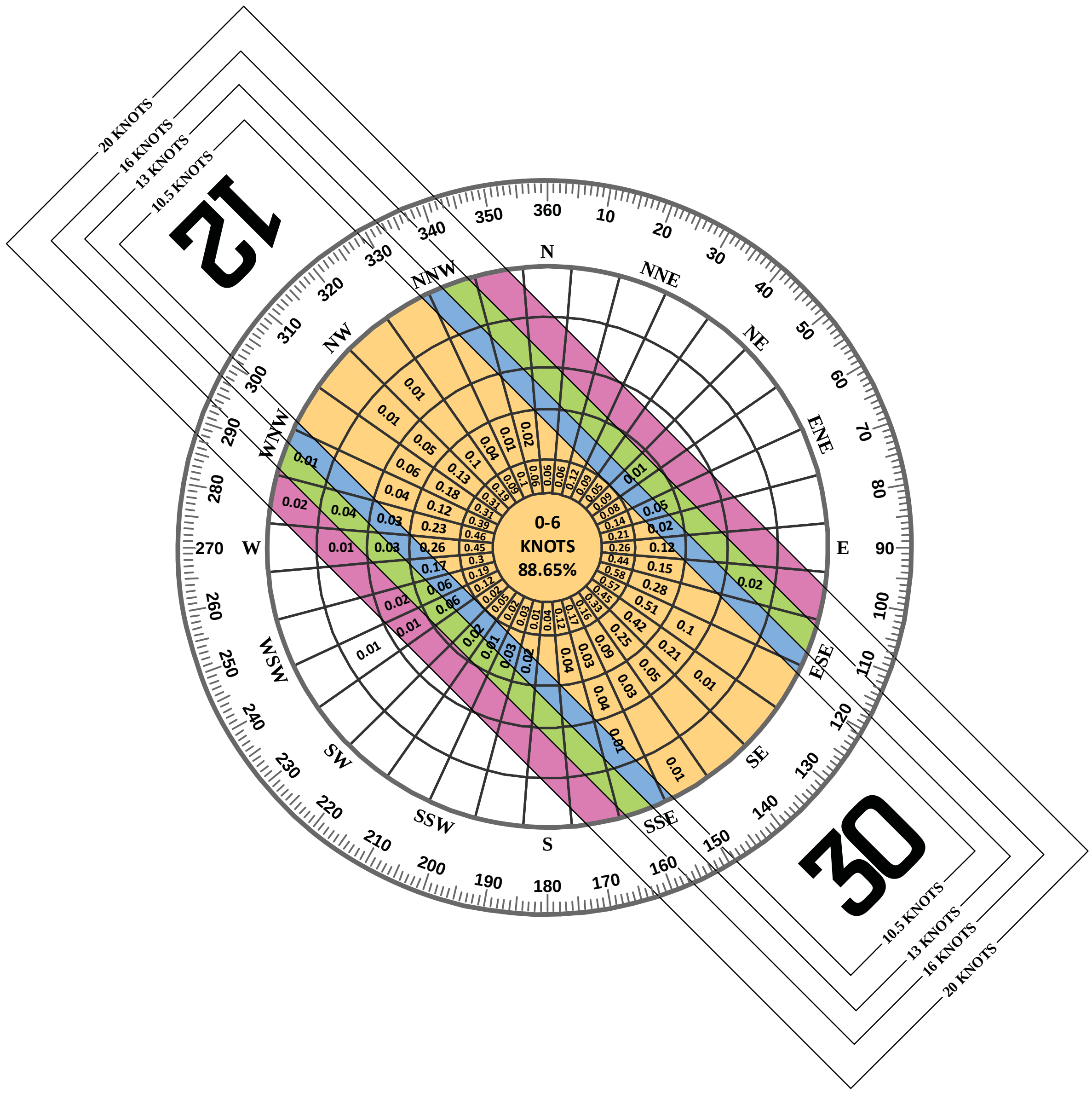
| Runways | 10.5 Knots | 13 Knots | 16 Knots | 20 Knots |
|---|---|---|---|---|
| Runway 12-30 | 97.89% | 99.04% | 99.72% | 99.93% |




SOURCE:
NOAA National Climatic Center
Asheville, North Carolina
Caldwell Industrial Airport
Caldwell, Idaho

OBSERVATIONS:
178,825 All Weather Observations
Jan. 1, 2010 - Dec, 31 2019

| IFR WIND COVERAGE | | | | |
|---|---|---|---|---|
| Runways | 10.5 Knots | 13 Knots | 16 Knots | 20 Knots |
| Runway 12-30 | 99.35% | 99.73% | 99.93% | 99.98% |




SOURCE:
NOAA National Climatic Center
Asheville, North Carolina
Caldwell Industrial Airport
Caldwell, Idaho

OBSERVATIONS:
11,264 All Weather Observations
Jan. 1, 2010 - Dec, 31 2019

**TABLE 3G | Runway Design Standards**
**Treasure Valley Executive Airport**

| AIRPORT DATA | Runway 12-30 (Existing Standard) | Current Condition | Runway 12-30 (Future) |
|---|---|---|---|
| Airport Design Aircraft | B-II-1B | B-II-1B | C-II-2 |
| Runway Design Code | B-II-5000 | B-II-5000 | C-II-2400 |
| Visibility Minimums | 1-Mile | 1-Mile | ½-Mile |
| **RUNWAY DESIGN** | | | |
| Runway Width | 75 | 100 | 100 |
| Runway Shoulder Width | 10 | 10 | 10 |
| Blast Pad Length/Width (if provided) | 150 x 95 | 290 x 150 | 150 x 120 |
| **RUNWAY PROTECTION** | | | |
| *Runway Safety Area (RSA)* | | | |
| Width | 150 | 150 | 500 |
| Length Beyond Departure End | 300 | 300 | 1,000 |
| Length Prior to Threshold | 300 | 300 | 600 |
| *Runway Object Free Area (ROFA)* | | | |
| Width | 500 | 500 | 800 |
| Length Beyond Departure End | 300 | 300 | 1,000 |
| Length Prior to Threshold | 300 | 300 | 600 |
| *Runway Obstacle Free Zone (OFZ)* | | | |
| Width | 400 | 400 | 400 |
| Length Beyond End | 200 | 200 | 200 |
| *Approach Runway Protection Zone (RPZ)* | | | |
| Length | 1,000 | 1,000 | 2,500 |
| Inner Width | 500 | 500 | 1,000 |
| Outer Width | 700 | 700 | 1,750 |
| *Departure Runway Protection Zone (RPZ)* | | | |
| Length | 1,000 | 1,000 | 1,700 |
| Inner Width | 500 | 500 | 500 |
| Outer Width | 700 | 700 | 1,010 |
| **RUNWAY SEPARATION** | | | |
| *Runway Centerline to:* | | | |
| Holding Position | 200 | 200 | 250 |
| Parallel Taxiway | 240 | 240 | 400 |
| Aircraft Parking Area | 250 | 250 | 500 |
| Note: All dimensions in feet. | | | |

*Source: FAA AC 150/5300-13A, Airport Design*

### Runway Safety Area (RSA)

The RSA is defined in FAA AC 150/5300-13A, *Airport Design,* as a "surface surrounding the runway prepared or suitable for reducing the risk of damage to aircraft in the event of undershoot, overshoot, or excursion from the runway." The RSA is centered on the runway and dimensioned in accordance to the approach speed of the critical aircraft using the runway. The FAA requires the RSA to be cleared and graded, drained by grading or storm sewers, capable of accommodating the design aircraft and fire and rescue vehicles, and free of obstacles not fixed by navigational purpose.

The existing RSA is 150 feet wide, centered on the runway, and extends 300 feet beyond the runway ends. The existing RSA meets the design standard.

The future RSA is 500 feet wide, centered on the runway, and extends 1,000 feet beyond the runway ends. On the west end of the Airport, Linden Street would penetrate the RSA and, on the east end, the Canyon Hill Lateral would penetrate the RSA. Therefore, if the Airport transitions to the more restrictive design standards (C-II), the RSA would need to be brought up to the new standard.

**Runway Object Free Area (ROFA)**

The ROFA is "a two-dimensional ground area, surrounding runways, taxiways, and taxilanes, which is clear of objects except for objects whose location is fixed by function (i.e., airfield lighting)." The ROFA does not have to be graded and level like the RSA; instead, the primary requirement for the ROFA is that no object in the ROFA penetrate the lateral elevation of the RSA. The runway ROFA is centered on the runway, extending out in accordance to the critical aircraft design category utilizing the runway.

The ROFA is 500 feet wide, centered on the runway, and extends 300 feet beyond the runway ends. There are no penetrations to the existing ROFA.

When the Airport transitions to the C-II category, the ROFA dimensions become more restrictive. The ROFA is 800 feet wide and extends 1,000 feet beyond the runway ends. On the west end, Linden Street would penetrate the ROFA and, on the east end, Ustick Road would penetrate a corner of ROFA. The Canyon Hill Lateral would not be a penetration to the ROFA provided the elevation is the same as the RSA.

**Obstacle Free Zone (OFZ)**

The OFZ is an imaginary surface that precludes object penetrations, including taxiing and parked aircraft. The only allowance for OFZ obstructions is navigational aids mounted on frangible bases, which are fixed in their location by function, such as airfield signs. The OFZ is established to ensure the safety of aircraft operations. If the OFZ is obstructed, the airport's approaches could be removed, or approach minimums could be increased.

The OFZ is 400 feet wide, and it extends 200 feet beyond the runway ends. The existing OFZ meets the design standard. The future OFZ has the same dimensions and will, therefore, meet standard in the future.

**Runway Protection Zone (RPZ)**

The RPZ is a trapezoidal area centered on the runway, typically beginning 200 feet beyond the runway end. When an RPZ begins at a location other than 200 feet beyond the end of a runway, two RPZs are required (i.e., a departure RPZ and an approach RPZ). The RPZ has been established by the FAA to provide an area clear of obstructions and incompatible land uses in order to enhance the protection of people and property on the ground. The RPZ is comprised of the central portion of the RPZ and the controlled activity area. The dimensions of the RPZ vary according to the visibility minimums serving the runway and the type of aircraft operating on the runway.

The central portion of the RPZ extends from the beginning to the end of the RPZ, is centered on the runway centerline, and is the width of the ROFA. Only objects necessary to aid air navigation, such as approach lights, are allowed in this portion of the RPZ. The remaining portions of the RPZ, the controlled activity areas, have strict land use limitations. Wildlife attractants, fuel farms, places of public assembly, and residences are prohibited from the whole of the RPZ.

FAA has renewed its focus on improving land use compatibility in RPZs. On September 27, 2012, the FAA issued a memo entitled, *Interim Guidance on Land Use Within a Runway Protection Zone* (*Interim Guidance*). The *Interim Guidance* indicates that any **new or modified** RPZs that include incompatibilities must be reviewed and approved by the FAA headquarters prior to implementation. **Table 3H** summarizes the actions that typically trigger a change in the size and/or location of the RPZ and lists incompatible land uses.

**TABLE 3H | New or Modified Land Uses in the RPZ**

| ACTIONS TYPICALLY TRIGGERING A CHANGE IN RPZ DIMENSIONS/LOCATION | | |
|---|---|---|
| 1 | An airfield project (e.g., runway extension, runway shift) | |
| 2 | A change in the critical design aircraft that increases the RPZ dimensions | |
| 3 | A new or revised instrument approach procedure that increases the RPZ dimensions | |
| 4 | A local development proposal in the RPZ (either new or configured) | |
| **LAND USES REQUIRING COORDINATION WITH FAA HEADQUARTERS** | | |
| | **Land Use** | **Examples and Notes** |
| 1 | Building and Structures | Including but not limited to: Residences, schools, churches, hospitals, other places of public assembly, etc. |
| 2 | Recreational Land Use | Including but not limited to: Golf courses, sports fields, amusement parks, other places of public assembly, etc. |
| 3 | Transportation Facilities | Including but not limited to: Rail facilities (light or heavy, passenger or freight), public roadways, and vehicular parking facilities. |
| 4 | Fuel Storage Facilities | Above and below ground |
| 5 | Hazardous Material Storage | Above and below ground |
| 6 | Above-Ground Utility Infrastructure | Electrical substations, solar panels, etc. |
| Note: Airport sponsors must continue to work with FAA to remove/mitigate existing RPZ land use incompatibilities. | | |

*Source: FAA Memo: Interim Guidance on Land Uses Within a Runway Protection Zone (Sept. 27, 2012)*

Since the *Interim Guidance* only addresses new or modified RPZs, existing incompatibilities are not subject to the new guidance. It is still necessary for the airport sponsor to take all reasonable actions to meet the RPZ design standard. FAA funding priority for certain actions, such as relocating existing roads in the RPZ, will be determined on a case-by-case basis.

Under current conditions, the RPZ serving Runway 12 is crossed by Linden Street. Approximately 0.41 acres (3.01 percent) of RPZ land is represented by the road. The RPZ serving Runway 30 is crossed by Ustick Road. Approximately 0.18 acres (1.29 percent) of RPZ land is represented by the road. **Table 3J** details the existing incompatible land use within the RPZs. If the Airport transitions to C-II design standards, the RPZs become larger (29.47 acres) and longer, thus representing a change to the RPZ. The alternatives analysis in the next chapter will explore options for meeting RPZ land use compatibility standards in the event the airport transitions to C-II.

**TABLE 3J | Runway Protection Zone Detail**
**Treasure Valley Executive Airport**

| Runway | RPZ Dimensions (ft.) | | RPZ Size (ac.) | Owned in Fee (ac.)/% Owned | Existing Incompatible Land Uses | Percent Incompatible |
|---|---|---|---|---|---|---|
| Rwy 12 | Inner Width:<br>Outer Width:<br>Length: | 500<br>700<br>1,000 | 13.77 ac. | 13.36 ac./96.99% | Linden Street | 3.01% |
| Rwy 30 | Inner Width:<br>Outer Width:<br>Length: | 500<br>700<br>1,000 | 13.77 ac. | 13.59 ac./98.71% | Ustick Road | 1.29% |

*Source: Coffman Associates analysis.*

### Runway/Taxiway Separation

The design standards for the separation between runways and parallel taxiways are determined by the critical aircraft and the instrument approach visibility minimums. The current critical aircraft is represented by those aircraft in ARC B-II which require a minimum separation of 240 feet. The existing separation between Runway 12-30 and parallel Taxiway A is 400 feet. The future C-II runway separation standard is 300 feet for ¾-mile visibility minimums and 400 feet for ½-mile visibility minimums. To preserve the future possibility of lower visibility minimums, the existing runway/taxiway separation should be maintained.

### Hold Line Separation

The hold lines on all taxiways connecting to Runway 12-30 are 250 feet from the runway centerline. The current standard is 200 feet and the future C-II standard is 250 feet. The hold line location should be maintained to provide an additional safety buffer and to preserve the potential for lower visibility minimums.

### Aircraft Parking Area Separation

Based on current conditions, the aircraft parking areas should be no closer than 250 feet from the Runway 12-30 centerline. In the future (C-II), aircraft parking areas should be at least 400 feet from the runway centerline. Currently, all aircraft parking positions are at least 400 feet from the runway centerline.

## RUNWAY LENGTH REQUIREMENTS

Aircraft operate on a wide variety of available runway lengths. Many factors will govern the suitability of those runway lengths for aircraft, such as elevation, temperature, wind velocity, aircraft operating weight, wing flap settings, runway condition (wet or dry), runway gradient, vicinity airspace obstructions, and any special operating procedures. Runway 12-30 is 5,500 feet long.

Advisory Circular 150/5325-4B, *Runway Length Requirements for Airport Design*, provides a five-step process for determining runway length needs.

1. Identify the list of critical design airplanes or airplane group.
2. Identify the airplanes or airplane group that will require the longest runway length at maximum certificated takeoff weight (MTOW).
3. Determine which of the three methods, described in the AC, will be used for establishing the runway length.
4. Select the recommended runway length from the appropriate methodology.
5. Apply any necessary adjustments to the obtained runway length.

The three methodologies for determining runway length requirements are based on the MTOW of the critical design aircraft or the airplane group. The airplane group consists of multiple aircraft with similar design characteristics. The three weight classifications are those with a MTOW of 12,500 pounds or less, those airplanes weighing over 12,500 pounds but less than 60,000 pounds, and those weighing 60,000 pounds or more. **Table 3K** shows these classifications and the appropriate methodology to use in runway length determination.

**TABLE 3K | Airplane Weight Classification for Runway Length Requirements**

| Airplane Weight Category (MTOW) | | | Design Approach | Methodology |
|---|---|---|---|---|
| **12,500 pounds or less** | Approach speeds of less than 30 knots | | Family grouping of small airplanes | Chapter 2: para. 203 |
| | Approach speeds of at least 30 knots but less than 50 knots | | Family grouping of small airplanes | Chapter 2: para. 204 |
| | Approach speeds of 50 knots or more | With less than 10 passenger seats | Family grouping of small airplanes | Chapter 2: para. 205, Figure 2-1 |
| | | With 10 or more passenger seats | Family grouping of small airplanes | Chapter 2: para. 205, Figure 2-1 |
| **Over 12,500 pounds but less than 60,000 pounds[1]** | | | Family grouping of large airplanes | Chapter 3: Figures 3-1 or 3-2 and Tables 3-1 or 3-2 |
| **60,000 pounds or more or Regional Jets** | | | Individual large airplanes | Chapter 4: Airplane performance manuals |

[1] Applicable methodology for determining runway length requirements.

*Source: FAA AC 150/5325-4B, Runway Length Requirements for Airport Design*

Utilizing FAA AC 150/5325-4B, *Runway Length Requirements for Airport Design*, the following presents the five-step process for determining the recommended runway length for Runway 12-30.

*Step 1: Identify the critical design airplanes or airplane group.*

The first step in determining the recommended runway length for an airport is to identify the critical design aircraft or family grouping of aircraft with similar design characteristics. The critical design aircraft or airplane group is that accounting for at least 500 annual operations. As outlined in the forecast chapter, the Cessna Citation 560XL is representative of the B-II-1B current critical aircraft. This aircraft has a maximum takeoff weight of 20,200 pounds. Since the representative critical aircraft is a business jet weighing more than 12,500 pounds, the appropriate runway length methodology is to examine the general runway length tables from Chapter 3 of AC 150/5325-4B.

*Step 2: Identify the airplanes or airplane group that require the longest runway length at maximum certificated takeoff weight (MTOW).*

Jet aircraft typically require the longest runway lengths; therefore, the runway length curves in Chapter 3 of AC 150/5325-4B will be examined for future conditions.

*Step 3: Determine which of the three methods, described in the AC, will be used for establishing the runway length.*

In consideration of the growing number of business jets (and their designation as the future design aircraft), it is necessary to select the specific methodology to use for the business jets. Chapter 3 of the AC groups business jets weighing over 12,500 pounds but less than 60,000 pounds into the following two categories:

- 75 percent of the fleet; and
- 100 percent of the fleet.

The AC states that the airplanes in the 75 percent of the fleet category generally need 5,000 feet or less of runway at mean sea level and standard day temperature (59° F), while those in the 100 percent of the fleet category need more than 5,000 feet of runway under the same conditions.

The AC indicates that the airport designer must determine which category to use for runway length determination. From the limited data available, it appears that the jet aircraft utilizing the Airport generally fall in the 0-75 percent of the fleet category. Jets in the 100 percent category rarely utilize the Airport currently. Therefore, the 75 percent of the fleet category is used to determine the current recommended runway length for EUL. **Table 3L** shows example aircraft for each runway length category.

**TABLE 3L | Categories for Runway Length Determination**

| 0-75 percent of the national fleet | MTOW | 75-100 percent of the national fleet | MTOW |
|---|---|---|---|
| Lear 35 | 20,350 | Lear 55 | 21,500 |
| Lear 45 | 20,500 | Lear 60 | 23,500 |
| Cessna 550 | 14,100 | Hawker 800XP | 28,000 |
| Cessna 560XL | 20,000 | Hawker 1000 | 31,000 |
| Cessna 650 (VII) | 22,000 | Cessna 650 (III/IV) | 22,000 |
| IAI Westwind | 23,500 | Cessna 750 (X) | 35,700 |
| Beechjet 400 | 15,800 | Challenger 604 | 47,600 |
| Falcon 50 | 18,500 | IAI Astra | 23,500 |

MTOW: Maximum Take Off Weight

*Source: FAA AC 150/5325-4B, Runway Length Requirements for Airport Design*

There are two runway length curves presented in the AC under the 75 percent of the fleet category:

- 60 percent useful load; and
- 90 percent useful load.

The useful load is the difference between the maximum allowable structural weight and the operating empty weight (OEW). The useful load consists of passengers, cargo, and usable fuel. The determination of which useful load category to use will have a significant impact on the recommended runway length;

however, it is inherently difficult to determine because of the variable needs of each aircraft operator. For shorter flights, pilots may take on less fuel; however, pilots may prefer to ferry fuel so that they don't have to refuel frequently. Because of the variability in aircraft weights and haul lengths, the 60 percent useful load category is considered the default, unless there are specific known operations that would suggest using the 90 percent useful load category. Examples of a need to use the 90 percent useful load include regular air cargo flights, long haul flights (i.e., cross-country), or known fuel ferrying needs. For this analysis, the default 60 percent useful load category will be used.

*Step 4: Select the recommended runway length from the appropriate methodology.*

The next step is to examine the 75 percent of the fleet at 60 percent useful load performance chart in the AC (**Figure 3-1**). This chart requires the following knowledge:

- The mean maximum daily temperature of the hottest month: July at 92.1°(F).
- The airport elevation: 2,431.5 feet above mean sea level (MSL).

By locating the appropriate temperature and airport elevation on the performance chart, the recommended runway length, without any adjustments, is 5,290 feet as shown on **Figure 3-1**.

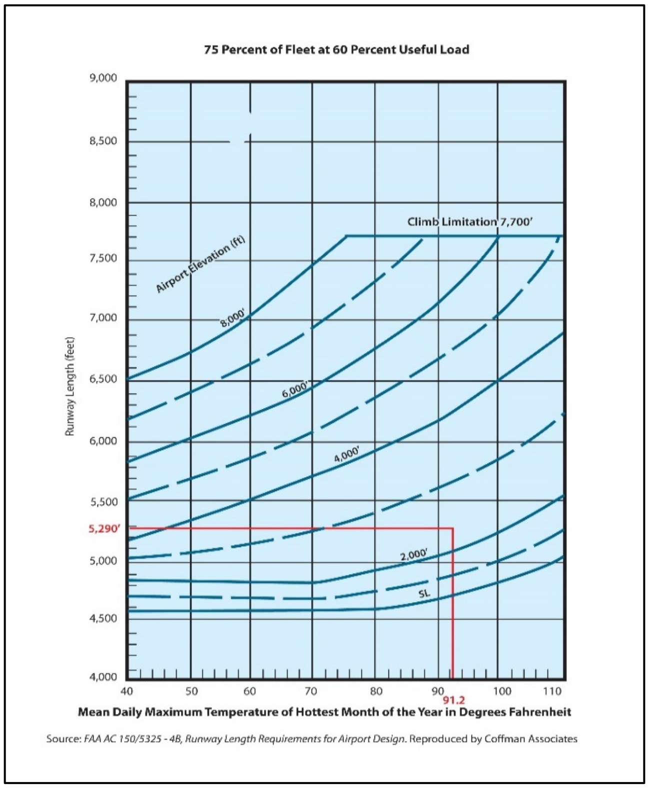



*Figure 3-1: Business Jet Runway Length*

*Step 5: Apply any necessary adjustments to the obtained runway length.*

The recommended runway length determined in Step #4 is based on no wind, a dry runway surface, and zero effective runway gradient. Therefore, the following criteria are applied:

- Wet runway surface
- 0.1% effective runway gradient (6 feet of elevation difference for Runway 12-30)

By regulation, the runway length obtained from the 60 percent useful load performance chart used in Step #4 is increased by 15 percent or up to 5,500 feet, whichever is less, to account for a wet surface.

The runway lengths obtained from Step #4 are increased at the rate of 10 feet for each foot of elevation difference between the high and low points of the runway centerline. At EUL, this equates to an additional 60 feet of required runway length.

**Table 3M** summarizes the data inputs and the final recommended runway length of 5,500 feet for the Airport.

**TABLE 3M | Runway Length Requirements**
**Treasure Valley Executive Airport**

| | | | | |
|---|---|---|---|---|
| Airport Elevation | 2,431' feet above mean sea level | | | |
| Average High Monthly Temp. | 91.2 degrees (July) | | | |
| Runway Gradient | 0.1% Runway 12-30 (6') | | | |
| **Fleet Mix Category** | **Raw Runway Length from FAA AC** | **Runway Length with Gradient Adjustment** | **Wet Surface Landing Length for Jets (+15%)*** | **Final Runway Length** |
| **75% of fleet at 60% useful load** | **5,290'** | **5,350'** | **5,500'** | **5,500'** |
| 100% of fleet at 60% useful load | 6,574' | 6,634' | 5,500' | 6,700' |
| 75% of fleet at 90% useful load | 7,441' | 7,501' | 7,000' | 7,500' |
| 100% of fleet at 90% useful load | 9,251' | 9,311' | 7,000' | 9,300' |

*Max 5,500' for 60% useful load and max 7,000' for 90% useful load in wet conditions

*Source: FAA AC 150/5325-4B, Runway Length Requirements for Airport Design.*

The 100 percent category at 60 percent useful load was also examined, which resulted in a recommended runway length of 6,700 feet. The 90 percent useful load categories are also shown for reference; however, the forecast does not indicate regular use of the runway by these aircraft.

### Supplemental Analysis Undertaken for Typical Business Jets Operating at Local Conditions

The required take-off and landing lengths for maximum load and range (adjusted for temperature and elevation) for many of the turbine aircraft utilizing the Airport are presented in **Table 3N**, for both dry and wet pavement conditions. The takeoff distance requirements reflect maximum gross weight for the aircraft; however, the percentage of useful load has also been calculated for the existing 5,500-foot runway length. When the runway length requirement exceeds the available runway length at the given design temperature, aircraft operators may be required to reduce payload. Runway length requirements that exceed the current length of Runway 12-30 are noted in red type.

Business jets may operate under different regulations depending on the type of flight being conducted, as noted in **Table 3N**. These regulations may impact the calculated runway available for landing. CFR Part 91k refers to operations conducted via fractional ownership, and Part 135 refers to commuter/on-demand (charter) operations. Fractional operators must be capable of landing within 80 percent of the landing distance available (LDA) and commuter/on-demand operators must be capable of landing within 60 percent of LDA. Operations conducted under CFR Part 25 are general aviation operations conducted by private owners, which are unfactored.

**TABLE 3N | Runway Length Requirements for Business Jets**
**Treasure Valley Executive Airport**

| **Airfield Parameters** | Elevation: 2431' MSL<br>Temp: 92.1°F<br>+/-0.1% Runway 12-30 (6' difference) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Runway Parameters** | **Take-off Length Required at MTOW** | | **% Useful Load for Takeoff on a 5,500' Runway** | | **LANDING LENGTH REQUIREMENTS** | | | | | |
| | | | | | **C.F.R. Part 25 (Unfactored)** | | **C.F.R. Part 135 (60% factored)** | | **C.F.R. Part 91k (80% factored)** | |
| **Runway Condition** | **Dry** | **Wet** | **Dry** | **Wet** | **Dry** | **Wet** | **Dry** | **Wet** | **Dry** | **Wet** |
| Lear 60 | 8,610 | 9,071 | 53% | 44% | 3,836 | 5,166 | 6,393 | 8,610 | 4,795 | 6,458 |
| Gulfstream V | 8,821 | 9,457 | 67% | 59% | 2,940 | 3,382 | 4,900 | 5,637 | 3,675 | 4,228 |
| Citation X | O/L | O/L | 67% | 52% | 4,089 | 5,821 | 6,815 | 9,702 | 5,111 | 7,276 |
| Falcon 50EX | O/L | O/L | 71% | 67% | 3,076 | 3,538 | 5,127 | 5,897 | 3,845 | 4,423 |
| Gulfstream IV | O/L | O/L | 69% | 50% | 3,779 | 7,243 | 6,298 | 12,072 | 4,724 | 9,054 |
| Challenger 300 | 6,972 | 7,468 | 72% | 63% | 2,741 | 5,253 | 4,568 | 8,755 | 3,426 | 6,566 |
| Lear 45XR | 5,962 | 5,986 | 91% | 65% | 3,012 | 3,850 | 5,020 | 6,417 | 3,765 | 4,813 |
| Citation (525) CJ1 | O/L | O/L | 96% | 95% | 3,046 | 4,119 | 5,077 | 6,865 | 3,808 | 5,149 |
| Beechjet 400A | O/L | O/L | 87% | 60% | O/L | O/L | O/L | O/L | O/L | O/L |
| Citation Bravo | 5,164 | 5,778 | 100% | 94% | 3,913 | 6,158 | 6,522 | 10,263 | 4,891 | 7,698 |
| Citation 560 XL | 5,225 | 5,357 | 100% | 96% | 3,619 | 5,741 | 6,032 | 9,568 | 4,524 | 7,176 |
| Citation Encore | 5,185 | 5,537 | 100% | 99% | 3,231 | 4,852 | 5,385 | 8,087 | 4,039 | 6,065 |
| Citation (525A) CJ2 | 4,773 | 5,106 | 100% | 100% | 3,358 | 4,846 | 5,597 | 8,077 | 4,198 | 6,058 |
| Citation Sovereign | 4,532 | 4,813 | 100% | 100% | 2,999 | 3,849 | 4,998 | 6,415 | 3,749 | 4,811 |
| Citation CJ3 | 4,391 | 4,801 | 100% | 100% | 3,188 | 4,334 | 5,313 | 7,223 | 3,985 | 5,418 |
| Citation I/SP | O/L | O/L | 92% | 92% | 2,522 | 2,900 | 4,203 | 4,833 | 3,153 | 3,625 |

*Key*:
MSL - Mean Sea Level; MTOW - Maximum takeoff weight; CFR - Code of Federal Regulations.
CFR Part 25: Standard unfactored landing lengths.
CFR Part 135: 60% factored landing length as required by commuter/on-demand operators.
CFR Part 91k: 80% factored as required by fractional operators.
O/L: Weight limited due to climb performance
Figures is red exceed the available runway length.

*Source: Aircraft operating manuals from UltraNav software.*

As can be seen in the table, most small- and medium-sized business jets can takeoff under maximum loading conditions. It is only the largest business jets that may have to reduce payload to takeoff at Caldwell under the conditions presented. Currently, there are very few operations by the largest business jets. If the number of operations by large business jets were to exceed the 500 operations threshold, then additional runway length may be justified.

### Runway Length Summary

The existing runway length of 5,500 feet is adequate to meet the needs of current airport users. Therefore, the current length should be preserved and maintained. In the future, the Airport could expect increased activity by larger business jets. These aircraft can and do currently operate at the Airport, although on an infrequent basis (less than 500 combined operations annually). Past planning for the runway has included a runway extension of 1,300 feet for a total length of 6,800 feet. This planning was intended to accommodate frequent operations (500 or more) by large business jets. Refinements in runway length determination, as well as a slight decrease in the average high monthly temperature (from 93° to 92°), results in a recommended runway length of 6,700 feet to accommodate the large business jets.

In the alternatives chapter, opportunities to extend the runway by 1,200 feet, for a total length of 6,700 feet, will be examined. A more detailed discussion of the justification for such an extension will also be presented. Based on the forecast projections of operations by large business jets, consideration will also be given to a "no-action" alternative as it relates to the runway, which would mean maintaining the existing runway length for the duration of this master plan (20 years).

### RUNWAY WIDTH

Runway 12-30 is 100 feet wide. The B-II standard is 75 feet wide. In the future when the Airport transitions to C-II, the runway width standard is 100 feet. The existing runway width should be maintained and no additional runway width is required to serve aircraft expected to operate at the Airport through the planning period.

### RUNWAY BLAST PADS

Blast pads are paved or prepared areas beyond the runway threshold that are intended to reduce prop wash and jet blast. The Airport recently installed blast areas by placing milled pavement at the ends of the runway. This effort served two purposes, one to recycle millings and two to reduce or eliminate clouds of dust from forming when certain aircraft takeoff. The blast pads are slightly oversized at 150 feet wide and 190 feet long (the standard is 95 feet wide and 150 feet long). The standard blast pad size increases if the Airport transitions to C-II, measuring 120 feet wide and 150 feet long. The existing blast pads are an asset to the runway system and should be maintained through the planning period.

### RUNWAY PAVEMENT STRENGTH

The most important feature of airfield pavement is its ability to withstand repeated use by aircraft of significant weight. The current published strength rating for Runway 12-30 is 72,000 pounds single wheel type gear, and 86,000 pounds for dual wheel type landing gear. The runway pavement is also rated following the new pavement classification number (PCN) methodology, which is 51/F/B/X/T (reference Chapter 1 for description). The pavement strength rating is adequate for the fleet of aircraft currently serving and expected to serve the Airport in the future.

It should be noted that the pavement strength rating is not the maximum weight limit for aircraft. Aircraft weighing more than the certified strength can operate on the runway on an infrequent basis. However, frequent operations by heavier aircraft can shorten the lifespan of airport pavements.

### RUNWAY LINE-OF-SIGHT AND GRADIENT

FAA has instituted various line-of-sight requirements to facilitate coordination among aircraft and between aircraft and vehicles that are operating on active runways. This allows departing and arriving aircraft to verify the location and actions of other aircraft and vehicles on the ground that could create a conflict.

Line-of-sight standards for an individual runway are based on whether there is a parallel taxiway available. When a full-length parallel taxiway is available (as it is for Runway 12-30), thus facilitating faster runway exit times, then any point five feet above the runway centerline must be mutually visible, with any other point five feet above the runway centerline that is located at less than half the length of the runway. The runway meets the line-of-sight standard.

The runway gradient is the maximum allowable slope for a runway. For Runway 12-30, the standard is no more than 2.0 percent. The runway slopes upward from the northwest end to the southeast end at a grade of 0.1 percent (six feet of elevation difference from end to end), thus meeting the gradient standard.

## TAXIWAY DESIGN STANDARDS

The design standards associated with taxiways are determined by the taxiway design group (TDG) and the airplane design group (ADG) of the critical design aircraft that would potentially use that taxiway. **Table 3P** presents the taxiway design standards to be applied at EUL. The Airport currently meets these standards, however, in some cases, the width of taxiways and taxilanes exceeds the design standard.

**TABLE 3P | Taxiway Design Standards**
**Treasure Valley Executive Airport**

| Standards Based on Wingspan (ADG) | ADG II (Runway 12-30) | |
|---|---|---|
| **TAXIWAY PROTECTION** | | |
| Taxiway Safety Area (TSA) width | 79' | |
| Taxiway Object Free Area (TOFA) width | 131' | |
| Taxilane Object Free Area width | 115' | |
| **TAXIWAY SEPARATION** | | |
| Taxiway Centerline to: | | |
| Parallel Taxiway/Taxilane | 105' | |
| Fixed or Movable Object | 65.5' | |
| Taxilane Centerline to: | | |
| Parallel Taxilane | 97' | |
| Fixed or Movable Object | 57.5' | |
| **WINGTIP CLEARANCE** | | |
| Taxiway Wingtip Clearance | 26' | |
| Taxilane Wingtip Clearance | 18' | |
| **Standards Based On TDG** | **TDG 1B (Current)** | **TDG 2 (Future)** |
| Taxiway Width Standard | 25' | 35' |
| Taxiway Edge Safety Margin | 5' | 7.5' |
| Taxiway Shoulder Width | 10' | 15' |

ADG: Airplane Design Group
TDG: Taxiway Design Group

*Source: FAA AC 150/5300-13A, Airport Design*

Taxiways typically provide direct access to the runway either via a parallel taxiway or connecting taxiways. Taxiways typically allow for faster ground movements than taxilanes. Taxilanes typically extend from taxiways to hangar areas, and they facilitate slower movement speeds than taxiways. As result, certain separation standards are different for taxiways and taxilanes. While taxiways should be planned to meet the critical aircraft standards, taxilanes can be designed to accommodate aircraft that will use it. For example, a taxilane leading to a row of small T-hangars only needs to meet the separation requirement for small aircraft and not for the larger critical aircraft.

### Taxiway Width Standards

Many airports have taxiways and taxilanes that are not uniform in width. All taxiways and taxilanes serving the critical aircraft should have a uniform width that meets that standard, now or in the future. While the current taxiway design group has a 25-foot width standard, the future TDG is for a minimum of 35-foot wide taxiways. **Table 3Q** summarizes the taxiway width standards as compared to the existing design. Taxiway A is currently 50 feet wide. The current design standard is 25 feet, and the future standard is 35 feet wide. Knowing that the future standard is 35 feet wide, it would be short-sighted to reduce the width to 25 feet only to turn around a few years later and widen it to 25 feet. Therefore, it is recommended that all taxiways be designed to meet the future standard of 35 feet in width.

**TABLE 3Q | Taxiways/Taxilanes Width Standards**
**Treasure Valley Executive Airport**

| Taxiway/Taxilane Designation | Current TDG/ Standard Width | Future TDG/ Standard Width | Current Width |
|---|---|---|---|
| Taxiway A (Parallel) | 1B/25' | 2/35' | 50' |
| Taxiway B (partial parallel) | 1B/25' | 2/35' | 50' |
| Taxiway E, F, G, J, N (Connectors) | 1B/25' | 2/35' | 50' |
| Taxiway H (Connector) | 1B/25' | 2/35' | 50' |
| Taxiway C (Parallel) | 1B/25' | 2/35' | 30' |
| Taxilane D | 1B/25' | 1B/25' | 22' |
| Taxilane G (South of Twy C) | 1B/25' | 2/35' | 35' |
| Taxilane H (South of Twy C) | 1B/25' | 2/35' | 35' |
| Taxilane J (South of Twy C) | 1B/25' | 2/35' | 35' |
| Taxilane K, L, M, N (South of Twy C) | 1B/25' | 2/35' | 35' |

### Other Taxiway Design Considerations

FAA AC 150/5300-13A, *Airport Design*, provides guidance on taxiway design that has a goal of enhancing safety by providing a taxiway geometry that reduces the potential for runway incursions. A runway incursion is defined as, "any occurrence at an airport involving the incorrect presence of an aircraft, vehicle, or person on the protected area of a surface designated for the landing and takeoff of aircraft."

The following is a list of the taxiway design guidelines and the basic rationale behind each recommendation:

1. **Taxi Method**: Taxiways are designed for "cockpit over centerline" taxiing, with pavement being sufficiently wide to allow a certain amount of wander. On turns, enough pavement should be provided to maintain the edge safety margin from the landing gear. When constructing new taxiways, upgrading existing intersections should be undertaken to eliminate judgmental over-steering, which is when the pilot must intentionally steer the cockpit outside the marked centerline to assure the aircraft remains on the taxiway pavement.

2. **Steering Angle**: Taxiways should be designed such that the nose gear steering angle is no more than 50 degrees, the generally accepted value to prevent excessive tire scrubbing.

3. **Three-Node Concept**: To maintain pilot situational awareness, taxiway intersections should provide a pilot a maximum of three choices of travel. Ideally, these are right- and left-angle turns and a continuation straight ahead.

4. **Intersection Angles**: Design turns to be 90 degrees wherever possible. For acute-angle intersections, standard angles of 30, 45, 60, 120, 135, and 150 degrees are preferred.

5. **Runway Incursions**: Design taxiways to reduce the probability of runway incursions.
   - *Increase Pilot Situational Awareness*: A pilot who knows where he/she is on the airport is less likely to enter a runway improperly. Complexity leads to confusion. Keep taxiway systems simple using the "three nodes" concept.
   - *Avoid Wide Expanses of Pavement*: Wide pavements require placement of signs far from a pilot's eye. This is especially critical at runway entrance points. Where a wide expanse of pavement is necessary, avoid direct access to a runway.
   - *Limit Runway Crossings*: The taxiway layout can reduce the opportunity for human error. The benefits are twofold – through simple reduction in the number of occurrences, and through a reduction in air traffic controller workload.
   - *Avoid "High Energy" Intersections*: These are intersections in the middle third of runways. By limiting runway crossings to the first and last thirds of the runway, the portion of the runway where a pilot can least maneuver to avoid a collision is kept clear.
   - *Increase Visibility*: Right-angle intersections, both between taxiways and runways, provide the best visibility. Acute-angle runway exits provide for greater efficiency in runway usage but should not be used as runway entrances or crossing points. A right-angle turn at the end of a parallel taxiway is a clear indication of approaching a runway.
   - *Avoid "Dual Purpose" Pavements*: Runways used as taxiways and taxiways used as runways can lead to confusion. A runway should always be clearly identified as a runway and only a runway.
   - *Indirect Access*: Do not design taxiways to lead directly from an apron to a runway. Such configurations can lead to confusion when a pilot typically expects to encounter a parallel taxiway.
   - *Hot Spots*: Confusing intersections near runways are more likely to contribute to runway incursions. These intersections must be redesigned when the associated runway is subject to reconstruction or rehabilitation. Other hot spots should be corrected as soon as practicable.

6. **Runway/Taxiway Intersections**:
   - *Right Angle*: Right-angle intersections are the standard for all runway/taxiway intersections, except where there is a need for a high-speed exit. Right-angle taxiways provide the best visual perspective to a pilot approaching an intersection with the runway to observe aircraft in both the left and right directions. They also provide optimal orientation of the runway holding position signs, so they are visible to pilots.
   - *Acute Angle*: Acute angles should not be larger than 45 degrees from the runway centerline. A 30-degree taxiway layout should be reserved for high-speed exits. The use of multiple intersecting taxiways with acute angles creates pilot confusion and improper positioning of taxiway signage.

- *Large Expanses of Pavement*: Taxiways must never coincide with the intersection of two runways. Taxiway configurations with multiple taxiway and runway intersections in a single area create large expanses of pavement, making it difficult to provide proper signage, marking, and lighting.

7. **Taxiway/Runway/Apron Incursion Prevention**: Apron locations that allow direct access into a runway should be avoided. Increase pilot situational awareness by designing taxiways in such a manner that forces pilots to consciously make turns. Taxiways originating from aprons and forming a straight line across runways at mid-span should be avoided.
   - *Wide Throat Taxiways*: Wide throat taxiway entrances should be avoided. Such large expanses of pavement may cause pilot confusion and makes lighting and marking more difficult.
   - *Direct Access from Apron to a Runway*: Avoid taxiway connectors that cross over a parallel taxiway and directly onto a runway. Consider a staggered taxiway layout that forces pilots to make a conscious decision to turn.
   - *Apron to Parallel Taxiway End*: Avoid direct connection from an apron to a parallel taxiway at the end of a runway.

FAA AC 150/5300-13A, *Airport Design,* states that, "existing taxiway geometry should be improved whenever feasible, with emphasis on designated hot spots. To the extent practicable, the removal of existing pavement may be necessary to correct confusing layouts."

There is one location on the airfield that does not currently meet the taxiway geometry design standards. Taxiway F extends from the runway across parallel Taxiways A and C and then enters the aircraft apron area. This would be considered to provide direct access to the runway from the apron.

The alternatives chapter will examine possible taxiway geometry changes that would improve pilot situational awareness and reduce potential pilot confusion. Any changes will consider the reasonableness of each alternative in terms of cost and benefit.

**Taxilane Design Considerations**

Taxilanes are distinguished from taxiways in that they do not provide access to or from the runway system directly. Taxilanes typically provide access to hangar areas and thus accommodate a slower movement speed. As a result, taxilanes can be constructed to varying design standards depending on the type of aircraft utilizing the taxilane. For example, a taxilane leading to a T-hangar area only needs to be designed to accommodate those aircraft typically accessing a T-hangar.

All taxilanes extending between hangar buildings provide for at least a 70-foot taxilane OFA, which meets the ADG I standard. The taxilanes south of Taxiway C (i.e., the extended Taxiways G, H, J, K, L, M, and N) provide for at least a 115-foot taxilane OFA, which meets ADG II standard. Any future taxilanes should be developed to provide the appropriate TOFA.

## HOLD APRONS

Hold aprons are an important feature at busy airports like EUL. Pilots can pull off the main taxiways into a hold apron to perform final pre-flight checks and engine run-ups. These activities can take several minutes and other aircraft that are ready for takeoff are then able to proceed to the runway threshold for departure without delay.

Hold aprons have specific design and separation standards which are intended to allow other aircraft to bypass aircraft using the hold apron. Specifically, the location on the hold apron where aircraft park should meet the taxiway-to-taxiway separation standard. That separation standard is based on the airplane design group of the critical aircraft. The current and future airplane design group is Roman numeral II, which includes all wingspans up to 79 feet wide. The separation standard from the parallel taxiway centerline to the holding position on the hold apron is 105 feet. An additional 17.5 feet of pavement is also required to account for the wheelbase of the holding aircraft (one-half the width of the taxiway width). Therefore, the distance from the parallel taxiway centerline to the outer edge of the hold apron should be 122.5 feet.

There are two designated hold aprons on the airfield. The hold apron serving the Runway 12 end is situated at the end of Taxiway C. The outer edge of the hold apron is only 89 feet from the centerline of Taxiway D (that portion between Taxiway A and C) when it should be 122.5 feet. Therefore, this hold apron is undersized and does not meet standard.

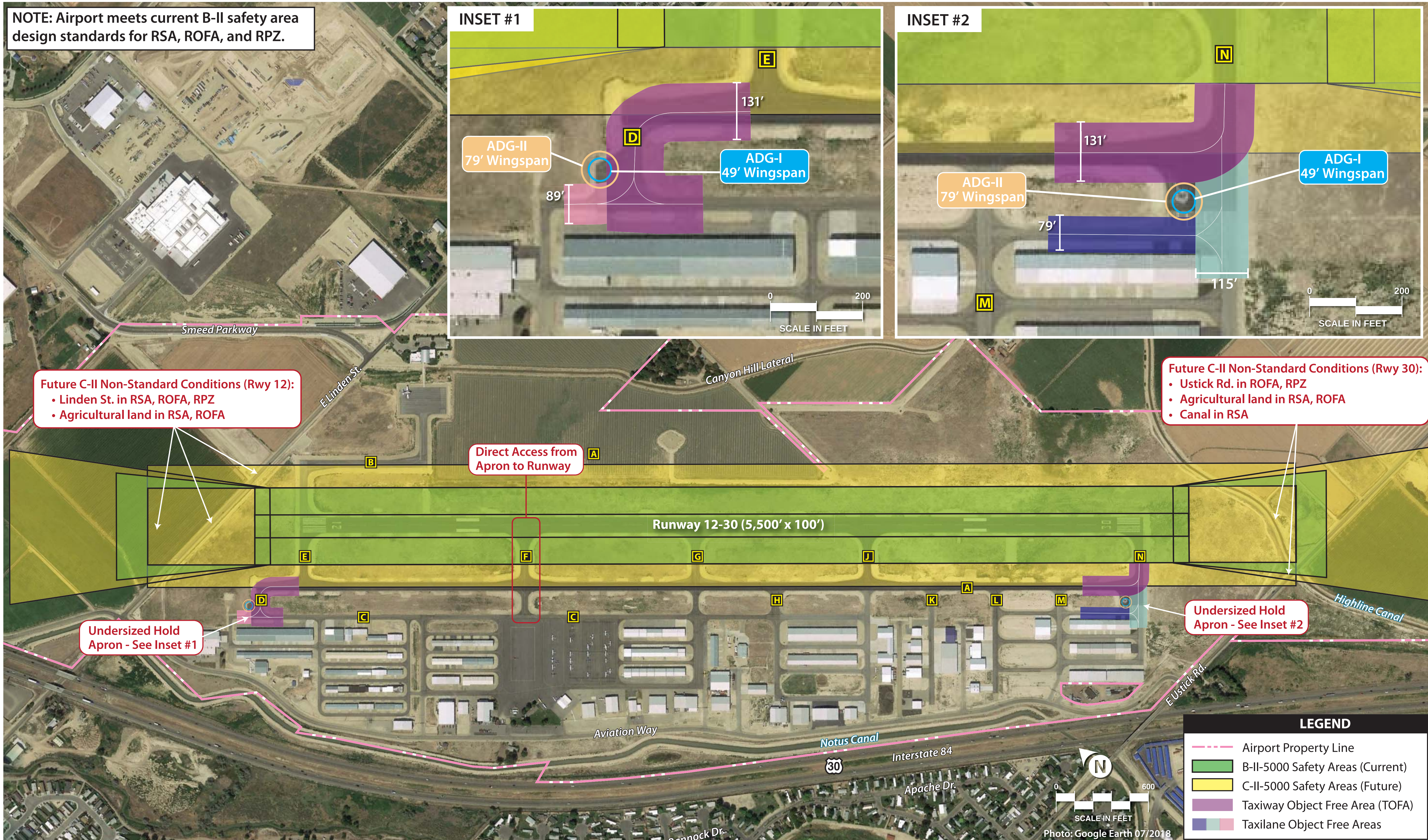
The second hold apron is located at the east end of Taxiway A and it serves Runway 30. This hold apron is larger than the first and it can accommodate an aircraft with a wingspan up to 70 feet, which includes all ADG I aircraft. It does not fully accommodate ADG II aircraft as the available space is only 70 feet and not the full 79 feet required for ADG II separation. This hold apron has the additional issue of Taxilane N extending directly to the runway threshold, which is non-standard.

The alternatives chapter will examine the feasibility of expanding or relocating these hold aprons to meet design standards. **Exhibit 3C** shows the airfield areas needing review in the alternatives chapter, including the hold aprons.

## INSTRUMENT NAVIGATIONAL AIDS AND APPROACH LIGHTING

Instrumentation for runways is important when weather conditions are less than visual (greater than three-mile visibility and 1,000-foot cloud ceilings). Both ends of the runway have non-precision instrument approaches (GPS/LPV) with 1-mile visibility minimums.

The lowest visibility minimums typically available to general aviation airports is ½-mile. At ½-mile, an approach lighting system is required, along with other ground-based equipment, including a localizer and glideslope antenna (referred to as an instrument landing system [ILS]). However, the FAA is not making new ILS installations as they move toward GPS-based instrument approaches, which are not currently available as stand-alone ILS approaches. Without an approach lighting system, the lowest feasible visibility minimum is ¾-mile.


NOTE: Airport meets current B-II safety area design standards for RSA, ROFA, and RPZ.
INSET #1
E
131'
D
ADG-II
79' Wingspan
ADG-I
49' Wingspan
89'
0
200
SCALE IN FEET
INSET #2
N
131'
ADG-II
79' Wingspan
ADG-I
49' Wingspan
79'
115'
M
0
200
SCALE IN FEET
Smeed Parkway
Canyon Hill Lateral
E Linden St.
Future C-II Non-Standard Conditions (Rwy 12):
• Linden St. in RSA, ROFA, RPZ
• Agricultural land in RSA, ROFA
Future C-II Non-Standard Conditions (Rwy 30):
• Ustick Rd. in ROFA, RPZ
• Agricultural land in RSA, ROFA
• Canal in RSA
Direct Access from Apron to Runway
Runway 12-30 (5,500' x 100')
A
B
C
D
E
F
G
H
J
K
L
M
N
Undersized Hold Apron - See Inset #1
Undersized Hold Apron - See Inset #2
Highline Canal
E Ustick Rd.
Aviation Way
Notus Canal
Interstate 84
30
Apache Dr.
Bannock Dr.
N
0
600
SCALE IN FEET
Photo: Google Earth 07/2018
LEGEND
Airport Property Line
B-II-5000 Safety Areas (Current)
C-II-5000 Safety Areas (Future)
Taxiway Object Free Area (TOFA)
Taxilane Object Free Areas

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The previous master plan and airport layout plan included the potential to lower the visibility minimums to ½-mile. At the time, it was common practice to allow roads to pass through RPZs; however, more recent FAA guidance indicates that roads are not a compatible land use for RPZs. Therefore, there may be challenges to maintaining the plan of ½-mile instrument approaches. The alternatives analysis will examine the feasibility of lower visibility minimums and the actions that would be necessary to have the associated RPZs meet standard for land use compatibility.

To provide pilots with visual guidance information during landings to the runway, electronic visual approach aids are commonly provided at airports. Both runway ends are equipped with a four-light precision approach path indicator (PAPI-4). These systems should be maintained.

### AIRFIELD MARKING, LIGHTING, AND SIGNAGE

Runway markings are designed according to the type of straight-in instrument approaches available to each runway end. Both ends of the runway have non-precision instrument markings. Since both ends of the runway are planned for non-precision instrument approaches, the current markings should be maintained. If an instrument approach with visibility minimums down to ½-mile is determined to be feasible in the alternatives analysis, then precision runway markings will be required.

Runway 12-30 is equipped with medium intensity edge lighting, which is appropriate, and should be maintained.

Taxiways A and B have medium intensity taxiway lighting which should be maintained. There is no edge lighting for Taxiways C and D, nor for the taxilanes, which is acceptable. The transient apron near the terminal building has blue can reflectors. Ultimately, the apron should be lit with apron lighting.

### HELICOPTER FACILITIES

There is a significant level of helicopter activity at the Airport, primarily generated by flight training. According to the forecast, estimates were approximately 33,000 helicopter operations in 2019. There are 22 helicopters based at the Airport. FAA AC 1150/5390-2C, *Heliport Design*, provides guidance on the design and location of heliports. The purpose of a heliport is to enhance the safety and operation of helicopters at airports.

There is no FAA requirement or activity threshold that triggers the need for a formal heliport. Development of a heliport is generally undertaken when it is determined by airport management that such a facility can enhance the safety of operations. It is unusual to develop a heliport to accommodate activity by only a few helicopters. More typically, heliports may be established at airports with significant transient or local training activity.

Currently, most helicopter activity is located on the south apron in proximity to the helicopter flight training business. This location is ideal since it is close to the main office and it follows the FAA guidance, which recommends locating helicopter parking as close to the intended origination/destination as possible, while ensuring safety.

According to the AC, "Separate facilities and approach/departure procedures may be necessary when the volume of airplane and/or helicopter traffic impacts operations." Currently, the interaction of fixed-wing aircraft and helicopters does not appear to negatively impact operations at the Airport. Nonetheless, Caldwell has a significant level of helicopter activity, and a heliport might be considered. The alternatives chapter will examine the feasibility of locating a heliport on the Airport.

### AIRSIDE SUMMARY

The Treasure Valley Executive Airport at Caldwell has a nice complement of airside systems with only a few noted areas of improvement. Taxiways F allows direct access to the runway, which is not the current recommended geometry. Both hold aprons are undersized and do not meet current geometry standards. Currently, both RPZs have roads that traverse them which no longer meet standards. The Airport should seek opportunities to remove the roads from the RPZs; however, since this is an existing condition that predates the current FAA guidance, no immediate action is necessary. If the RPZs change size or location, thus introducing more incompatible land uses, then FAA HQ will need to be consulted on feasibility. The RSA and ROFA both currently meet standard; however, when the Airport transitions to more restricting design standards, then both will be penetrated by roads which must be mitigated at that time. While the existing runway system provides adequate capacity and wind coverage, Runway 12-30 will be examined in the following chapter for potential extension to accommodate increasing business jet activity at the Airport. A summary of the airside facility needs is shown on **Exhibit 3D**.

## *LANDSIDE REQUIREMENTS*

Landside facilities provide the essential interface between the airside facilities and ground access to and from the Airport. The capacities of existing facilities have been examined against the projected requirements to gauge anticipated timing of needs. Included in the following analysis are: aircraft hangars and storage, aircraft parking apron, general aviation terminal services, automobile parking, and support elements, such as fuel storage, perimeter fencing, and a potential control tower.

### AIRCRAFT STORAGE REQUIREMENTS

The demand for aircraft storage hangar area is based upon the forecast number and mix of aircraft expected to be based at the Airport in the future. Most based aircraft are stored in either individual hangars or shared conventional hangars. It is estimated that 90 percent of the based aircraft will require hangar storage. Future requirements for T-hangars are calculated using 1,400 square feet per space/unit, box hangars are estimated at 2,200 square feet per space/unit, and conventional hangar space has been estimated at 2,800 square feet per space/unit.

Future hangar requirements for the Airport are summarized in **Table 3R**. As shown in the table, additional hangar area will be required throughout the planning period. The landside alternatives evaluation will examine the options available for hangar development at the Airport and determine the best

| | AVAILABLE | POTENTIAL IMPROVEMENT/CHANGE |
|---|---|---|
| **RUNWAY 12-30** | | |
|  | RDC: B-II-5000 | C-II-4000 or C-II-2400 |
| | Visibility minimum: 1-mile | Examine ¾- and ½-mile visibility minimums |
| | Runway length/width: 5,500' x 100' | Consider extension to 6,700'/maintain current width |
| | Pavement strength: 72(S)/86(D) | Maintain |
| | RSA: 150' wide x 300' beyond runway ends | RSA: 500' wide x 1,000' beyond runway ends |
| | ROFA: 500' wide x 300' beyond runway ends | ROFA: 800' wide x 1,000' beyond runway ends |
| | OFZ: 400' wide x 200' beyond runway ends | Meets standard - maintain |
| | RPZ ownership: partial ownership | Acquire if feasible. |
| | RPZ Incompatibilities: Roads | Remove RPZ incompatibilities if feasible (not required) |
| | Nonprecision markings | Meets standard - Maintain |
| | Precision markings (currently NA) | Add precision markings for ½-mile visibility minimums |
| | Medium intensity runway lighting (MIRL) | Meets standard - Maintain |
| **TAXIWAYS** | | |
|  | TDG - 1B | TDG - 2 |
| | Centerline markings | Meets standard - maintain |
| | Width varies from 20'-50' | Implement uniform 35' taxiway width |
| | Medium intensity taxiway lighting (MITL) | Meets standard - maintain |
| | Taxiway layout/geometry deficiencies | Redesign taxiway layout/geometry deficiencies |
| **INSTRUMENT NAVIGATION AND WEATHER AIDS** | | |
|  | WX-AWOS | Maintain system |
| | Beacon | Maintain |
| | 3 Windsocks/1 wind indicator | Consider adding windsocks near runway thresholds. |
| | 1-mile non-precision instrument approach (Rwy 12) | Consider ¾-mile minimums |
| | 1-mile non-precision instrument approach (Rwy 30) | Consider ¾ or ½-mile minimums |
| | Airport Traffic Control Tower - None | Consider ATCT locations |
| **VISUAL AIDS** | | |
|  | PAPI-4L | Maintain |
| | REILs (NA) | Consider adding REILs to both runway ends |

**KEY**

AWOS - Automated Weather Observing System
MIRL/HIRL - Medium/High Intensity Runway Lighting
MITL - Medium Intensity Taxiway Lighting
OFZ - Obstacle Free Zone
PAPI - Precision Approach Path Indicator
RDC - Runway Design Code
REIL - Runway End Identification Lights
ROFA - Runway Object Free Area
RSA - Runway Safety Area
RPZ - Runway Protection Zone
TDG - Taxiway Design Group



Exhibit 3D
AIRSIDE FACILITY REQUIREMENTS

location for each type of hangar facility. It should be noted that the Airport is currently at a 100 percent occupancy rate. There is a current need for more hangar space and larger executive and conventional hangars are in the highest demand.

**TABLE 3R | Hangar Needs**
**Treasure Valley Executive Airport**

| | Currently Available | Current Need | Short Term | Intermediate Term | Long Term |
|---|---|---|---|---|---|
| Based Aircraft | 400 | 400 | 421 | 444 | 493 |
| Aircraft to be Hangared (90%) | 360 | 360 | 379 | 400 | 444 |
| Single and Multi-Engine Piston | 344 | 344 | 355 | 366 | 392 |
| Turboprops, Jets, and Helicopters | 16 | 16 | 24 | 34 | 52 |
| **HANGAR AREA REQUIREMENTS** | | | | | |
| T-Hangar Area | 68,400 | 77,000 | 79,000 | 82,000 | 87,000 |
| Box Hangar Area | 505,250 | 502,000 | 532,000 | 557,000 | 611,000 |
| Conventional Hangar Area | 171,200 | 189,000 | 226,000 | 248,000 | 291,000 |
| **Total Storage Area (s.f.)** | **744,850** | **768,000** | **837,000** | **887,000** | **989,000** |

Future T-hangar area is estimated at 1,400 sf. per aircraft parking space
Future box hangars are estimated at 2,200 sf. per aircraft parking space
Future conventional hangar area is estimated at 2,800 sf. per aircraft parking space
*Source: Coffman Associates analysis.*

Currently, there is approximately 745,000 square feet of hangar storage space. There is a calculated immediate need for 23,000 square feet of more space. By the long-term planning period, it is estimated that approximately 989,000 square feet will be needed. Over the next 20 years, approximately 244,000 square feet of additional hangar space may be needed.

## AIRCRAFT PARKING APRON REQUIREMENTS

Parking aprons should provide for the locally based aircraft that are not stored in hangars, itinerant and transient aircraft, as well as for those aircraft used for maintenance functions, such as temporary ramp space when moving aircraft around. In total, it is estimated there are 88 apron positions available on the Airport. This includes approximately 56 on the main southside apron, 20 transient positions (six of which are adjacent to the north side terminal building), and 12 on the south side which are primarily used by helicopters. Combined, these positions represent approximately 45,000 square yards of paved ramp.

The local tie-down apron is slightly undersized currently and by the long-term planning period, approximately 6,100 square yards of local tie-down apron could be needed. The transient apron space is also undersized at approximately 19,000 square yards currently. By the long-term planning period, a total of 35,800 square yards of dedicated transient apron may be required. The apron area primarily used by helicopters on the south side is adequate for the short term but may need to be expanded through the long-term planning period. Total aircraft parking apron requirements are presented in **Table 3S**.

**TABLE 3S | Aircraft Apron Requirements**
**Treasure Valley Executive Airport**

| | | | FORECAST | | |
|---|---|---|---|---|---|
| | **Currently Available** | **Calculated Need** | **Short Term** | **Intermediate Term** | **Long Term** |
| Local Apron Positions | 56 | 50 | 52 | 54 | 59 |
| Local Apron Area (s.y.) | 13,000 | 17,000 | 18,300 | 18,300 | 19,100 |
| Transient Apron Positions | 20 | 30 | 32 | 34 | 37 |
| Piston Transient Positions | 16 | 24 | 25 | 27 | 30 |
| Turbine Transient Positions | 4 | 6 | 6 | 7 | 7 |
| Transient Apron Area (s.y.) | 19,000 | 29,000 | 30,500 | 32,200 | 35,800 |
| Helicopter Apron Positions | 12 | 12 | 12 | 13 | 15 |
| Helicopter Apron Area (s.y.) | 13,000 | 13,000 | 13,000 | 14,300 | 16,500 |
| **Total Apron Area (s.y)** | **45,000** | **59,000** | **61,800** | **64,800** | **71,400** |

*Source: Coffman Associates analysis*

## GENERAL AVIATION TERMINAL SERVICES

General aviation terminal services have several functions, such as flight planning, a pilots' lounge, concessions, airport management, and storage. Many airports will also have leasable space in the terminal building for such features as a restaurant or concessions area, FBO line services, and other needs. These functions at EUL are generally included in the terminal building, although other commercial users (e.g., FBOs) on the airport may duplicate many of these functions.

The methodology used in estimating general aviation terminal facility needs is based on the number of airport users expected to utilize these facilities during the design hour. General aviation space requirements are based upon providing 120 square feet per design hour itinerant passenger. Design hour itinerant passengers are determined by multiplying design hour itinerant operations by the estimated number of passengers on the aircraft (multiplier). **Table 3T** outlines the general aviation terminal facility space requirements for the Airport.

**TABLE 3T | General Aviation Terminal Area Facilities**
**Treasure Valley Executive Airport**

| | **Existing Facilities** | **Short Term** | **Intermediate Term** | **Long Term** |
|---|---|---|---|---|
| Design Hour Operations | 71 | 75 | 77 | 82 |
| Design Hour Itinerant Operations | 24 | 25 | 26 | 29 |
| Multiplier | 2.0 | 2.0 | 2.0 | 2.0 |
| Total Design Hour Itinerant Passengers | 48 | 50 | 53 | 59 |
| Terminal Building Public Space (s.f.) | 9,000 | 5,100 | 5,355 | 6,035 |
| FBO GA Services Space (s.f.) | 1,000 | 900 | 945 | 1,065 |
| Total Terminal Building Space (s.f.) | 10,000 | 6,000 | 6,300 | 7,100 |

*Source: Coffman Associates analysis*

The north side terminal building provides general aviation services as do several Airport businesses on the south side. As the north side of the Airport expands with more hangars, as has been long planned, the terminal building will naturally serve an increasing role as a terminal providing user services. Currently, most of the aviation activity is positioned on the south side of the airfield.

### AUTOMOBILE PARKING

Airport planners should be cognizant of the need for vehicle parking space on general aviation airports. At the same time, parking needs are generally determined by the hangar owner's needs. Those operating a business may have a need for more parking, while private hangars may not have a need for any dedicated parking as they park in their hangars when utilizing their aircraft. For this reason, it is inherently challenging to estimate future hangar needs.

Parking needs can be divided between transient airport users and locally based users. Transient users include those employed at the airport and visitors, while locally based users primarily include those attending to their based aircraft. Ideally, both user types would have access to dedicated vehicle parking outside the fence; however, at general aviation airports, it is common for local based aircraft owners to park in their hangar. Rather than attempt to determine a specific number of vehicle positions needed in the future, developers should include vehicle parking, where necessary, in their development plans.

At Caldwell, the total number of vehicle parking spaces appears adequate. New parking should be made available in conjunction with new hangar/building construction.

## *SUPPORT FACILITIES*

Various facilities that do not logically fall within the airside or landside classification are examined in this support facilities section. These support facilities relate to the overall operations of the Airport.

### FUEL STORAGE

Fuel sales are managed by the fuel providers on the Airport. They own and operate their own fuel storage and delivery vehicles. Therefore, it is a business decision if additional fuel storage capacity is needed.

Additional fuel storage capacity should be planned if the fuel providers are unable to maintain an adequate supply and reserve—a 14-day reserve being common for general aviation airports. Including delivery trucks, there is a 14,000-gallon capacity for Jet A fuel and 25,000 gallons for Avgas. In 2019, there was approximately one gallon of Avgas sold per piston operation and for Jet A, it was approximately three gallons sold per turbine operation. Future fuel sales are based on an increasing volume per operation as outlined in **Table 3U**. Current fuel capacity appears adequate through the intermediate planning horizon. By the long term, additional Avgas and Jet A fuel may be needed.

**TABLE 3U | Fuel Storage Requirements**
**Treasure Valley Executive Airport**

| | | | PLANNING HORIZON | | |
|---|---|---|---|---|---|
| | Current Capacity (gal.) | Baseline Consumption[1] | Short Term | Intermediate Term | Long Term |
| **Jet A Gallons per Operation** | 14,000 gal. | 3 gal./op. | 5 gal./op. | 10 gal./op. | 30 gal./op. |
| Annual Usage (gal.) | | 32,141 | 60,762 | 135,779 | 501,654 |
| Daily Usage (gal.) | | 88 | 166 | 372 | 1,374 |
| 14-Day Storage (gal.) | | 1,233 | 2,331 | 5,208 | 19,242 |
| **Avgas Gallons per Operation** | 25,000 gal. | 0.9 gal./op. | 1 gal./op. | 2 gal./op. | 5 gal/op. |
| Annual Usage (gal.) | | 122,987 | 145,072 | 291,906 | 762,606 |
| Daily Usage (gal.) | | 337 | 397 | 800 | 2,089 |
| 14-Day Storage (gal.) | | 4,717 | 5,564 | 11,196 | 29,251 |

*Source: [1]Airport fuel report (2019); Coffman Associates analysis*

## PERIMETER FENCING

At general aviation airports, full perimeter fencing is not required like it is at commercial service airports. Perimeter fencing serves multiple purposes, including basic airfield security and wildlife deterrence. As development occurs around general aviation airports, the need for full perimeter fencing becomes more necessary.

Currently, Caldwell has perimeter fencing and access gates on the south side of the Airport. Portions of the west side have perimeter fencing. There is limited fencing on the north and east sides of the Airport. As development occurs on the north side, additional perimeter fencing should be considered.

## AIRCRAFT RESCUE AND FIREFIGHTING FACILITIES

Airports that are certificated under Title 14 Code of Federal Regulations, Part 139 (commercial service airports), are required to have on-site firefighting capabilities. The Treasure Valley Executive Airport is not a Part 139 airport and, therefore, is not required to have on-site firefighting capabilities. Instead, local fire departments respond to Airport emergencies.

The closest fire station is Fire Station No. 3, located approximately one mile to the northeast. The fire station maintains a supply of aqueous film-forming foam (AFFF). Additional supplies are available at other nearby locations.

## AIRPORT TRAFFIC CONTROL TOWER

The Treasure Valley Executive Airport does not currently have an airport traffic control tower (ATCT). All traffic is coordinated through the local Unicom radio frequency, which is monitored by the Airport administration and Airport FBOs. The current level of operations at the Airport may indicate that airport safety could be enhanced if there were an ATCT. The following presents the process and initial analysis for justifying a federally funded ATCT.

Guidance for the establishment of an ATCT is provided in the following documents:

- FAA Advisory Circular 150/5300-13A, *Airport Design*;
- FAA Order 6480.7D, *Airport Traffic Control Tower and Terminal Radar Approach Control Facility Design Guidelines*;
- FAA Order 6480.4B, *Airport Traffic Control Tower Siting Process*;
- FAA Order 8260.3D, *United States Standard for Terminal Instrument Procedures (TERPS)*;
- FAA Handbook 7031.2C, *Airway Planning Standard Number One - Terminal Air Navigation Facilities and Air Traffic Control Services*.
- Federal Aviation Regulations (FAR) Part 170, *Establishment and Discontinuance Criteria for Air Traffic Control Services and Navigational Facilities*;
- FAA Report No. APO 90-7, *Establishment and Discontinuance Criteria for Air Traffic Control Towers.*

**Establishment Criteria**

Air traffic control towers (ATCTs) are established at airports to provide for a safe, orderly, and expeditious flow of traffic on, and in the vicinity of, an airport. Class D airspace surrounding the airport from the surface to 2,500 feet above the airport elevation (charted in mean sea level) is usually established in conjunction with a new ATCT. Many of the new control towers are part of the Federal Contract Tower Program.

The FAA has the authority to establish control towers or discontinue control tower services through the National Airspace System when activity levels and safety considerations merit such action. Criteria for establishing a control tower was initially developed and published in 1951. Current guidelines are established by the FAA Office of Aviation Policy and Plans (APO-200).

According to FAR Part 170.13, the following criteria, along with general facility establishment standards, must be met before an airport can qualify for a control tower:

1. The airport, whether publicly or privately owned, must be open to and available for use by the public as defined in the *Airport and Airway Improvement Act of 1982*;
2. The airport must be part of the *National Plan of Integrated Airport Systems* (NPIAS);
3. The airport owners/authorities must have entered into appropriate assurances and covenants to guarantee that the airport will continue in operation for a long enough period to permit the amortization of the control tower investment;
4. The FAA must be furnished appropriate land without cost for construction of the control tower; and
5. The airport must meet the benefit-cost ratio criteria utilizing three consecutive FAA annual counts and projections of future traffic during the expected life of the tower facility. (An FAA annual count is a fiscal year or a calendar year activity summary. Where actual traffic counts are unavailable or not recorded, adequately documented FAA estimates of the scheduled and non-scheduled activity may be used.)

The FAR specifically states that an airport is not guaranteed to receive a control tower, even if the airport meets all the criteria listed above. This is where the contract tower program comes in. The FAA, responding to an airport sponsor's request for an air traffic control tower, can elect to establish a contract tower. The FAA will fund the operating costs of an ATCT included in the contract tower program if depending on the results of the benefit-cost analysis. Typically, the airport sponsor is responsible for the cost of construction of the tower. Recent changes to Federal legislation have made some funds available for ATCT construction which is discussed further in Chapter Six.

**Benefit-Cost Ratio**

The FAA prescribes benefit-cost-based criteria for establishment and discontinuance of control tower facilities as part of its mission to maximize safety and efficiency throughout the airport and airway system consistent with available resources. Decisions to establish and operate control towers have been, and will continue to be, based on benefits exceeding costs of such actions.

The criteria and computation methods used in determining the eligibility of terminal locations for VFR tower establishment and discontinuance is based on economic analysis of the costs and benefits of a control tower. The criterion compares the present value of VFR tower benefits (BPV) at a site with the present value of VFR tower costs (CPV) over a 15-year timeframe. A location is eligible for a control tower when the benefits derived from operating the tower exceed the installation and operation costs. This is the same as saying that value of benefits exceeds costs, or **BPV/CPV≥1.00.**

Site-specific activity forecasts are used to estimate three categories of tower benefits:

- Benefits from prevented collisions between aircraft;
- Benefits from other prevented accidents; and
- Benefits from reduced flying time.

Explicit dollar values are assigned to the prevention of fatalities and injuries and time saved.
Tower establishment costs include:

- Annual operating costs: staffing, maintenance, equipment, supplies, and leased services.
- Investment costs: facilities, equipment, and operational start-up.

**The Federal Contract Tower (FCT) Program**

The FCT has been in place since 1982 and currently provides for the contract operation of air traffic control (ATC) services at over 250 airports. Through the program, FAA contracts air traffic control services to the private sector at visual flight (VFR) airports. The primary advantages of the program are enhanced safety and significant cost savings to the federal government. FAA contract towers receive continuous oversight and monitoring by FAA and all contract controllers are certified by the agency.

**Initial Analysis**

The establishment of a new ATCT follows a two-phase process as outlined in FAA Order 7031.2C, *Airway Planning Standard Number One - Terminal Air Navigation Facilities and Air Traffic Control Services*. The first phase involves identifying possible candidacy through analysis of operational levels at the Airport. The formula presented in **Table 3V** has been utilized as an initial operational screening test to determine if it is reasonable for the Airport to request a full benefit/cost analysis from the FAA.

**TABLE 3V | ATCT Eligibility Calculations**
**Treasure Valley Executive Airport**

| | | PLANNING YEAR | |
|---|---|---|---|
| **Formula** | **Function** | **2019** | **2039** |
| Air Carrier Operations/38,000 | + | 0.0000 | 0.0000 |
| Air Taxi Operations/90,000 | + | 0.0226 | 0.0304 |
| GA Itinerant Operations/160,000 | + | 0.2923 | 0.3605 |
| GA Local Operations/280,000 | + | 0.3509 | 0.3876 |
| Military Itinerant Operations/48,000 | + | 0.0068 | 0.0068 |
| Military Local Operations/90,000 | + | 0.0000 | 0.0000 |
| **Total** | **=** | **0.6725** | **0.7853** |

*Source: Coffman Associates*

Experience at airports with similar annual operations to EUL has shown that when the initial results of the formula are above 0.5, there is a possibility that the FAA benefit/cost ratio may be above 1.0 because it considers many additional factors, not just operations, with varying degrees of weight applied. Should the City of Caldwell desire, they may notify the FAA of a desire to be included in the ATCT program so that a benefit/cost analysis can be conducted.

The second phase involves complex analysis of the benefits and costs of the establishment of an ATCT. The benefits, which derive from operating the tower, must exceed the installation and operation costs. The costs would include such items as construction, installation, salaries, and maintenance. The analysis applies values to the benefits, which include accident prevention and increases in efficiency.

Should a benefit/cost analysis be conducted, and it is found that the ratio is below 1.0, then under the contract tower cost-sharing program, the Airport could qualify for on-going operational FAA funding equal to the benefit/cost ratio. For example, if a benefit/cost ratio of 0.76 results, then the Airport could be expected to receive funding to cover 76 percent of the annual operations cost. The city would then be responsible for the remaining 24 percent of the annual operating costs.

Since the Airport has not been served by an ATCT, current operational counts are estimates and the FAA may require further justification of operational counts. In the past, the FAA has supported the use of acoustical counts or even established a temporary tower to obtain a more accurate operational count. Such a physical count was conducted at Caldwell for a 12-month period and is the basis of the forecasts previously presented. Fuel sales records and manual monitoring of activity can also aid the FAA benefit/cost analysis.

Whether a positive benefit/cost ratio is realized in the short or long term, it is important to identify and reserve an appropriate location on the airport for a new ATCT. The alternatives chapter will include a basic site analysis for locating a new ATCT.

## AIRPORT ACCESS

Access to the Airport is a concern to the Airport sponsor and the community. While Interstate 84 passes to the immediate south of the Airport, the nearest exit is at Franklin Road to the west. From this interchange, those going to the Airport must traverse a 2.5-mile winding route to get the Airport. There is no reasonable access from the Interstate from the east.

Area transportation planners have, in the past, considered a new Interstate 84 interchange at Middleton Road. Such an interchange could potentially provide more direct access to the Airport. A more direct route to the Airport would make the development of Airport compatible industrial and commercial properties more likely. The Airport sponsor should follow development in this regard to ensure that any new interchange planned to the south or east of the airport consider Airport access.

## PARACHUTE ACTIVITY

The Treasure Valley Executive Airport is one of five “drop zones” in Idaho and one of approximately 240 in the United States (www.dropzone.com). Each of these sites is so designated on aeronautical sectional charts with a small parachute symbol. Established drop zones have an associated annual NOTAM (Notice to Airmen) that alerts pilots to the possibility of parachute activity. Parachutists are free to utilize the Airport without prior notification.

The FAA regulates skydiving activities under Title 14 of the Code of Federal Regulations, Part 105 (14 CFR 105), “Parachute Operations.” Flight operations for skydiving are conducted under Part 91, General Operating and Flight Rules (14 CFR 91). FAA Advisory Circulars (AC) provide additional guidance about aspects of sky diving operations: FAA AC 105-2, *Sport Parachute Jumping*, and FAA AC 90-66, *Recommended Standard Traffic Patterns for Aeronautical Operations at Airports without Operating Control Towers*. In addition, the FAA’s Airports Compliance Handbook (Order 5190.6B) details an airport’s obligation with respect to skydiving and other activities.

According to the *Airports Compliance Handbook*, parachute jumping is an aeronautical activity and requests to use an airport for this purpose or to establish a drop zone within the airport boundaries must be evaluated by the airport operators on the same basis as any other aeronautical activity. Airports that accept federal grants, such as EUL, cannot discriminate against any business conducting aeronautical activities, but reasonable limitations may be implemented to ensure safe operation of the airport. Among the reasonable limitations are:

- The airport owner designates reasonable time periods for jumping and specific areas for drop zones.
- Jumpers (or requesting organizations) agree to pay a reasonable fee that is not unjustly discriminatory.
- Jumpers hold a general liability insurance policy that names the airport owner as an additional ensured party, with the amount of insurance to be reasonable and not unjustly unreasonable.

To further quote from the *Airports Compliance Handbook*, "the airport owner is not required to permit this activity if, in his judgment, it creates a safety hazard to the normal operations of aircraft arriving or departing from the airport, nor is the airport owner required to close the airport to provide a safe environment for parachute jumpers." The FAA Flight Standards and Air Traffic division has the authority to make a final determination of the reasonableness of any airport owner's restrictions.

When Caldwell Industrial Airport was constructed in the mid-1970s, it was a low activity facility that experienced little, if any, helicopter and jet activity. Today, the Airport experiences more than 150,000 annual operations and has a very active helicopter flight school and several based turboprops and business jets. Skydivers should exercise extreme caution when utilizing the Caldwell drop zone.

### WASH RACK

Busier general aviation airports will often desire to establish an aircraft wash rack in a single location for aircraft cleaning purposes. Wash racks and water recovery systems enhance pollution prevention through water reclamation, wash eater filtration, and cleaning solution reclamation. Wash racks provide an environmentally friendly method to contain aircraft cleaning fluids.

There is not a dedicated wash rack facility at the Airport currently. The alternatives analysis will consider potential locations for a wash rack.

### LANDSIDE SUMMARY

**Exhibit 3E** summarizes the landside and support facility requirements. The Airport is at capacity for hangar occupation currently. There is a forecast need for up to an additional 244,000 square feet of aircraft hangar space over the next 20 years. As the Airport grows in terms of based aircraft as forecast, additional aircraft parking apron will be needed to accommodate that growth. As additional facilities are constructed, vehicle parking should be included to accommodate the planned use of the facility.

## *SUMMARY*

This chapter has outlined both airside and landside facility requirements for EUL for a 20-year planning period.

At its current length of 5,500 feet, Runway 12-30 meets the needs of current Airport users. By the long-term planning period, there is a possibility that the Airport will transition to a larger critical aircraft by recording more than 500 annual operations by these larger business jets. If this happens, then there may

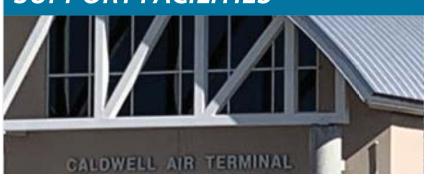
## HANGARS

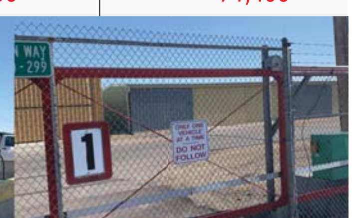
| | Available | Short Term | Intermediate Term | Long Term |
|---|---|---|---|---|
| **Based Aircraft** | 400 | 421 | 444 | 493 |
| **Hangar Positions** | | | | |
| T-Hangars | 55 | 56 | 58 | 62 |
| Executive/Box Hangars | 245 | 242 | 253 | 278 |
| Conventional Hangar Positions | 91 | 81 | 89 | 104 |
| **Hangar Area (s.f.)** | | | | |
| T-Hangars | 68,400 | 79,000 | 82,000 | 87,000 |
| Conventional Hangar | 171,200 | 226,000 | 248,000 | 291,000 |
| Executive/Box Hangars | 505,250 | 532,000 | 557,000 | 611,000 |
| Total Hangar Area | 744,850 | 837,000 | 887,000 | 989,000 |

## AIRCRAFT PARKING POSITIONS


| | Available | Short Term | Intermediate Term | Long Term |
|---|---|---|---|---|
| Local Positions | 56 | 52 | 54 | 59 |
| Local Helicopter Positions | 12 | 12 | 13 | 15 |
| Transient Piston Positions | 16 | 25 | 27 | 30 |
| Transient Business Jet Positions | 4 | 6 | 7 | 7 |
| **Aircraft Parking Apron (s.y.)** | | | | |
| Local Apron Area | 13,000 | 18,300 | 18,300 | 19,100 |
| Helicopter Apron Area | 13,000 | 13,000 | 14,300 | 16,500 |
| Transient Apron Area | 19,000 | 30,500 | 32,200 | 35,800 |
| Total Apron | 45,000 | 61,800 | 64,800 | 71,400 |

## SUPPORT FACILITIES




| | Available | Short Term | Intermediate Term | Long Term |
|---|---|---|---|---|
| **Auto Parking** | | | | |
| Total Vehicle Parking Spaces | 270 | 205 | 217 | 241 |
| Total Vehicle Parking Area (s.f.) | 55,100 | 62,000 | 65,000 | 72,000 |
| **GA Terminal Building** | | | | |
| Area (s.f.) | 10,000 | 6,000 | 6,300 | 7,100 |
| **Fuel Storage** | | | | |
| Jet A Capacity | 14,000 gal. | Maintain | Maintain | Add 12,000 gal. |
| AvGas Capacity | 25,000 gal. | Maintain | Maintain | Add 12,000 gal. |
| Perimeter Fencing | Intermittent Fencing on north and east sides | Provide full perimeter fencing | Maintain and Replace as Needed | Maintain and Replace as Needed |
| Aircraft Wash Rack | None | Add Wash Rack | Maintain | Maintain |



Exhibit 3E
LANDSIDE FACILITY REQUIREMENTS

be justification for a runway length of up to 6,700 feet. In addition, the RSA, ROFA, and RPZ dimensions all become more restrictive. Currently, there is not available space to easily plan for a longer runway and more restrictive design standards; therefore, the alternatives analysis to follow will examine the impacts of meeting these long-term requirements.

Consideration will also be given to potential improvements to the instrument approach procedures. Currently, the procedures permit landing when visibility is as low as 1-mile. The lowest visibility minimums available to general aviation airports is ½-mile; therefore, an analysis of the feasibility of improving the visibility minimums will be examined in the alternatives chapter.

The current taxiway width standard is 25 feet; however, the Airport is anticipated to transition to a width standard of 35 feet. Some of the taxiways exceed this standard. At the time of the next major reconstruction of those taxiways, additional analysis may be required to maintain the current width. Without special dispensation for taxiway width, this plan will consider a uniform width of 35 feet for all taxiways.

Landside facility requirements indicate an increasing need for more hangar space. Over the 20-year scope of the master plan, approximately 245,000 square feet of hangar space may be needed to accommodate forecast growth at the Airport. Along with that growth comes a commensurate need for additional aircraft parking apron and vehicle parking.

Current activity levels indicate that the Airport may be eligible for an airport traffic control tower. Only the FAA can perform the required benefit-cost-analysis for towers. Should Airport management desire, they can request that the FAA perform this analysis. Should the Airport be eligible for a control tower, there are significant expenses involved, including construction, staffing, and on-going maintenance.

The following chapter will consider various airside and landside layouts to address forecast growth at the Treasure Valley Executive Airport.