Airport Master Plan Update

PHOENIX GOODYEAR AIRPORT
PHOENIX, ARIZONA | JULY 2017

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ADOT NO. E7F3C
PROJECT NO. AV41000072 FAA
Phoenix Goodyear Airport

Airport Master Plan Update

Working Paper 3 - Draft

Prepared for
City of Phoenix Aviation Department

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Chapter 4 Facility Requirements

4.1 Introduction

This chapter identifies the infrastructure and facilities needed at the Airport to meet the forecasted aviation demand presented in Chapter 3. To properly plan for the future needs of the Airport, it is necessary to identify the specific types and quantity of infrastructure and facilities that are needed to serve the anticipated unconstrained demand levels.

Facility requirements have been developed for the airside, landside, general aviation, and support facilities after conducting a capacity and demand analysis based on the results of the aviation demand forecasts. Additionally, recommendations and feedback of airport personnel, tenants, businesses, and other stakeholders obtained during the Planning and Technical Advisory Committee meetings, interviews, public events, workshops, and online surveys were also used.

4.2 Planning Horizons

Chapter 1 discussed a planning period of 20 years for the airport master plan update. Beginning with a base year of 2016, the planning horizon will extend through 2036. The time frame for addressing development needs usually involves short-term (up to five years), medium-term (six-to-ten years), and long-term (eleven-to-twenty years) planning periods. Short-term analysis focuses on addressing immediate deficiencies, medium-term planning focuses on a more detailed assessment of needs, while the long-term planning primarily focuses on the ultimate role of the airport. Most important to consider is that a good plan is one that is based on actual demand at an airport rather than time-based predictions. Actual activity at the Airport will vary over time and may be higher or lower than what the demand forecast predicts. Using the three planning milestones (short-term, medium-term, and long-term) the Airport can make an informed decision regarding the timing of development based on the actual demand. This approach will result in a financially responsible and demand-based development of the Airport. The planning horizon will be used in subsequent sections to present the facility requirements for the airside, landside, general aviation and support facilities. As review, a summary of the forecast of based aircraft and total operations for each planning period is depicted in Table 4-1.

<table>
<thead>
<tr>
<th>YEAR</th>
<th>BASED AIRCRAFT</th>
<th>TOTAL OPERATIONS</th>
<th>PEAK MONTH OPERATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016 (base year)</td>
<td>222(^1)</td>
<td>123,394(^2)</td>
<td>12,675(^3)</td>
</tr>
<tr>
<td>2021</td>
<td>241</td>
<td>132,346</td>
<td>13,595</td>
</tr>
<tr>
<td>2026</td>
<td>265</td>
<td>140,030</td>
<td>14,384</td>
</tr>
<tr>
<td>2031</td>
<td>290</td>
<td>170,462</td>
<td>17,510</td>
</tr>
<tr>
<td>2036</td>
<td>315</td>
<td>200,360</td>
<td>20,581</td>
</tr>
</tbody>
</table>

Note: \(^1\)Airport Management data; \(^2\)FAA Traffic Flow Management System Counts (TFMSC) database; \(^3\)November.
Source: Armstrong Consultants, Inc., 2017
4.3 Airport Peaking Characteristics

The capacity of an airport relates to the activity levels during a peak, or design, period. The aviation demand forecasts are used to determine the operational peaking characteristics and will be used throughout the facility requirements chapter.

To ensure that a facility isn’t overbuilt during the planning horizon, several factors are used to analyze the required facilities for an airport. The average day of the peak month, or the design day, is an accepted industry methodology used in evaluating peaking characteristics. Metrics such as average annual day doesn’t adequately take into consideration increased activity at certain times of the year. Although, considering only the busy or peak day of the peak month may result in facilities that are overbuilt.

The periods used in the capacity analysis and facility requirements are as follows:

**Peak Month:** The calendar month when peak passenger volumes of aircraft operations occur.

**Design Day:** The average day in the peak month. This indicator is derived by dividing the peak month operations by the number of days in a month.

**Busy Day:** The busy day of a typical week in the peak month.

**Design Hour:** The peak hour within the design day.

For the purpose of evaluating the peak design hourly operations, the following rationale was considered: FAA Traffic Flow Management System Counts (TFMSC) data for the Airport reveals that night-time operations, defined by FAA as 10:00 pm to 7:00 am, occurred 4.3 percent of the time in 2016; meaning that 95.7 percent of operations occurred during the day-time (15 hours). Considering that the maximum peak hourly occurrence can be nearly twice the average of the hourly operations calculated for this time period means that the design hour operations are approximately 13 percent of the design day operations. The average peak monthly, daily, and hourly operations projected for the Airport are summarized on Table 4-2.

### Table 4-2 Summary of Peak Demand Forecast

<table>
<thead>
<tr>
<th>YEAR</th>
<th>TOTAL OPERATIONS</th>
<th>PEAK MONTH OPERATIONS</th>
<th>DESIGN DAY OPERATIONS</th>
<th>DESIGN HOUR OPERATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016 (base year)</td>
<td>123,394&lt;sup&gt;1&lt;/sup&gt;</td>
<td>12,675&lt;sup&gt;2&lt;/sup&gt;</td>
<td>423</td>
<td>54</td>
</tr>
<tr>
<td>2021</td>
<td>132,346</td>
<td>13,595</td>
<td>453</td>
<td>58</td>
</tr>
<tr>
<td>2026</td>
<td>140,030</td>
<td>14,384</td>
<td>479</td>
<td>61</td>
</tr>
<tr>
<td>2031</td>
<td>170,462</td>
<td>17,510</td>
<td>584</td>
<td>74</td>
</tr>
<tr>
<td>2036</td>
<td>200,360</td>
<td>20,581</td>
<td>686</td>
<td>88</td>
</tr>
</tbody>
</table>

Note: <sup>1</sup>FAA Traffic Flow Management System Counts (TFMSC) database; <sup>2</sup>The peak month for GYR was determined to be November.  
Source: Armstrong Consultants, Inc., 2017

### 4.3.1 Airfield Capacity

Airfield capacity, also referred to as throughput capacity, is a measure of the maximum number of aircraft operations which can be accommodated on an airport in a one hour period. FAA defines capacity in terms of specific time intervals. The two most commonly used time intervals are hourly
and annual. As operations, or demand, approach the capacity of the airfield, individual aircraft delay will increase. Successive hourly demands exceeding the hourly capacity result in unacceptable delays. The Annual Service Volume (ASV) is defined by FAA as “a reasonable estimate of an airport’s annual capacity” and is the most important value that must be computed in order to understand the runway capacity at an airport. In other words, ASV is the theoretical limit of operations that the airport can safely accommodate with delay occurring on a regular basis. The ASV takes into account different runway use, aircraft mix, weather conditions, and other related factors.

**Airfield Geometry**

The airfield configuration is the primary factor in determining the overall airport capacity due to its direct influence on how aircraft maneuver the airfield. The physical orientation and proximity of the various runway and taxiway surfaces may or may not contribute to the overall airfield capacity. The capacity of a runway system is influenced by the ability of aircraft to exit the runway as quickly and safely as possible. The number and location of exit taxiways directly influence runway occupancy time and the overall capacity of the system.

**Runway Configuration**

The Airport utilizes a single-runway configuration. Therefore, the capacity of the runway will be representative of the overall capacity of the Airport.

**Exit Taxiways**

The capacity of a runway system is greatly influenced by the ability of an aircraft to exit the runway as quickly as possible. Thus, the amount and location of exit taxiways directly influence runway occupancy time and the overall capacity of the system. Capacity is also enhanced if a full-length parallel taxiway is provided; full-length parallel taxiways generally have several connector taxiways, which in turn increases the number of runway exits. Complete taxiway systems eliminate the need to back-taxi on a runway.

As presented in Chapter 2, the Airport has a single, full-length parallel taxiway with a series of exit taxiways. The taxiway exits are generally located in positions that allow aircraft to efficiently clear the runway, which in turn, minimizes runway occupancy time. Runway exit taxiways should be located approximately 2,000 to 4,000 feet past the arrival threshold for general aviation and corporate jet aircraft, and located approximately 4,000 to 8,000 feet for aircraft weighing more than 300,000 pounds. Using these criteria, the number of eligible taxiway exits for each runway end that can be used when calculating capacity are shown in **Table 4-3**.

### Table 4-3 Eligible Taxiway Exits for Capacity Calculations

<table>
<thead>
<tr>
<th>Runway/Flow</th>
<th>2,000 TO 4,000-FOOT RANGE</th>
<th>4,000 TO 8,000-FOOT RANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Runway 3 (East flow)</td>
<td>2 - (T/Ws A6, A8)</td>
<td>4 - (T/Ws A1, A2, A3, A4)</td>
</tr>
<tr>
<td>Runway 21 (West flow)</td>
<td>2 - (T/Ws A3, A5)</td>
<td>4 – (T/Ws A7, A8, A9, A10)</td>
</tr>
</tbody>
</table>

*Source: Armstrong Consultants, Inc., 2017*
4.3.1-1 Capacity Methodology

Estimates of airfield capacity at the Airport were developed in accordance with the methods presented in FAA Advisory Circular (AC) 150/5060-5, Change 2, *Airport Capacity and Delay*. Methodologies from this AC were used to calculate the hourly capacity of the runway system and ASV of the airfield. To calculate ASV, first the ratio of annual demand to average daily demand, during the peak month, is calculated. Next, the ratio of average daily demand to average peak (design) hour demand, during the peak month is determined. The values are then multiplied together with the corresponding weighted hourly capacity to compute ASV. These calculations were based on the specific airfield configuration, operational, and meteorological characteristics of the Airport on a typical day.

*Aircraft Mix Index*

The FAA has designated four categories of aircraft for capacity determinations which are based on the maximum certified takeoff weight, the number of engines, and the wake turbulence classifications. The mix index is calculated by adding the percent of Class C aircraft plus three times the percent of Class D aircraft. The percent of Class A and B aircraft (both under 12,500 pounds) is not considered to significantly affect airfield capacity because the wake turbulence generated by these smaller aircraft dissipates fairly rapidly. Class C aircraft include multi-engine aircraft greater than 12,500 pounds, but less than 300,000 pounds with a large wake turbulence classification. The Boeing 757-200 and Airbus A319 are examples of aircraft that fall within Class C. The final category of aircraft is Class D, which include multi-engine aircraft over 300,000 pounds with a heavy wake turbulence classification. The Boeing 767-300 and McDonnell Douglas DC-10 are examples of aircraft that fall within Class D. It’s important to note that these capacity classes differ from the Aircraft Approach Categories described in Chapter 2. For the planning period, the aircraft mix indexes are shown in Table 4-4.

<table>
<thead>
<tr>
<th>YEAR</th>
<th>A &amp; B</th>
<th>C</th>
<th>D</th>
<th>AIRCRAFT MIX INDEX (C+3D)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016¹</td>
<td>99.71%</td>
<td>0.27%</td>
<td>0.002%</td>
<td>0</td>
</tr>
<tr>
<td>2021</td>
<td>99.71%</td>
<td>0.27%</td>
<td>0.002%</td>
<td>0</td>
</tr>
<tr>
<td>2026</td>
<td>99.71%</td>
<td>0.27%</td>
<td>0.002%</td>
<td>0</td>
</tr>
<tr>
<td>2031</td>
<td>99.71%</td>
<td>0.27%</td>
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<td>0</td>
</tr>
<tr>
<td>2036</td>
<td>99.71%</td>
<td>0.27%</td>
<td>0.002%</td>
<td>0</td>
</tr>
</tbody>
</table>

Note. ¹2016 is the base year.
Source: Armstrong Consultants, Inc., 2017

*Percent of Aircraft Arrivals*

The percent of arrivals is the ratio of aircraft arrivals to total operations during a peak or average hour of operations. The FAA methodology considers a 40, 50, or 60 percent arrival factor to compute airfield capacity. At general aviation airports, such as GYR, the percent of arrivals is assumed to equal those of departures for any given time, even the peak hour. Therefore, a 50 percent arrival factor was applied to the capacity calculations.
Percent of Touch-and-Go Operations

A touch-and-go operation refers to a training procedure in which the pilot performs a normal landing followed by an immediate takeoff, without stopping or taxiing clear of the runway. While each touch-and-go operation actually accounts for two runway operations (one landing and one takeoff), this procedure typically takes less time than two operations by separate aircraft. Therefore, airports with a high percent of touch-and-go operations will have a greater airfield capacity than a similar airport with less of these training operations.

The touch-and-go operations are significant at the Airport due to the high level of flight training by the flight schools. It is anticipated that the same level of touch-and-go operations, approximately 30 to 40 percent, will continue throughout the planning period. For planning purposes, it is assumed that all touch-and-go operations occur during VFR conditions. Therefore, based on Figure 3-3 of AC 150/5060-5, the VFR conditions touch-and-go factor is 1.31. During IFR conditions, it is assumed touch-and-go operations are prohibited. Therefore, the touch-and-go factor is 1.00.

Meteorological Conditions

Different meteorological conditions influence the utilization of an airfield’s runway(s). Variations in the weather resulting in limited cloud ceiling and reduced visibility minimums typically lower airfield capacity, while changes in wind direction and velocity will dictate runway usage. Using the meteorological data collected for this airport master plan update, the area averages Visual Flight Rules (VFR) conditions more than 99 percent of the time, with Instrument Flight Rules (IFR) conditions less than 1 percent of the time.

Wind Coverage and Runway Utilization

The wind coverage analysis presented in Chapter 2 revealed that on average, the wind coverage exceeds the required 95 percent for each of the all-weather crosswind components, 10.5 through 20 knots.

Given that the Airport is a single runway configuration, all of the fixed wing operations occur on Runway 3-21. Using radar data obtained from the City of Phoenix Aviation Department, the individual runway end utilization for use in estimating airfield capacity is shown in Table 4-5. Runway use was assumed to be consistent for all categories of aircraft and users.

Table 4-5 Runway End Utilization

<table>
<thead>
<tr>
<th>Runway</th>
<th>ARRIVALS</th>
<th>DEPARTURES</th>
<th>TOUCH AND GO OPERATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Runway 3</td>
<td>18</td>
<td>26</td>
<td>26</td>
</tr>
<tr>
<td>Runway 21</td>
<td>82</td>
<td>74</td>
<td>74</td>
</tr>
</tbody>
</table>

Sources: 2012 radar data provided by the City of Phoenix Aviation Department / Phoenix Goodyear Air Traffic Control Tower
4.3.1-2 Capacity Analysis

The Airport's hourly runway capacity base is approximately 102^1 aircraft during VFR conditions. Applying the 1.31 touch-and-go factor and the 0.94 runway exit factor, the adjusted hourly VFR capacity is 125 aircraft operations.

The Airport's hourly runway capacity base is 70^2 aircraft during IFR conditions. Applying the 1.00 touch-and-go factor and the 0.39 runway exit factor, the adjusted hourly capacity during IFR conditions is 27 aircraft operations.

It is important to note that these runway capacities represent “theoretical or ideal” capacities that can be realized under optimal conditions. In practice, the actual runway capacity will be less than the theoretical values. Often times actual runway capacities equalling approximately 80 percent of the theoretical capacity will be realized.

The weighted runway capacity is a function of the different runway use configurations used in a one year period, the percent of time each runway use configuration is used, the hourly capacity for each runway use configuration, and the ASV weighted factor.

\[
c_w = \left( \frac{p_1 \cdot c_1 \cdot w_1 + p_2 \cdot c_2 \cdot w_2 + \cdots + p_n \cdot c_n \cdot w_n}{p_1 \cdot w_1 + p_2 \cdot w_2 + \cdots + p_n \cdot w_n} \right)
\]

Where:
- \(C_w\) = weighted hourly capacity
- \(P_n\) = percent of time configuration “n” is used
- \(C_n\) = hourly capacity of configuration “n”
- \(W_n\) = ASV weighting factor (based on the percent of maximum capacity)

The resultant of the weighted hourly capacity is approximately 121 aircraft operations.

The preceding airfield geometry, operational characteristics, and meteorological conditions were first used to calculate hourly capacity. The results were then applied to determine the annual service volume in order to evaluate the ability of the airfield to accommodate the projected demand.

The ASV is determined by the following equation:

Annual Service Volume = \((C_w \times D \times H)\)

Where:
- \(C_w\) = weighted hourly capacity
- \(D\) = ratio of annual demand to the average daily demand during the peak month
- \(H\) = ratio of average daily demand to the design hour demand during the peak month

---

1 Source: Figure 3-3 of AC 150/5060-5
2 Source: Figure 3-43 of AC 150/5060-5
The total operations for the Airport in 2016 were 123,394 operations. The average daily demand during the peak month in 2016 is approximately 423 operations per day. The ratio of annual demand to average daily demand during the peak month is 292 \( (123,394 \div 423) \). The ratio of average daily demand during the peak month to the average peak hour demand during the peak month is 7.8 \( (423 \div 54) \). The resultant ASV for the Airport equals approximately 275,590\(^3\) aircraft operations \( (121 \times 292 \times 7.8) \).

### 4.3.2 Capacity Conclusion and Recommendations

The preceding information was used to calculate the capacity of the Airport in accordance with accepted industry methodologies. These calculations were based on the specific airfield configuration, operational, and meteorological characteristics of the Airport on a typical day.

A demand that exceeds the annual service volume will likely result in significant delays on the airfield. However, regardless of how substantial an airport’s capacity may appear, delays can occur even before an airport reaches its stated capacity. According to FAA Order 5090.3C, *Field Formulation of the National Plan of Integrated Airport Systems (NPIAS)*, for most every type of capacity enhancing project, the FAA recommends beginning to plan for such improvements when the activity levels reach 60 to 75 percent of the annual capacity. A summary of the airfield capacity is shown in Table 4-6.

Based on the existing airfield configurations and the results of the capacity analysis, the Airport is not likely to reach the point in the planning horizon where the FAA would recommend additional capacity. For planning purposes, it is recommended that the necessary airfield improvements to increase capacity in the future be considered as development alternatives are created. One example of an enhancement to increase the capacity of the current airfield includes constructing an additional runway to accommodate the forecasted demand. Depending on the location of a new runway, land and additional taxiways may be needed to further enhance capacity. Also, instrument approaches, and/or operational procedures can also enhance the capacity of an airfield and should be considered as development alternatives are created.

#### Table 4-6 Summary of Airfield Capacity

<table>
<thead>
<tr>
<th>YEAR</th>
<th>OPERATIONAL DEMAND</th>
<th>ANNUAL SERVICE VOLUME</th>
<th>CAPACITY PERCENT OF CAPACITY</th>
<th>WEIGHTED HOURLY CAPACITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016 (base year)</td>
<td>123,394</td>
<td>275,590</td>
<td>45</td>
<td>121</td>
</tr>
<tr>
<td>2021</td>
<td>132,346</td>
<td>275,590</td>
<td>48</td>
<td>121</td>
</tr>
<tr>
<td>2026</td>
<td>140,030</td>
<td>275,590</td>
<td>51</td>
<td>121</td>
</tr>
<tr>
<td>2031</td>
<td>170,462</td>
<td>275,590</td>
<td>62</td>
<td>121</td>
</tr>
<tr>
<td>2036</td>
<td>200,360</td>
<td>275,590</td>
<td>73</td>
<td>121</td>
</tr>
</tbody>
</table>

Source: Armstrong Consultants, Inc., 2017

---

3 Calculations determined using FAA AC 150/5060-5, *Airport Capacity and Delay*
4.5 Airside Facilities

Airside facilities consist of those facilities that are related to aircraft arrival, departure, and ground movement, along with all associated navigational aids, airfield lighting, pavement markings, and signage. This section presents the required facilities in a quantitative and qualitative manner for the airside portion of the Airport; the results of the forecasted aviation demand provided quantitative findings, whereas interviews, discussions, and a survey with airport personnel, committee members, tenants, and users provided more qualitative findings.

4.5.1 Runway Requirements

4.5.1-1 Runway Design Standards

As discussed previously in Chapter 2, the design aircraft(s) and Airport Reference Code (ARC) are key components of the FAA’s design standards. The design aircraft (or family of design aircraft), along with the ARC, provide the information needed to determine which FAA design standards apply to the airfield, and in turn can be used to determine some of the necessary facility requirements. As mentioned, the existing ARC for the Airport is D-IV, and the existing design aircraft is a DC-10-40.

It is recommended in the previous chapter, Aviation Forecasts, that due to multiple reasons, the ARC for the Airport should remain at D-IV for the planning period, and identifying the future critical design aircraft as the Boeing 767-300. Any implications of this change will be evaluated more in the next chapter, Development Alternatives.

4.5.1-2 Runway Length

The previous 2007 Airport Master Plan recommended improvements to the Runway Safety Areas (RSA) by shifting the runway while also removing the Runway 21 displacement and maintaining a runway length of 8,500 feet. To meet standards, a Technical Memorandum was prepared by Landrum & Brown in November 2013, to reevaluate the need to shift the runway. The Technical Memorandum confirmed the recommendation that Runway 3-21 be shifted by extending the Runway 3 end by 300 feet, and that the Runway 21 threshold displacement of 1,800 feet could be removed. The safety area compliance project resulted in a runway length (arrival and departure) of 8,500 feet with no runway threshold displacements or declared distances. This Airport Master Plan will validate the findings of the Technical Memorandum based on the existing design aircraft for the planning horizon.

There are many factors that may determine the runway length for an airport. The information required to determine the recommended runway length(s) includes airfield elevation, mean maximum temperature of the hottest month, and the effective gradient for the runway. Also, the performance characteristics and operating weight of an aircraft impacts the amount of runway length needed. The following information for the Airport was used for the analysis:

- Field elevation: 969 feet mean sea level (MSL)
- Mean maximum temperature of hottest month (July): 106.9°F
- Maximum difference in runway centerline elevation (Runway 3-21): 26.2 feet
• Performance characteristics and operating weight of aircraft

The process to determine recommended runway lengths for a selected list of critical design aircraft begins with determining the weights of the critical aircraft that are expected to use the airport on a regular basis. For aircraft weighing 60,000 pounds or less, the runway length is determined by family groupings of aircraft having similar performance characteristics. The first family grouping is identified as small aircraft, which is defined by the FAA as airplanes weighing 12,500 pounds or less at maximum takeoff weight (MTOW). The second family grouping is identified as large aircraft, which is defined by the FAA as aircraft exceeding 12,500 pounds but weighing less than 60,000 pounds. For aircraft weighing more than 60,000 pounds, the required runway length is determined by aircraft-specific length requirements. Table 4-7 depicts the aircraft weight categorization as recommended by the FAA.

### Table 4-7 Airplane Weight Categorization for Runway Length Requirements

<table>
<thead>
<tr>
<th>AIRPLANE WEIGHT CATEGORY</th>
<th>MTOW</th>
<th>AIRCRAFT GROUPING</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 12,500 Pounds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Approach Speed &lt; 30 knots</td>
<td></td>
<td>Family groupings of small airplanes</td>
</tr>
<tr>
<td>Approach Speed ≥ 30 knots, but &lt; 50 knots</td>
<td></td>
<td>Family groupings of small airplanes</td>
</tr>
<tr>
<td>Approach Speed ≥ 50 knots</td>
<td></td>
<td>Family groupings of small airplanes</td>
</tr>
<tr>
<td>With &lt; 10 Passengers</td>
<td></td>
<td>Family groupings of small airplanes</td>
</tr>
<tr>
<td>With ≥ 10 Passengers</td>
<td></td>
<td>Family groupings of small airplanes</td>
</tr>
<tr>
<td>Over 12,500 pounds, but &lt; 60,000 pounds</td>
<td></td>
<td>Family groupings of large airplanes</td>
</tr>
<tr>
<td>≥ 60,000 pounds or more, or Regional Jets¹</td>
<td></td>
<td>Individual large airplane</td>
</tr>
</tbody>
</table>

Note: ¹All regional jets, regardless of their MTOW, are assigned to the 60,000 pounds or more weight category.

Source: FAA AC 150/5325-4B, Runway Length Requirements for Airport Design, 2005

Recommended runway lengths are determined using charts in AC 150/5325-4B based on the seating capacity and the mean daily maximum temperature of the hottest month of the year at the airport. The small airplanes with an approach speed of greater than or equal to 50 knots with less than 10 passenger seats and a MTOW less than 12,500 pounds recommends a runway length of 4,240 feet in order to accommodate 100 percent of the fleet; the 100 percent of fleet category is a type of airport that is primarily intended to serve communities located on the fringe of a metropolitan area or a relatively large population remote from a metropolitan area. With an existing runway length of 8,500 feet, Runway 3-21 can accommodate 100 percent of the small airplanes.

Recommended runway lengths to serve large aircraft weighing over 12,500 pounds, but less than 60,000 pounds, are determined using a certain percentage of the useful load. The term useful load, is the difference between the maximum allowable structural gross weight and the operating empty weight. According to the above referenced Advisory Circular, 75 percent of fleet at 60 percent useful load requires a runway length of 5,410 feet respectively. Similarly, 100 percent of fleet at 60 percent useful load requires a runway length of 7,190 feet respectively. Again, for aircraft weighing more than 60,000 pounds, which do periodically utilize the airport, the required runway length is determined by aircraft-specific length requirements. Still, calculations for this category of aircraft determined an approximate required runway length of approximately 8,100 feet. With an existing runway length of 8,500 feet, Runway 3-21 can accommodate the majority of the aircraft that fall
within the large aircraft category (over 12,500 pounds, but less than 60,000 pounds), and also aircraft that weigh more than 60,000 pounds according to FAA calculations. However, some aircraft may be somewhat constrained if they desire to take off at a higher percentage of useful load, i.e. aircraft that may wish to carry the maximum weight (passengers or cargo) over a great distance with full fuel tanks during the hotter summer months.

Therefore, based on the runway length analysis above, findings of the Technical Memorandum by Landrum & Brown, as well as completion of the recent runway improvement projects, the existing runway length is sufficient to accommodate the departure and arrival length requirements of the projected aircraft fleet mix through the planning horizon. The results of the runway length analysis are summarized in Table 4-8. In addition to the runway length analysis, Figure 4-1 graphically depicts the take-off length requirements for a variety of aircraft currently using or anticipated to use the Airport over the course of the planning period.

### Table 4-8 Runway 3-21 Length Analysis

<table>
<thead>
<tr>
<th>Aircraft Grouping</th>
<th>Recommended Runway Length (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing Runway 3-21 Length (ft)</td>
<td>8,500</td>
</tr>
<tr>
<td>Small Aircraft (&lt;12,500 lbs., &lt; 10 passenger seats)</td>
<td></td>
</tr>
<tr>
<td>75 percent of these small airplanes</td>
<td>3,030</td>
</tr>
<tr>
<td>95 percent of these small airplanes</td>
<td>3,590</td>
</tr>
<tr>
<td>100 percent of these small airplanes</td>
<td><strong>4,240</strong></td>
</tr>
<tr>
<td>Large Aircraft (&lt;60,000 lbs.)</td>
<td></td>
</tr>
<tr>
<td>75 percent of these planes at 60 percent useful load</td>
<td>5,410</td>
</tr>
<tr>
<td>75 percent of these planes at 90 percent useful load</td>
<td>8,480</td>
</tr>
<tr>
<td>100 percent of these planes at 60 percent useful load</td>
<td>7,190</td>
</tr>
<tr>
<td>100 percent of these planes at 90 percent useful load</td>
<td>11,260</td>
</tr>
<tr>
<td>Aircraft more than 60,000 lbs.</td>
<td><strong>8,100 (approx.)</strong></td>
</tr>
</tbody>
</table>

4.5.1-3 Runway Width

The required runway width is a function of airplane approach category, airplane design group, and the approach minimums for the design aircraft expected to use the runway on a regular basis. The
existing runway pavement width of 150 feet for Runway 3-21 meets FAA design standards and should be maintained over the planning period. Similarly, the required runway width for a potential additional runway is also driven by the same criteria. Based on the design standards for aircraft within the B-II category, a width of 75 feet is recommended for this additional runway.

4.5.1-4 Runway Orientation

The FAA AC 150/5300-13A, *Airport Design*, recommends that a runway’s orientation provide at least 95 percent crosswind coverage. Based on the wind data presented in Table 2-7 in Chapter 2, the wind coverage exceeds the recommended 95 percent wind coverage for each crosswind component (10.5 through 20 knots) for Runway 3-21. Therefore, the true azimuth of Runway 3-21 (38° 05’ 16.08”) should remain for the planning horizon.

The runway orientation of a new runway will be determined during the alternatives development phase. However, based on the existing runway’s orientation, it is likely that a potential new runway will be orientated in a similar fashion.

4.5.1-5 Pavement Strength

The existing runway pavement strength at the Airport was discussed in Chapter 2, along with a summary of the overall runway pavement composition and strength presented in Table 2-9. A sampling of the current and forecasted fleet mix at the Airport with the corresponding maximum take-off weight and landing-gear configuration is depicted in Table 4-9.

<table>
<thead>
<tr>
<th>AIRCRAFT</th>
<th>MAXIMUM TAKE-OFF WEIGHT (POUNDS)</th>
<th>LANDING GEAR CONFIGURATION (NOSE GEAR / MAIN GEAR / BELLY GEAR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cessna 172R Skyhawk (A-I)</td>
<td>2,450</td>
<td>SW/SW</td>
</tr>
<tr>
<td>Cessna Mustang (B-I)</td>
<td>10,600</td>
<td>SW/SW</td>
</tr>
<tr>
<td>Beechcraft King Air 200 (B-II)</td>
<td>12,500</td>
<td>SW/DW</td>
</tr>
<tr>
<td>Bombardier Learjet 45 (C-I)</td>
<td>19,500</td>
<td>SW/DW</td>
</tr>
<tr>
<td>Bombardier Challenger 605 (C-II)</td>
<td>47,600</td>
<td>DW/DW</td>
</tr>
<tr>
<td>Boeing 737-700 (C-III)</td>
<td>171,000</td>
<td>DW/DW</td>
</tr>
<tr>
<td>Airbus A319 (C-III)</td>
<td>141,000</td>
<td>DW/DW</td>
</tr>
<tr>
<td>Boeing 757-200 (C-IV)</td>
<td>255,000</td>
<td>DW/DTW</td>
</tr>
<tr>
<td>Boeing 767-300 (D-IV)</td>
<td>350,000</td>
<td>DW/DTW</td>
</tr>
<tr>
<td>Bombardier Learjet 60XR (D-I)</td>
<td>23,500</td>
<td>SW/DW</td>
</tr>
<tr>
<td>Gulfstream G450 (D-II)</td>
<td>73,900</td>
<td>DW/DW</td>
</tr>
<tr>
<td>Gulfstream G500 (D-III)</td>
<td>85,100</td>
<td>DW/DW</td>
</tr>
<tr>
<td>Boeing 737-800 (D-III)</td>
<td>174,200</td>
<td>DW/DW</td>
</tr>
<tr>
<td>McDonnell Douglas DC-10-40 (D-IV)</td>
<td>555,000</td>
<td>DW/DTW/DW</td>
</tr>
<tr>
<td>Boeing 747-400 (D-V)</td>
<td>870,000</td>
<td>DW/DTW/DTW</td>
</tr>
<tr>
<td>Boeing 777-300 (D-V)</td>
<td>660,000</td>
<td>DW/TDTW</td>
</tr>
</tbody>
</table>

Abbreviations: SW = Single Wheel, DW = Dual Wheel, DTW = Dual Tandem Wheel, TDTW = Triple Dual Tandem Wheel
Source: Armstrong Consultants, Inc.
Some of the aircraft that currently use the Airport on a regular basis fall outside of the runway bearing strength on portions of the runway. Use by aircraft with a maximum take-off weight that exceeds the runway bearing strength periodically should not significantly impact the lifespan of the pavement. However, the Airport should monitor the pavement condition to determine if the use by heavier aircraft is accelerating the need to rehabilitate the runway. With the exception of the first 300 feet of Runway 3, the remainder of the runway does not meet the pavement bearing strength for some of the select aircraft identified in Table 4-9; according to the FAA Airport Master Record as shown in Table 2-9 in Chapter 2, the remainder of the runway’s pavement strength is reported as 75,000 pounds SW, 200,000 pounds DW, and 270,000 pounds DTW.

4.5.1-6 Proposed Additional Runway

The results of the airfield capacity, as shown in Table 4-5, indicate the Airport may reach approximately 72 percent of its annual service volume by the year 2036. To that end, additional airfield capacity can be achieved by constructing a second runway. For planning purposes, the Development Alternatives chapter will consider the optimum location for an additional runway. The previous 2007 master plan concluded that a second runway be constructed south of the existing runway to satisfy the forecasted demand for the planning horizon. Based on feedback from airport users, tenants, and flight schools, an additional runway is still desired for use by the local general aviation aircraft, the flight schools, and occasional corporate jet operators.

As such, it is recommended that an additional larger-than-utility runway be considered in this master plan to ensure that enough property is preserved for a potential runway in the future. A larger-than-utility runway accommodates aircraft with a maximum gross weight of 12,500 pounds or greater; this category of runway will be able to serve the needs of the flight school aircraft, as well as the majority of the corporate and business jet traffic which frequent the Airport. Likewise, it is recommended that one end of this runway include a non-precision instrument approach, such as an RNAV (GPS), with visibility minimums one-statute mile or greater in order to better serve the student pilots and corporate aircraft alike. The possibility of adding an instrument approach procedure is ultimately determined by the FAA, along with its visibility minimums; thus, it is only a recommendation within this report for planning purposes only.

It is recommended that the proposed runway meet FAA design standards for a RDC of B-II with a recommend runway visibility range equal to one-statute mile or greater. A length of at least 5,000 feet is also recommended, which will allow the majority of corporate aircraft to use the runway on a limited basis. Furthermore, based on the FAA Traffic Flow Management System Counts (TFMSC) for the year 2016, the B-II aircraft which utilized the Airport the most was the Cessna Excel/XLS. Thus, it is recommended that this be the design aircraft for the proposed runway at this point in time. The Airport should continue to monitor the types of aircraft using the Airport, and should a different aircraft within the B-II family surpass the Cessna Excel/XLS further in the planning period, the design aircraft may be adjusted. The important recommendation is that the design aircraft fall within the B-II family of aircraft. For planning purposes however, the TDG group which corresponds to the Cessna Excel/XLS is TDG 2. Thus, it is recommended any taxiways or taxiway connectors for the proposed runway be designed with these standards in mind. All of these
recommendations pertaining to the additional runway will be evaluated given the physical constraints of the Airport, amongst other considerations, in the Development Alternatives chapter.

4.5.2 FAA Hot Spots and Non-Standard Geometry

4.5.2-1 Hot Spots

An airport hot spot is defined as “a location on an airport movement area with a history of potential risk of collision or runway incursion, and where heightened attention by pilots and drivers is necessary.” These areas have an increased risk or potential for runway incursions or surface accidents due to a variety of causes, such as: airfield geometry, traffic-flow, pavement markings, signage and lighting, situational awareness, and training. The FAA has not identified any official “hot spots” on the Airport.

4.5.2-2 Non-Standard Geometry

Having a location on an airfield that is considered by the FAA to be non-standard geometry does not necessarily mean it is a “hot spot.”

Non-standard conditions observed in both the movement and non-movement areas of the airfield were discussed in Chapter 2, and summarized in Tables 2-16 and 2-17. Of the non-standard conditions, those located in the movement area that are related to pavement geometry and/or marking are discussed below.

Non-standard Geometry 1

According to runway separation standards for aircraft within the D-IV category, the runway centerline to aircraft parking area requires 500-feet of separation. The existing Terminal/Lux Air Apron area boundary to Runway 3-21 centerline is approximately 440 feet. It is recommended that the apron boundary be marked at the correct separation distance to delineate the beginning/ending of the parking apron.

Non-standard Geometry 2

According to design standards applicable to general aviation heliports, Helipad H1 at the Airport does not meet the following standards:

- FATO center to runway centerline for VFR operations with operations by heavy aircraft over 300,000 pounds requires a separation of 700 feet during concurrent operations. The existing H1 FATO center to Runway 2-21 centerline distance is approximately 580 feet. At the existing H1 location, separation standards are not met, and therefore concurrent operations by heavy aircraft weighing over 300,000 pounds on Runway 3-21 and helicopters making a VFR approach or departure to/from the helipad is not permitted. If this is something that may occur in the future due to an increase in either aircraft’s operations, it is recommended that the helipad H1 be relocated to a different location.

- The H1 FATO center to the adjacent taxilane centerline stripe distance is approximately 35 feet. ADG-II aircraft operating on the adjacent taxilane could penetrate the H1 FATO. Thus,
it is recommended that in the short-term, the taxilane centerline stripe be moved or the taxilane
be restricted when Helipad H1 is in use to meet separation standards. Possible relocation of
H1 should be considered thereafter.

- The H1 safety area to adjacent taxilane centerline stripe distance is approximately 15 feet.
  Presently, ADG-II aircraft operating on the adjacent taxilane penetrate the H1 safety area.
  Thus, it is recommended that in the short-term, the taxilane stripe be moved or the taxilane
  be restricted when Helipad H1 is in use to meet separation standards. and possible relocation
  of H1 be considered thereafter.

**Non-standard Geometry 3**

For taxiway separation standards for ADG IV aircraft, the taxiway centerline to a fixed or movable
object distance is 129.5 feet. The existing Terminal/Lux Air Apron area boundary is not marked to
provide 129.5 feet from the Taxiway A centerline. It is recommended that the Terminal/Lux Air
Apron boundary be marked at the correct separation distance to delineate the limits of where aircraft
may park on the apron.

**Non-standard Geometry 4**

Design standards based on the existing TDG 5 for the Airport require taxiway shoulder widths of
30 feet. Taxiway A and several taxiway connectors do not meet the width requirement. For example,
shoulders are non-existent in various locations along the length of Taxiway A and along taxiway
connectors A2 and A3; shoulders should be constructed where missing to the correct width
requirements. Furthermore, the existing width of the shoulder along taxiway connectors A4 – A8 is
only 25 feet. The shoulders in these areas should be widen to the required 30-foot standard.

**Non-standard Geometry 5**

Per FAA’s stance on the importance of preventing runway incursions, no aircraft apron should
provide direct access to an active runway. Currently at the Airport, taxiway connectors A2, A3, and
A8 provide direct access to Runway 3-21 from various aircraft aprons without requiring a turn by
taxiing aircraft. It is recommended that the taxiway connectors be reconfigured and/or shifted
which would require taxiing aircraft to turn first in order to provide indirect access to Runway 3-21.

### 4.5.3 Taxiway Requirements

By definition, a taxiway is a defined path established for the taxiing of aircraft from one area of the
airport to another. A taxilane is a taxiway designated for low speed and precise taxiing. Taxilanes are
usually, but not always, located outside the movement area, providing access from taxiways to aircraft
parking positions, hangars, and terminal areas. Existing taxiway geometry should be improved
whenever feasible with emphasis on “hot spots,” and to the extent practical, the removal or marking
of existing pavement to correct confusing layouts is advisable.

As discussed previously in Chapter 2, to arrive at the TDG, the undercarriage dimensions of the aircraft
are used. The TDG design standards are based on the overall main gear width (MGW) and the cockpit-
to-main gear (CMG) distance. Taxiway/taxilane width and fillet standards, and in some instances, runway-to-taxiway and taxiway/taxilane separation requirements, are determined by the TDG. The FAA advises that it is appropriate for a series of taxiways on an airport to be built to a different TDG standards based on anticipated use. On the other hand, the Airplane Design Group (ADG) is based on the wingspan and tail height and determines the safety area, object free area, and separation standards for a taxiway.

The existing design aircraft for the Airport falls within TDG 5. Based on the recent improvement projects which occurred in 2015 and 2016, portions of Taxiway A were enhanced using TDG 5 standards. As such, it is recommended that the TDG for Taxiway A and its connectors remain the same over the course of the planning period.

In addition, the PCN Report dated October 2014 also indicated Taxiway A and several connector taxiways do not meet the pavement bearing strength needed to accommodate several of the aircraft currently using and forecasted to use the Airport as discussed in Chapter 2, and shown in Table 2-12. Consideration should be given to strengthening the taxiways as needed in the planning horizon.

Finally, there are two aircraft run-up areas located on either end of Taxiway A. With multiple flight schools located at the Airport, there are times when multiple aircraft taxi to the departure ends of Runway 3-21 simultaneously. The aircraft run-up areas increase operational efficiency by allowing aircraft ready for departure to bypass those on the taxiway that are performing run-ups. The existing aircraft run-up areas are in good condition and provide adequate space for the needs of the Airport. To enhance safety, it is recommended that the designated aircraft run-up area hold bars be marked to correspond with the connecting taxiway’s centerline to fixed or movable object separation distance.

### 4.5.4 Airfield Lighting, Marking, Signage, and Visual Aids to Navigation

Based on findings from the airport inventory as discussed in Chapter 2, several recommendations for improvements to the airfield lighting, signage, markings, and visual aids to navigation are recommended for the Airport. These recommendations include the following:

**Airfield Lighting**

During the inventory process, it was noted that pavement edge lighting does not exist for the full length of Taxiway A. It is recommended that pavement edge medium intensity taxiway lights (MITLs) be installed on the remaining length of Taxiway A and all taxiway connectors. The existing airfield lighting has previously been upgraded to LED fixtures, and is in good condition. The existing airfield lighting should be maintained throughout the planning period. Should additional airfield lighting be necessary in the future, it is recommended that efficient LED fixtures be installed.

**Airfield Signage**

The airfield signage was recently upgraded in 2013 to internally lit LED fixtures. The airfield signs are in good condition and adequate for the future needs of the Airport and should be maintained throughout the planning period. Should additional airfield signage be necessary in the future, it is recommended that efficient LED fixtures be installed.
Pavement Markings

Clear and highly visible airfield pavement markings are important to safely guide aircraft on the airfield and prevent incursions. The existing runway and taxiway pavement markings on the airfield are in good condition. It is recommended that the pavement markings be maintained as needed to prevent fading. The apron pavement markings are in good overall condition. However, as discussed in Section 2.5.3, multiple areas located on aircraft aprons consist of pavement markings that do not meet standards (refer to Table 2-17). It is recommended that these areas be marked correctly to meet current FAA standards.

Visual Aids to Navigation

The existing visual navigation aids are adequate for non-precision instrument approaches into the Airport. The runway end identifier lights (REILs) for Runway 3-21 are LED fixtures in good condition. It is recommended that the REILs be maintained throughout the planning period. The precision approach path indicators (PAPIs) are also LED fixtures and are in excellent condition. It is recommended that the PAPIs be maintained throughout the planning period. The Airport has four existing lighted wind cones on the airfield. The primary wind cone, and segmented circle are in good overall condition and should be maintained. The supplemental wind cones are in good condition; however, they are located within the Runway 3-21 ROFA. It is recommended that the supplemental wind cones be relocated outside of the Runway 3-21 ROFA, if possible. Should a secondary runway be constructed in the future, it is recommended that REILs, PAPIs, and supplemental wind cones be installed with the runway. The Airport has two existing rotating beacons. The primary rotating beacon, located atop of the ATCT is in good overall condition and should be maintained throughout the planning period. The secondary rotating beacon is outdated and utilizes an inefficient light fixture. It is recommended that the beacon be upgraded with an LED fixture if the Airport plans to utilize the secondary rotating beacon.

Weather Reporting Systems

As previously mentioned, the Airport uses a LAWS with a limited number of automated sensors and a dedicated observer responsible for the aviation routine weather report, also known as a METAR. Although this serves the Airport well now, it may be wise to consider the addition of a fully-automatic weather reporting system such as an Automated Weather Observing System (AWOS). An AWOS provides more accurate weather data and in a more efficient manner than a LAWS. This may be beneficial to users of the airport as operations increase over the planning period. Recommendations on the type and location of an AWOS will be provided in the next chapter, Development Alternatives.

4.5.5 Aircraft Parking Apron

An aircraft apron is typically located in the non-movement area of an airport near or adjacent to the terminal area. The function of an apron is to accommodate aircraft during loading and unloading of passengers and/or cargo. Activities such as fueling, maintenance, and short- to long-term parking take place on an apron. The layout and size of an apron depends on aircraft and ground vehicle circulation needs and specific aircraft clearance requirements. There are several types of aircraft aprons:
**Terminal/itinerant aircraft apron** – These aprons are adjacent to the terminal where passengers board and deplane from the aircraft. The apron also accommodates multiple activities such as fueling, maintenance, limited aircraft service, etc. Itinerant aprons handle itinerant aircraft activities which are usually only on the airport for a few days. At general aviation airports, this type of apron can also provide some tie-down locations for both itinerant and based aircraft.

**Tie-down apron** – An apron area for both short- and long-term aircraft parking (based and itinerant aircraft).

**Other services apron** – Apron areas that will accommodate aircraft servicing, fueling, and the loading/unloading of cargo other than the terminal/itinerant apron.

**Hangar aprons** – This is an area on which aircraft move into and out of a storage hangar.

FAA AC 150/5300-13A, *Airport Design*, provides design criteria to assist in apron layout and capacity. For the purpose of calculating the aircraft apron size, the following planning criterions were used:

- 500 square yards of apron per aircraft for helicopters
- 800 square yards of apron per aircraft for single-engine and multi-engine aircraft
- 1,200 square yards per aircraft for turbo-props and business jets
- 30% of single-engine (forecasted) based aircraft will require apron parking
- 10% of multi-engine, turbojet, and helicopters (forecasted) based aircraft will require apron parking
- Itinerant aircraft apron requirements are based on the design hour operations

**Flight School Apron**

As of 2016, the total based single- and multi-engine aircraft at the Airport totaled 219. Of the 219-based single- and multi-engine aircraft, approximately 25 percent are operated by Lufthansa and CTC flight schools. As previously mentioned in Chapter 2, Section 2.5.1-12, the total amount of apron available on the Flight School Apron is 75,000-square yards, of which approximately 47,500-square yards is directly leased to Lufthansa and CTC for the parking and maneuvering of their aircraft (57 total parking spaces made up of shaded and open tie-downs). This equates to approximately 800-square yards of parking apron per aircraft. In order to determine the amount of additional apron the flight schools may need over the course of the planning period, the assumption that the flight school aircraft would make up 25 percent of the forecasted total single- and multi-engine based aircraft was used based on the flight school’s current fleet mix of Diamond DA-20/DA-42’s.

**Terminal/Lux Air Apron**

In order to determine the amount of additional apron needed for the Terminal/Lux Air Apron, the remainder of the forecasted based aircraft not belonging to the Lufthansa and CTC flight school operation were used along with the methodologies above. In addition, the apron needs of itinerant aircraft were also determined over the course of the planning period. Using the forecasted aircraft
operations data, it was inferred that an average of 33 percent of the total operations are general aviation itinerant operations. Using the calculated design hour operations for each five-year increment over the course of the planning period (see Table 4-2) and the average percentage of itinerant GA operations, one was able to determine the amount of itinerant aircraft per planning term. For GYR, it was estimated that between 19-29 itinerant aircraft would need to park on the Terminal/Lux Air apron over the 20-year planning horizon. Furthermore, it was assumed that of these itinerant aircraft, 75 percent would fall within the single- and multi-engine aircraft category, and 25 percent would fall within the jet/other category. Using the same methodologies found above, it was determined that approximately 82,800-square yards of additional apron would be required for itinerant aircraft parking over the course of the planning period.

**AerSale Apron**

Due to the unique nature of AerSale’s business model, traditional methodologies for calculating the apron requirement do not apply. The activity on the AerSale apron is unique because the range of aircraft types (various mix of medium-to-large air carrier aircraft) change frequently and the parking configurations are not standard. The existing AerSale apron does not meet the needs of the tenant. For example, maneuvering tugged aircraft into the hangars and around the apron is a challenge given its current size and location of various randomly parked aircraft. For planning purposes, it is recommended that the existing apron size should be increased by 50 percent in the short-term, and doubled in the mid- and long-term planning period. Depending on activity of AerSale’s business over the planning period, the apron requirement will need to be adjusted to accommodate their changing activity.

Furthermore, although not technically designated as apron, the aircraft storage area on the western portion of the airfield currently has adequate space available. This area is comprised of approximately 62 acres, of which approximately 40 acres-compacted treated soil. Additional space is available to the north (approximately 15 acres) and to the south (approximately 2 acres) to expand the aircraft storage area if needed during the planning horizon, although this will be examined more in the Development Alternatives chapter. Based on conversations with AerSale, the construction of a new demolition pad, as well as an expansion to one of their hangar/buildings, is desired in the near future due to anticipated increase their aircraft dismantling operations. The best locations for such additions will also be examined in the next chapter.

**Aircraft Parking Apron Summary**

Based on the above rationale and calculations, additional aircraft parking apron is needed in the planning period. The Airport should monitor the utilization of the apron and based on the above criterion, make adjustments in the apron size as needed. It is recommended that routine reconstruction and pavement maintenance projects take place on the existing apron as well. Table 4-10 depicts the aircraft parking apron requirements for the Airport.

Besides the apron space requirements, it is evident based on the 2014 PCN Report for the Airport that several of the Airport’s aprons are not structurally adequate to handle regular operations of the aircraft using these apron areas. These aprons include (referred to by their common names by airport
users/tenants) portions of the Flight School Apron and the taxilane adjacent to the AerSale Apron and the North T-Hangar apron (see Figure 2-8). As mentioned in the previous section, further review and verification of the pavement strength should be undertaken in the near future. In order for the airport to accommodate heavier aircraft on a regular basis in the future, the pavement strength of the aforementioned aprons may also need to be increased; the best course of action regarding aircraft parking apron pavement will be included in the Development Alternatives chapter.

Table 4-10 Aircraft Parking Apron Requirements

<table>
<thead>
<tr>
<th>AIRCRAFT PARKING APRON REQUIREMENTS (BASED ON FORECASTS)</th>
<th>2016</th>
<th>2021</th>
<th>2026</th>
<th>2031</th>
<th>2036</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flight School Apron (tie-down apron)¹</td>
<td>75,000</td>
<td>76,600</td>
<td>80,600</td>
<td>84,600</td>
<td>89,400</td>
</tr>
<tr>
<td>Terminal/Lux Air Apron (terminal/itinerant apron)²</td>
<td>27,700</td>
<td>58,390</td>
<td>62,210</td>
<td>69,900</td>
<td>78,500</td>
</tr>
<tr>
<td>AerSale Apron (other services apron)³</td>
<td>95,300</td>
<td>142,950</td>
<td>142,950</td>
<td>190,600</td>
<td>196,600</td>
</tr>
<tr>
<td>Total Aircraft Parking Apron Area (approx. SY)</td>
<td>198,000</td>
<td>277,940</td>
<td>285,760</td>
<td>345,100</td>
<td>364,500</td>
</tr>
</tbody>
</table>

Note: All totals are in square yards. ¹Includes percentage of total based aircraft which are operated by Lufthansa and CTC flight schools and calculations are based on 800 square yards per forecasted SE/ME aircraft; calculations have been rounded and are approximate. ²Includes remainder of forecasted based aircraft plus forecasted itinerant aircraft calculations; calculations have been rounded and are approximate. ³Conventional apron requirement calculation methodologies do not necessarily apply for the aircraft apron parking requirements of MRO operators.

Source: Armstrong Consultants, Inc., 2017

4.5.6 Helicopter Operations

The size of the existing heliport and navigational aids are currently meeting the needs of the Airport. The location of the heliport may not be optimal because of periodic aircraft movement along the apron and the occasional need to park aircraft adjacent to the heliport. Long-term, the heliport may need to be relocated to make room for more fixed wing aircraft parking. Moving the heliport to another location could improve the separation of rotor and fixed-wing aircraft on the Airport. The next chapter, Development Alternatives, will evaluate the location of the existing heliport.

4.5.7 Aircraft Hangars

As previously mentioned in Chapter 2, the Airport has conventional hangars, T-hangars, and shade structures located on the airport. The estimated hangar needs of the Airport are discussed further below.

Prefabricated conventional and T-hangar units are available from a variety of manufacturers throughout the nation. Storage space for based aircraft was determined using guidelines suggested in manufacturer’s literature. Typical aircraft sizes were also reviewed in light of the evolution of business aircraft sizes.

Conventional hangar standards:

- 1,200 square feet for single-engine aircraft
- 1,400 square feet for multi-engine aircraft
- 1,800 square feet for turboprop or turbojet aircraft
T-hangar standards:

- 1,450 square feet for single- and multi-engine aircraft

The assumptions that were made regarding the type of storage needed for each type of aircraft at Airport are illustrated in Table 4-11.

### Table 4-11 Breakdown of Aircraft Storage Types

<table>
<thead>
<tr>
<th>PERCENT OF AIRCRAFT TYPE</th>
<th>TYPE OF STORAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>10% Air carrier (MRO Aircraft)</td>
<td>Conventional hangar</td>
</tr>
<tr>
<td>90% Air Carrier (MRO Aircraft)</td>
<td>Open Storage</td>
</tr>
<tr>
<td>100% of turbojet</td>
<td>Conventional hangar</td>
</tr>
<tr>
<td>55% of multi-engine</td>
<td>Conventional hangar</td>
</tr>
<tr>
<td>35% of multi-engine</td>
<td>T-hangar or Shade Structure</td>
</tr>
<tr>
<td>10% of multi-engine</td>
<td>Parking apron</td>
</tr>
<tr>
<td>10% of single-engine</td>
<td>Conventional hangar</td>
</tr>
<tr>
<td>60% of single-engine</td>
<td>T-hangar or Shade Structure</td>
</tr>
<tr>
<td>30% of single-engine</td>
<td>Parking apron</td>
</tr>
</tbody>
</table>

Source: Armstrong Consultants, Inc., 2017

Using the above criterion and the based aircraft forecasts, combined with consideration of the potential fleet mix, Table 4-12 depicts the demand requirements for aircraft storage types at the Airport. The exact size and number of hangars will ultimately be determined by demand; however, the Development Alternatives chapter will consider and propose various hangar configurations and locations to be considered. It should be noted that these requirements are not rigid, meaning that shifting of the space requirements between conventional and T-hangars is something that will need to be considered as operations fluctuate and the need to satisfy user's specific requirements are identified.

### Table 4-12 Aircraft Hangar and Shade Structure Storage Requirements

<table>
<thead>
<tr>
<th>AIRCRAFT STORAGE AREA REQUIREMENTS</th>
<th>2016 (Existing)</th>
<th>2021</th>
<th>2026</th>
<th>2031</th>
<th>2036</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aircraft Requiring Conventional Hangars</td>
<td>-</td>
<td>33</td>
<td>38</td>
<td>43</td>
<td>47</td>
</tr>
<tr>
<td>Aircraft Requiring T-Hangars or Shade Structures</td>
<td>-</td>
<td>138</td>
<td>149</td>
<td>161</td>
<td>173</td>
</tr>
<tr>
<td>Total Number of Aircraft Needing Storage</td>
<td>-</td>
<td>171</td>
<td>187</td>
<td>204</td>
<td>220</td>
</tr>
</tbody>
</table>

#### Hangar Size Requirements

<table>
<thead>
<tr>
<th></th>
<th>2016 (Existing)</th>
<th>2021</th>
<th>2026</th>
<th>2031</th>
<th>2036</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional Hangars</td>
<td>36,000&lt;sup&gt;1&lt;/sup&gt;</td>
<td>42,600</td>
<td>49,600</td>
<td>57,000</td>
<td>62,800</td>
</tr>
<tr>
<td>T-Hangars or Shade Structures</td>
<td>301,800</td>
<td>200,100</td>
<td>216,000</td>
<td>233,450</td>
<td>250,850</td>
</tr>
<tr>
<td>Total Hangar Size (SF)</td>
<td>337,800</td>
<td>242,700</td>
<td>265,600</td>
<td>290,450</td>
<td>313,650</td>
</tr>
</tbody>
</table>

Note: <sup>1</sup> Conventional hangar square footage is for Lux Air Jet Center only.
Source: Armstrong Consultants, Inc., 2017
4.6 Landside Facilities

4.6.1 General Aviation Terminal Services

The terminal building at general aviation airports typically offers various amenities to passengers, local and transient pilots, and airport management. Terminal buildings most often house public restrooms, public telephones, a pilot lounge area, and information regarding airport services. It is recommended that an airport’s terminal building be able to satisfy the forecasted peak-hour general aviation pilot and passenger demand.

The methodology used to determine the terminal building facility requirements for general aviation airports is based on the number of airport users anticipated to use the facility during the design hour operations. The design hour is defined as the peak hour of an average day of the peak month. The design hour measures the number of passengers departing or arriving on an aircraft in an elapsed hour of a typical busy (design) day. In the case of GYR, given that the design hour operation takes into account the activities of the airport as a whole, this methodology may not reflect the most accurate way to calculate the size requirements of the facility; the reasoning is the flight schools and MRO operators do not routinely use the terminal building. Therefore, a modified design hour derived from the total itinerant operations during the peak month was calculated for the Airport over the course of the planning period.

For planning purposes, a factor of 2.5 people (pilots and passengers) per peak-hour (design hour) and an area of 100 to 150 square feet of space per person is considered adequate to accommodate the peak-hour traffic. To determine the terminal facility size requirement at the Airport, the modified itinerant operations design hour and 100 square feet of space was used. Additionally, the total square-footage of the City’s terminal building and the shared public space of the new FBO was combined for the calculation. The logic being that with the addition of the new FBO, some GA itinerant users will use the FBO over the City terminal and vice versa; the addition of the FBO public shared space in fact adds to the overall “terminal” space at the Airport, even though the space is located in physically different locations. Thus, using the criteria described, the general aviation terminal requirements were calculated and are summarized in Table 4-13.

Table 4-13 General Aviation Terminal Services Requirements

<table>
<thead>
<tr>
<th>YEAR</th>
<th>DESIGN HOUR OPERATIONS</th>
<th>TERMINAL FUNCTION SIZE (APPROX. SF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016 1</td>
<td>20</td>
<td>8,000 3</td>
</tr>
<tr>
<td>2021</td>
<td>22</td>
<td>5,500</td>
</tr>
<tr>
<td>2026</td>
<td>23</td>
<td>5,750</td>
</tr>
<tr>
<td>2031</td>
<td>28</td>
<td>7,000</td>
</tr>
<tr>
<td>2036</td>
<td>33</td>
<td>8,250</td>
</tr>
</tbody>
</table>

Note. 1 2016 is the base year. 2 Modified design hour based on the total itinerant operations in the peak month. 3 Total square-footage of the GYR terminal building and the FBO common area (5,500 sqft + 2,500 sqft).
Source: ACRP Report 113, Guidebook on General Aviation Facility Planning; Armstrong Consultants, Inc., 2017
According to the calculations above, the existing 8,000 square-foot combined terminal building and FBO common area should meet the space requirements for the majority of the planning period. Beginning in 2036, as the peak hour pilot and passenger demand increases, the existing size of the combined terminal building and FBO common area may become somewhat constrained. Therefore, it is recommended that the City continue to monitor the utilization of both spaces throughout the planning horizon and consider expansion as needed.

The terminal building and FBO are centrally located on the Airport and provides good access to the aircraft parking apron. It is recommended that the City continue using the terminal building for airport administration personnel and look for potential tenants to use the remainder of the building. The building will likely need some level of modernization and upgrading such as: roof replacement, mechanical, plumbing, and HVAC systems replacement as the building approaches the end of the planning horizon. The exterior façade and windows should only require routine maintenance. Vehicle parking for visitors can be constrained at times. Recommendations for vehicle parking are discussed in more detail in Section 4.7.2, Vehicle Parking. The Lux Air facility was opened in January of 2017, and thus should have no need for any upgrades or refurbishment except for routine maintenance and upkeep for the span of the 20-year planning period.

### 4.6.2 Fueling Facilities

For general aviation airports, such as Phoenix Goodyear Airport, it is typically recommended that the airport have sufficient storage capacity for up to a week of fueling demands. The current fuel farm has room for expansion, and future demand could mandate increasing Jet-A fuel storage from its present 40,000 gallons to a configuration of tanks capable of holding 60,000 gallons of product. In similar fashion, 100 LL storage may be increased from its current 100,000 gallons to as much as 150,000 gallons in seven or eight storage tanks. The existing aircraft fueling facilities at the Airport appear to be adequate for existing demand. However, it is likely that fueling facility capacity at the Airport will need to be increased in the future to accommodate forecasted demand. The airport should also plan on an additional 10 or 20-thousand-gallon tank for alternative fuels. Ultimate build out of the fuel farm could mean expanding from 7 twenty-thousand gallon tanks today to a dozen tanks over the twenty-year planning horizon. Furthermore, designated fuel truck parking is lacking at the Airport. Currently, fuel trucks park along the edge of the North T-hangar apron and in various locations in front of the Lux Air facility. This can potentially restrict aircraft movement into and out of the T-hangars and on the taxilane. Thus, it is recommended that designated fuel truck parking be constructed at a location on the airport where the trucks can be safely parked and not cause potential aircraft maneuvering issues. The size and location of such parking will be examined further in the following chapter, *Development Alternatives*.

### 4.6.3 Aircraft Rescue and Firefighting

Operational usage at the Airport consists of light single- and twin-engine training aircraft, along with consistent heavy jet traffic. The Airport is already a busy facility, and forecasts indicate that its operations will increase in intensity and complexity as the facility grows. The forecast shows an increase of approximately 62% annual operations over the 20-year planning horizon and an increase in heavy jet traffic. While not required by current regulations, it is recommended that the Airport consider
increasing its ARFF capability in several ways to maintain the safety of its operations. Further actions may include the following:

- Airport could request ARFF standby services from local fire departments, whereby an appropriate firefighting vehicle would physically be sent to the airport for critical operations of heavy aircraft or other aircraft with special requirements by prior arrangement.

- The Airport should consider establishing its own ARFF station physically located on the airport, with equipment capable of meeting FAA FAR Part 139 requirements, such as 3 minute or less response time to the center point of the airports runway. Such a facility should house the required fire response vehicles, storage for specialized firefighting agents, and have appropriate office, communications, support and training areas on site.

- Either directly, or by mutual agreement with local fire departments, the Airport should ensure that all firefighting units identified for immediate airport response are capable of delivering water, chemical, and aqueous film forming foam (AFFF) operations to the emergency site. Additionally, all firefighters should be trained in the use of specialized agents, and tactics necessary to the unique environment of aircraft emergencies.

4.6.4 Airport Maintenance

Generally speaking, airport maintenance facilities need to be large enough to store and repair maintenance equipment. Typically, maintenance facilities will also occupy space around the building to locate fuel, spare equipment, park commercial size trucks, tractors and apparatuses. Most maintenance yards will be either located in a secure part of an airport, or have security fencing/wall to protect the equipment. The existing maintenance building and storage yard occupy approximately 3,900 square yards, or 0.8 acres. It is recommended that the existing maintenance building be expanded as the need arises to maintain additional infrastructure. Adequate space exists in the storage yard for an expanded maintenance building.

4.8.5 Additional Airport Buildings/Structures

Most existing airport buildings are in reasonably good shape or new, and many older buildings have been refurbished, or upgraded to meet the requirements of their current use. For example, the airport electrical vault is up to date and meets current demand. It also has the capacity to be expanded in future as necessary.

The deluge water tank and pump house are older facilities and should be evaluated to determine if they continue to be fit for their assigned function, and to determine if its use could be expanded to serve new hangar development.

The blast fence, located behind the run-up area on the Runway 3 end, is in good overall condition. The fence functions as a safety device to redirect high energy exhaust and prevent erosion during aircraft run-up and engine testing. The blast fence currently meets the needs of the Airport and should be maintained throughout the planning period.
The GA wash rack located on the North Hangar Apron is in good condition; however, it is recommended that the wash rack be relocated to provide adequate separation from adjacent taxi lane centerlines. The existing position of the wash rack located on the Flight School Apron (which is used exclusively by the flight school operators) does not provide adequate separation from the adjacent taxi lane centerline. The wash rack is also positioned directly adjacent to a wall which restricts the maneuvering ability of aircraft into and out of position. It is recommended that wash rack be relocated to an area on the Flight School Apron where it meets separation standards.

Chapter 2, Section 2.8.5, discusses the contamination located on the Airport property. There are numerous extraction, injection, and monitoring wells located on the Airport property, as well as remediation piping and two groundwater treatment plants. Impact to the wells, remediation piping, and treatment plants should be avoided, if possible, during the planned development at the Airport. The Goodyear Tire and Rubber Company has been designated as the Potential Responsible Party (PRP) for the contamination. The PRP has a system of extraction, injection, and monitoring wells on the Airport property that are not under the control of the Airport. The wells will continue to function until underground contamination associated with that cleanup effort has been mitigated at some point in the future. The Development Alternatives chapter will consider the location and the potential impacts to the wells as part of the alternative analysis. It is likely that some of the wells will be impacted by the proposed development. Coordination with the PRP will be necessary as alternatives are considered.

Finally, it was suggested during discussions with both Lufthansa and CTC flight schools' management that the need for additional dormitory space may be required in the near future. Both schools plan to increase their operations, and as such anticipate more students over the next five-to-ten years. According to management, 285 dormitory rooms are currently available for students within the three buildings found on campus; 123 are allocated to Lufthansa, 102 to CTC, and 60 to the German Air Force. Both Lufthansa and CTC indicated that during 2016, the dormitories were nearly at capacity. Thus, it is recommended that additional areas on the flight school campus be reviewed for potential locations for new dormitory facilities. Potential locations will be discussed more in the Development Alternative chapter.

4.8.6 Utilities

The current capacity for all utilities is adequate for present day demands. However, some infrastructure on the airport is aging and should be evaluated for ability to supply additional capacity as necessary in future years.

New hangar development may bring the need for additional water capacity to meet current fire codes, and large developments for larger aircraft may require deluge systems, or other fire control systems as well. These can likely be accommodated from existing water utilities depending on the time/need for resupply, and capacity of a new deluge systems. This also assumes possible installation of foam or other firefighting agent systems in hangars to supplement the available water supply. As new developments occur available water capacity should be evaluated relative to the needs of each facility.

Commercial electrical feeds are assumed adequate for current and future use, but large developments could require independent sub-stations or dedicated transformers to power their operations. All new
developments should be coordinated with outside utility providers to assure sufficient capacity exists to support final development and operations.

The 2007 Phoenix Goodyear Airport Master Plan Update included a Master Utility Plan Study in its CIP, to determine the adequacy of the existing infrastructure to accommodate planned growth. Indications are that this plan was never completed. Given the age of the airports established infrastructure, it is highly recommended that a general utility study be performed to gauge the adequacy of the airports current systems, and estimate the utility demands for full build out as forecast in this current Airport Master Plan Update study.

4.8.7 Fencing and Security

The primary purpose of airport fencing is to restrict inadvertent entry to the airport by unauthorized people and wildlife. While Phoenix Goodyear Airport has no FAR Part 139 security requirement, it has already implemented appropriate fencing and other access control systems necessary to control improper entry into its facilities, and provided a level of security for its operators. Additionally, the Phoenix Goodyear Airport has implemented a Security Identification Display Area (SIDA) and identification badge program, that further controls who can access the operational areas of the airport. The existing perimeter fencing and security infrastructure serve the needs of the Airport, however improvements are recommended.

As mentioned in Chapter 2, there are several areas where the perimeter fence has large gaps beneath where wildlife, particularly coyotes and javelina, are able to gain access to the airfield. According the airport personnel and the findings from the 2016 Wildlife Hazard Assessment (WHA), the southwestern corner of airport property near a culvert and ditch see the most activity by wildlife intruders. Airport operations staff have indicated that the western portion of the airport property near the MRO storage parking area has been breached on several occasions and the aircraft have been vandalized. Thus, based on the WHA findings and airport staff reports, it is recommended that the existing perimeter fence be removed and replaced with a new fenceline approximately 27,000-feet in length to better deter breaches from wildlife and unauthorized personnel. Additionally, CCTV cameras at access Gates 1, 2, and 3 will create additional situational awareness that can be tied into the Airport’s Access Control and Alarm Monitoring System (ACAMS) System.

Until such time that the existing fencing can be replaced, it is recommended that airport personnel continue to monitor the fencing as outlined within the WHA for wildlife, and continue to monitor and work with local authorities to increase the security of the airfield from unauthorized individuals as needed. There are several programs and publications designed to increase general aviation airport security.

Airport Operations staff are already familiar with the TSA Security Guidelines for General Aviation Airports; thus, it is recommended that Airport continue to review the latest version of the Guidelines in order to continue to assess the suggested security enhancements for the Airport.
4.7 Airport Access and Vehicle Parking

4.7.1 Airport Access

As of today, the Airport has only one entrance to access the landside and airside portions of the airfield. Goodyear Parkway (which intersects at Litchfield Road) adequately serves this function today; however, it is possible that as development on and around the airport increases, the need for an additional airport access point will become likely. A second airport access point was suggested within the 2007 Airport Master Plan, siting future development and the creation of business corridors within the City of Goodyear. Within the 2007 master plan, a second access point to the airport from the north was suggested, possibly stemming from Bullard Avenue. This is still a likely possibility given the proposed future development at the airport. Likewise, the anticipated development around the airport has not changed within the City of Goodyear General Plan, and in fact has grown quite a bit with the addition of the Goodyear Ballpark recreational area to the northwest of the Airport. As such, it is recommended that the Airport plan for an additional airport entrance road, in which the best location(s) will be described in the Development Alternatives chapter.

4.7.2 Vehicle Parking

As described in the Inventory chapter, there are several vehicle parking lots located throughout the Airport property. The primary vehicle parking location for the general public is located adjacent to the terminal building where Goodyear Parkway terminates. Likewise, with the addition of the new Lux Air Jet Center facility which opened in early 2017, additional parking for the public is now available; the Lux Air facility and its vehicle parking lot is located directly across from the terminal building also where Goodyear Parkway terminates. As noted in the Inventory chapter, there are currently 45 general public parking spaces in the terminal building lot (a total of 64 spaces are available, however 19 of these spaces are designated for City of Phoenix personnel parking only), and 37 parking spaces in the Lux Air lot, for a total of 82 general public parking spaces. The other parking lots on the property are private lots designated for employees of AerSale, Lufthansa, CTC, and the other various tenants, and are not intended for use by the general public. Thus, when determining the vehicle parking requirements over the course of the planning period, only the needs for public parking was calculated. However, the vehicle parking needs of the tenants were not overlooked; vehicle parking requirements for airport tenants were determined based upon in-person interviews with key management representatives at the onset of the master plan update.

Normally, an airport’s vehicle parking area should be able to satisfy the forecasted peak-hour (design-hour) general aviation pilot and passenger demand. Again, because of the unique nature of the operations at the Airport, the same rationale that was used to determine the terminal building size requirements has also been used to determine the vehicle parking requirements. The modified design hour based on the total itinerant operations during the peak month over the course of the planning period and the standard 2.5 passengers per design hour were used for the calculations. As a result, the vehicle parking space requirements for the 20-year planning period are depicted in Table 4-14.
Table 4-14 Vehicle Parking Requirement (General Public)

<table>
<thead>
<tr>
<th>YEAR</th>
<th>PARKING SPACE REQUIREMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016¹</td>
<td>82²</td>
</tr>
<tr>
<td>2021</td>
<td>55</td>
</tr>
<tr>
<td>2026</td>
<td>56</td>
</tr>
<tr>
<td>2031</td>
<td>70</td>
</tr>
<tr>
<td>2036</td>
<td>83</td>
</tr>
</tbody>
</table>

Note. ¹ 2016 is the base year. ² Existing vehicle parking spots available for the general public at the terminal and Lux Air Jet Center only. Source: Armstrong Consultants, Inc, 2017

Based on the existing general public parking spaces currently available at the Airport and the calculations above, no additional parking spaces should be needed until nearly the end of the planning period (2036-time frame). It is possible that additional spaces may be needed at this point, but this will likely depend on the forecasted demand. Thus, much like the terminal building size, the need for additional parking should be monitored by the City throughout the planning horizon and consider expansion as the need arises.

From discussions with the Airport’s prominent tenants, AerSale and Lufthansa/CTC flight schools, no additional vehicle parking needs are foreseen. Both tenants indicated that at this time, vehicle parking needs are adequate and it is not anticipated that additional vehicle parking would be needed in the near future. Should changes in either operation demand more vehicle parking be provided, the tenant should notify the City to ensure that adequate space and locations are available based upon the proposed future development contained within this airport master plan.

During the on-site inventory of the Airport, it was observed that neither the north or south T-hangar aprons had designated vehicle parking spaces for the based aircraft tenants. Presently, tenants are required to park their personal vehicle in their T-hangar when it is not occupied by an aircraft. Moving forward, it is recommended that the City consider adding designated vehicle parking locations on the north and south T-hangar aprons in accordance with the design standards found within AC 150/5300-13A, Change 1, Airport Design. Vehicle parking near tenant hangars is not uncommon at GA airports similar to GYR, and it would further encourage tenants to follow existing FAA rules and regulations pertaining to contents of aircraft hangars. Proposed vehicle parking spaces for the north and south T-hangar apron will be discussed further in the Development Alternatives chapter.

4.8 Summary of Facility Requirements

The facility requirements for the Airport are summarized in Table 4-15. The recommendations are based on the types and volume of aircraft currently using, and expected to use, the airport in the short- and long-term time frames. It should be noted that the summary table includes only those facility requirements that were determined using the results aviation demand forecasts and the capacity analysis. In the Development Alternatives Chapter, various airside and landside improvements will be presented and evaluated, which will in turn lead to the recommended airside and landside development for the Airport. The recommended facilities will enable the Airport to continue to serve its current and future users in a safe and efficient manner.
## Table 4-15 Facility Requirements Summary

<table>
<thead>
<tr>
<th>FACILITY DESCRIPTION</th>
<th>BASE YEAR (2016)</th>
<th>SHORT-TERM (0 – 5 yrs.)</th>
<th>MEDIUM-TERM (6 – 10 yrs.)</th>
<th>LONG-TERM (11 – 20 yrs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RUNWAYS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3-21 (Existing)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Runway Design Code (RDC)</td>
<td>RW 3: D-IV/5000</td>
<td></td>
<td>Maintain Existing</td>
<td></td>
</tr>
<tr>
<td></td>
<td>RW 21: D-IV/VIS</td>
<td></td>
<td>Maintain Existing</td>
<td></td>
</tr>
<tr>
<td>Length (ft)</td>
<td>8,500</td>
<td></td>
<td>Maintain Existing</td>
<td></td>
</tr>
<tr>
<td>Width (ft)</td>
<td>150</td>
<td></td>
<td>Maintain Existing</td>
<td></td>
</tr>
<tr>
<td><strong>TAXIWAYS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Taxiway A (Runway 3-21)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Taxiway Design Group (TDG)</td>
<td>5</td>
<td>Maintain Existing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Width (ft)</td>
<td>75</td>
<td>Maintain Existing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shoulder width</td>
<td>30¹</td>
<td>Construct shoulder in areas where it is currently missing</td>
<td>Maintain</td>
<td></td>
</tr>
<tr>
<td><strong>Taxiway Connectors A1-A10 (Runway 3-21)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Taxiway Design Group (TDG)</td>
<td>5</td>
<td>Maintain Existing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Width (ft)</td>
<td>75</td>
<td>Maintain Existing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shoulder width (ft)</td>
<td>30²</td>
<td>Construct shoulder in areas where it is missing or needs additional pavement</td>
<td>Maintain</td>
<td></td>
</tr>
<tr>
<td><strong>TERMINAL³</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Aviation (sf)</td>
<td>8,000ᵃ</td>
<td>5,500</td>
<td>5,750</td>
<td>7,000 - 8,250</td>
</tr>
<tr>
<td><strong>HANGARS (sf)⁵</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conventional (total approx. sf)</td>
<td>36,000ᵇ</td>
<td>42,600</td>
<td>49,600</td>
<td>57,000 – 62,800</td>
</tr>
<tr>
<td>T-hangars/shade (total approx. sf)</td>
<td>301,800ᶜ</td>
<td>200,100</td>
<td>216,000</td>
<td>233,450 – 250,850</td>
</tr>
<tr>
<td><strong>APRONS⁴</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Aircraft Parking Area (approx. sy)</td>
<td>198,000</td>
<td>277,940</td>
<td>285,760</td>
<td>345,100 – 364,500</td>
</tr>
<tr>
<td><strong>VEHICLE PARKING</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total (general public spaces)</td>
<td>82</td>
<td>55</td>
<td>56</td>
<td>70 – 83</td>
</tr>
</tbody>
</table>

Abbreviations: S = Single-wheel landing gear, D = Dual-wheel landing gear, DT = Dual-tandem landing gear, N/A = not applicable
Note. ¹Paved shoulder is missing in various locations along the length of the taxiway. ²Paved shoulder is not present on connectors A2 and A3, and connectors A4-A8 have shoulders which are only 25-feet in width. ³Calculated using a modified design hour based on the total itinerant operations in the peak month ⁴Combined total square footage of the terminal building and the FBO shared common areas. ⁵Hangar development will depend on actual demand. ⁶Total square-footage of conventional hangar space available to the general public; other conventional hangars at GYR are leased to AerSale and Lufthansa/CTC flight schools for their exclusive use. ⁷Apron development will depend on actual demand.

Source: Armstrong Consultants, Inc., 2017
Chapter 5 Land Use and Zoning

5.1 Introduction

Designating land use and zoning on, adjacent to, and in the close proximity of an airport is an important task for municipal airport sponsors. Typical land use compatibility considerations include safety, height hazards, and noise exposure, all of which sponsors should address when designating land use and zoning ordinances on and around airports within their jurisdiction. In order to gain a better understanding of the land uses in the vicinity of the Airport, Maricopa County, and the cities of Goodyear and Avondale land use maps and zoning were reviewed. As the future development of the Airport is laid out within the airport master planning process, it is essential both the Cities and County’s planning efforts as it relates to land use are working in conjunction to prevent incompatible land use in the vicinity of the Airport.

The following are addressed in the chapter:

- **Airport Design Standards** – FAA’s airport design standards can have an impact on existing land uses around an airport. A summary of the design standards that extend off airport property will be described. The need for the Airport to have control over land within certain design standards will also be discussed.

- **Airspace Considerations** – Title 14, Code of Federal Regulations (14 CFR) Part 77 Imaginary Surfaces can have an impact on existing land uses and zoning around an airport. A summary of applicable imaginary surfaces that could impact existing land uses and zoning controls will be described.

- **Existing Land Use** – For the purpose of analyzing the existing land use around the Airport, the Maricopa County Land Use data will be used.

- **Existing General Plan** – The City of Goodyear’s vision for the growth and development of Goodyear is contained within the Goodyear 2025 General Plan. A discussion of areas that may affect the Airport will be described.

- **Existing Zoning** – the existing zoning near the Airport will be presented. The City of Goodyear zoning districts will be described and any incompatible uses discussed.

- **Land Use and Zoning Summary** – a summary of incompatible land uses and zoning will be presented along with recommended actions.

5.2 Airport Design Standards

As previously mentioned in Chapter 2, there are several airport design standards that apply to an airport. The standards are meant to enhance safety, efficiency and improve the economics of the airport system. Figure 2-3 depicts the existing airport design standards for the Airport. All of the design standards discussed in Chapter 2 are located on airport property with the exception of a portion of one, the Runway Protection Zones (RPZ) on both ends of Runway 3-21. The purpose of the RPZ is to enhance the protection of people and property on the ground, which is why the FAA encourages airport operators to
own or control as much land as possible within RPZs. When land located within an RPZ is not owned in fee or controlled via avigation easements, the land becomes susceptible to development which may or may not be compatible with RPZ design standards, even if the land use or zoning itself is deemed compatible near airports. A brief discussion of the Airport’s existing RPZs was described in Section 2.5.1-3, Runway Protected Areas within Chapter 2. It was noted there are parcels of land located both in the RPZ for Runway 3 and 21, in which the City of Phoenix nor the City of Goodyear control. Table 5-1 summarizes the parcels located in the existing Runway 3-21 RPZs that contain land that is not presently controlled by the Airport.

### Table 5-1 Properties within Runway Protection Zones

<table>
<thead>
<tr>
<th>OWNERSHIP</th>
<th>AREA WITHIN THE RPZ (ACRES)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RUNWAY 21 RPZ</strong></td>
<td></td>
</tr>
<tr>
<td>EJM Property/Beck Property (vacant)</td>
<td>8.75</td>
</tr>
<tr>
<td>Union Pacific Railroad (vacant, tracks removed)</td>
<td>0.36</td>
</tr>
<tr>
<td>Qwest Corporation (Century Link)</td>
<td>0.63</td>
</tr>
<tr>
<td>Jehovah’s Witnesses</td>
<td>0.002</td>
</tr>
<tr>
<td>Cavco Litchfield</td>
<td>0.001</td>
</tr>
<tr>
<td>Cavco Litchfield</td>
<td>0.10</td>
</tr>
<tr>
<td>West Yuma Road Right-of-Way</td>
<td>2.66</td>
</tr>
<tr>
<td><strong>RUNWAY 3 RPZ</strong></td>
<td></td>
</tr>
<tr>
<td>JVH Property LLC</td>
<td>6.0 (Approximate)</td>
</tr>
<tr>
<td>Union Pacific Railroad and MC85 Right-of Way</td>
<td>1.0 (Approximate)</td>
</tr>
</tbody>
</table>

Source: 1 Supporting Factors in the Need to Obtain Positive Control of the Runway 21 Runway Protection Zone at Phoenix Goodyear Airport (GYR) prepared by HNTB, June 2016; 2 Maricopa County Assessor’s Office, April 2017; 3 Acreage is not a result of an actual boundary survey.

In order to comply with FAA design standards as it pertains to RPZs, the City of Phoenix Aviation Department is aware of the need to gain positive control of the land within the Airport’s RPZ, either by fee simple acquisition or easement(s).

The *Development Alternatives* chapter will consider the impacts of the existing RPZ land uses and will make recommendations to improve control of the RPZ in the future. Additional runway capacity alternatives will consider all of the airport design standards and the potential impacts on land uses around the airport. **Exhibit 5-1** illustrates the parcels of land described in **Table 5-1**.
### Land Ownership in Runway Protection Zones

**Exhibit 5-1**

**Parcel Ownership Source:** Maricopa County Assessors Office 2016

**Place Data Source:** Google Earth 2017

<table>
<thead>
<tr>
<th>Number</th>
<th>Parcel</th>
<th>Owner Name</th>
<th>Property Address</th>
<th>Mailing Address</th>
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<tbody>
<tr>
<td>1</td>
<td>500-07-018F</td>
<td>JVH Property LLC</td>
<td>3829 S Estrella Pkwy</td>
<td>Goodyear, AZ 85338</td>
</tr>
<tr>
<td>2</td>
<td>500-07-006P</td>
<td>City of Goodyear</td>
<td>S. Estrella Pkwy</td>
<td>190 N Litchfield Rd, PO Box 5100, Goodyear, AZ 85338</td>
</tr>
<tr>
<td>3</td>
<td>500-07-006R</td>
<td>City of Phoenix</td>
<td>1658 S Litchfield Rd</td>
<td>Goodyear, AZ 85338</td>
</tr>
<tr>
<td>4</td>
<td>MC 85</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>500-07-022R</td>
<td>SUN MP Investment Properties LLC</td>
<td>5665 N Scottsdale Rd, Ste 135</td>
<td>Scottsdale, AZ 85253</td>
</tr>
<tr>
<td>6</td>
<td>500-07-022S</td>
<td>City of Goodyear</td>
<td>S. Estrella Pkwy</td>
<td>190 N Litchfield Rd, PO Box 5100, Goodyear, AZ 85338</td>
</tr>
<tr>
<td>7</td>
<td>500-07-022M</td>
<td>SUN MP Investment Properties LLC</td>
<td>5665 N Scottsdale Rd, Ste 135</td>
<td>Scottsdale, AZ 85253</td>
</tr>
<tr>
<td>8</td>
<td>500-07-022P</td>
<td>SUN MP Investment Properties LLC</td>
<td>5665 N Scottsdale Rd, Ste 135</td>
<td>Scottsdale, AZ 85253</td>
</tr>
<tr>
<td>9</td>
<td>500-04-021A</td>
<td>Mountain States Telephone &amp; Telegraph Co</td>
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</tr>
<tr>
<td>10</td>
<td>500-04-015V</td>
<td>Larson Property Investments LLC</td>
<td>1040 S Camino Oro, Goodyear</td>
<td>85338</td>
</tr>
<tr>
<td>11</td>
<td>500-04-994</td>
<td>Estrella Mountain Congregation of Jehovah &amp; Others</td>
<td>14038 W Yuma Rd, Goodyear</td>
<td>85338</td>
</tr>
<tr>
<td>12</td>
<td>500-04-019V</td>
<td>City of Goodyear</td>
<td>14000 W Yuma Rd</td>
<td>Goodyear, AZ 85338</td>
</tr>
<tr>
<td>13</td>
<td>500-04-021A</td>
<td>Mountain States Telephone &amp; Telegraph Co</td>
<td>14064 W Yuma Rd, Goodyear</td>
<td>85338</td>
</tr>
<tr>
<td>14</td>
<td>500-04-015V</td>
<td>Larson Property Investments LLC</td>
<td>1040 S Camino Oro, Goodyear</td>
<td>85338</td>
</tr>
<tr>
<td>15</td>
<td>500-04-019V</td>
<td>City of Goodyear</td>
<td>14000 W Yuma Rd</td>
<td>Goodyear, AZ 85338</td>
</tr>
<tr>
<td>16</td>
<td>500-04-994</td>
<td>Estrella Mountain Congregation of Jehovah &amp; Others</td>
<td>14038 W Yuma Rd, Goodyear</td>
<td>85338</td>
</tr>
<tr>
<td>17</td>
<td>500-04-015V</td>
<td>Larson Property Investments LLC</td>
<td>1040 S Camino Oro, Goodyear</td>
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<tr>
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<td>City of Goodyear</td>
<td>14000 W Yuma Rd</td>
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<td>20</td>
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<td>Larson Property Investments LLC</td>
<td>1040 S Camino Oro, Goodyear</td>
<td>85338</td>
</tr>
<tr>
<td>21</td>
<td>500-04-019V</td>
<td>City of Goodyear</td>
<td>14000 W Yuma Rd</td>
<td>Goodyear, AZ 85338</td>
</tr>
<tr>
<td>22</td>
<td>500-04-994</td>
<td>Estrella Mountain Congregation of Jehovah &amp; Others</td>
<td>14038 W Yuma Rd, Goodyear</td>
<td>85338</td>
</tr>
</tbody>
</table>

**Diagram:**

- Runway 3 Protection Zone
- Runway 21 Protection Zone
- Runway 21 Protection Zone (RPZ)
- Runway 3 Protection Zone (RPZ)
5.3 Airspace Considerations

Chapter 2, section 2.5.1-4 provides an overview of FAA’s imaginary surfaces that surround an airport. These surfaces are used as a guide to provide a safe and unobstructed operating environment for aviation. Title 14, Code of Federal Regulations (14 CFR) Part 77 Imaginary Surfaces consists of five surfaces; primary, approach, horizontal, conical and transitional. Each of these surfaces are discussed and graphically depicted in more detail in Chapter 2.

For the purpose of land use compatibility, typically the primary, approach and transitional surfaces are the most common surfaces to encounter potential land use impacts. While analyzed, the conical and horizontal surfaces begin at 150 feet above the ground and typically don’t impact land use immediately adjacent to an airport unless the surrounding terrain is mountainous.

The terrain immediately adjacent to the Airport is generally flat and does not appear to conflict with the Airport’s airspace. The Estrella Mountains are located approximately 4 miles to the Southeast and have been analyzed for obstacle penetrations. Further discussion and analysis of obstructions to the airspace will be discussed in the Development Alternatives chapter.

5.4 Land Use

Arizona Revised Statute (ARS) 28-8486, Public Airport Disclosure, requires that public airport owners publish a map depicting the boundaries of the “territory in the vicinity of the public airport”. The territory is defined as property that is within the traffic pattern airspace defined by the FAA which includes property that experiences a Day-Night Average Sound level (DNL) of 60 decibels or higher in counties with more than 500,000 residents (in counties with 500,000 residents or less the threshold is 65 decibels). ARS 28-8486 requires the State Real Estate Office prepare a disclosure map in conjunction with the airport owner that is recorded with the county and available to the public. In order to evaluate the impact the Airport may have on land uses in the vicinity of the Airport, a review of the current and future land uses in the cities of Goodyear and Avondale is necessary. The result of the review will be a public airport disclosure map for the Airport. The outer most limits of the boundary also extend into other cities, such as Phoenix, Tolleson, Litchfield Park, and Buckeye. Because of the limited acreage within these municipalities, the Maricopa Association of Governments (MAG) data was used to evaluate the land uses. The Phoenix Goodyear Airport public airport disclosure map and the existing land use of the surrounding area is depicted on Exhibit 5-2.
5.4.1 City of Goodyear

As is common in most large metropolitan areas, the City of Goodyear is bordered by and near several other municipalities and communities in all directions; the municipal boundary is adjacent to Litchfield Park and Glendale to the north; Avondale, Tolleson, and Phoenix to the east; the Gila River Indian Community, Pinal County, and various wilderness areas to the south and southeast; and Buckeye to the west. The municipal boundary of the City of Goodyear itself is longer than it is wide, i.e. most of its land is contained in a north-south direction versus an east-west direction. In total, the City of Goodyear encompasses approximately 191 square-miles. The Airport is located in the northern portion of the municipal boundary, near the official city center. Because of the close proximity of the nearby municipalities, it is also important to review the land uses of not only the City of Goodyear, but of the surrounding communities as well.

The community’s vision for the growth and development of Goodyear is contained within the Goodyear 2025 General Plan⁴, which was created by the community and approved by voters on November 4, 2014. According to the City of Goodyear, “The purpose of the General Plan is to guide decision making in the community in order to ensure that we are growing according to our shared vision.” A significant component of the General Plan is the Land Use and Transportation Plan (designated as Chapter 8). The Land Use and Transportation Plan “represents the preferred land use, physical form, and mobility pattern for Goodyear,” according to the City of Goodyear. There are several categories of land use, along with special overlay districts, contained within the Land Use Plan, as well as general and specific design guidelines for each category. The Land Use and Transportation Map graphically depicts the various land use categories found within the General Plan. As per the map, the Airport property resides within the Industrial land use category.

As defined in the General Plan, the Industrial category:

> Provides areas for more intensive business and employment uses which have a greater impact on surrounding land uses. Uses that are appropriate include office, industrial, and business parks. Supportive uses such as community and neighborhood commercial and public facilities are also allowed in the Industrial category, to the extent that they are needed to serve the primary uses within the category (pg. 127, 2014).

The majority of adjacent land to the north, south, and west of the Airport (that is not within the Industrial category) is designated within the Business and Commerce category, which is similar to Maricopa County’s designations; land to the east of the Airport and its Industrial boundary does not fall within City of Goodyear limits, which is where the County land use map is helpful. Again, a small amount of residential land use is present, but is not uncommon given the age of the Avondale neighborhood.

A review of the Goodyear 2025 General Plan, Physical Growth and Development chapter reveals that one of the potential barriers to implementation of the plan is; “Luke Air Force Base and the Phoenix Goodyear Airport are important community assets; however, certain types of land uses are restricted within their proximity.” Another policy is to promote development within the City’s designated growth

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⁴ http://www.goodyearaz.gov/home/showdocument?id=10645
areas first, with the Airport identified as being located within a targeted job center. A policy in the plan is to “protect the Phoenix Goodyear Airport Traffic Pattern and their respective critical noise contours surrounding the Airport from incompatible land uses in support of their continued and/or expanded future operations.” Another economy policy is to “foster the creation of jobs within key industry clusters; aviation and aerospace.”

There are also several special land use overlays contained in the Goodyear 2025 General Plan such as the Village Center Overlay, Transit Oriented Development Overlay, Luke Compatible Land Use Overlay, Wildlife Linkage Overlay and the Aggregate Mining Overlay.

Consideration of potential impacts to the land uses contained in the Goodyear 2025 General Plan will be evaluated in the Development Alternative chapter.

5.4.2 City of Avondale

In total, the City of Avondale encompasses approximately 30 square-miles. The Airport is located west of the municipal boundary. Because of the close proximity, it is also important to review the land uses of not only the City of Goodyear, but of the surrounding communities as well.

The City of Avondale adopted a general plan in 1990, which was later updated in 2002. The current 2030 General Plan is the most recent update, occurring in 2012 and plans for community growth through the year 2030. Both the 1990 Plan and the 2002 Plan were based on the citizen’s vision for the future. The 1990 Plan contained land use circulation and transportation, recreation and natural resources, public facilities and services, urbanization, and economic development elements. The 1990 Plan called for redevelopment plans for the downtown area. Since the 1990 Plan, other plans were completed to address topics not anticipated in the 1990s. These plans include:

- Freeway Corridor Plan -1991
- Tres Rios Greenway Specific Plan – 1992
- North Avondale Plan 1996
- Redevelopment Implementation Plan -1999
- Avondale Business Core Redevelopment Implementation Plan - 1999

The 2002 Plan included land use, economic development, growth area, cost of development, housing, conservation, redevelopment and rehabilitation, open space, environmental planning and conservation, circulation, bicycling, water resources, public safety and facilities, public buildings, and safety elements that are required by ARS §9-461.05 for jurisdictions over 50,000.

The 2002 Plan encouraged the development of safe and affordable housing types that were called for in the 1990 Plan. The 2002 Plan recognized the desire for a range of housing options by identifying areas for low density residential development south of Broadway Road for executive housing.

The majority of the existing land use in the City of Avondale remains agriculture, or vacant with over 8,600 acres. Open space is the second largest land use with over 2,700 acres. Medium density residential
is the third largest land use with over 2,400 acres. The smallest land use is multi-family residential with only 369 acres.

A review of the individual goals and policies of the 2030 Plan revealed that a policy goal contained in Economic Element includes; “identifying opportunities to leverage the proximity to the Phoenix Goodyear Airport and other regional assets”. No other mention of the Airport was made in the 2030 Plan.

The land uses within the City of Avondale limits closest to the Airport consist of a mixture of medium and high density housing, local commercial, education, and the Historic Avondale District. Consideration of potential impacts to these land uses will be evaluated in the Development Alternative chapter.

5.4.3 Maricopa Association of Governments

The cities of Goodyear and Avondale, along with other cities (with the exception of the Gila River Indian Community and Pinal County), are contained within Maricopa County. On a regional scale, data driven long-range planning and policy development for the metropolitan Phoenix in areas such as transportation, air and water quality, and solid waste management is performed by the Maricopa Association of Governments (MAG). MAG was formed in 1967 when elected officials realized that many of the issues mentioned above affected residents beyond the borders of their individual jurisdictions. One tool MAG offers is a County-wide interactive land use map.

According to the MAG Existing Land Use Maps, land adjacent to the Airport’s property is classified as agricultural, industrial, commercial, vacant, and public/special event. These classifications pair well with airports, and are compatible. There is some residential (mostly single-family high density and multi-family) land use within a two-three-mile radius of the Airport; most of which is found to the north, east, and west of the Airport. Although residential land use is not ideal in such near proximity of an airport, it is not uncommon. Most neighborhoods in this area have been a part of the landscape for many years.

According to the MAG Future Land Use Maps, land adjacent to the Airport’s property will be converted to different classifications such as business park, mixed use, and industrial with no agriculture in the vicinity of the Airport. These classifications also pair well with airports, and are also compatible.

The future land use designations for Maricopa County, the City of Goodyear, the City of Avondale, and land in surrounding communities is illustrated as Exhibit 5-3.
THIS PAGE WAS INTENTIONALLY LEFT BLANK
5.6 Existing Zoning

5.6.1 City of Goodyear Zoning

The Zoning Ordinance of the City of Goodyear, Arizona\(^5\) revised on December 18, 2013, contains the existing regulations, standards, and zoning districts for the City. Exhibit 5-4 depicts the City of Goodyear Zoning Districts within the Public Airport Disclosure Limits of the Phoenix Goodyear Airport. Likewise, the accompanying Zoning Districts Map\(^6\) graphically depicts the different zoning districts found within City limits. According to the map, the Airport property in its entirety is zoned as an agricultural district. As per the Zoning Ordinance, “the purpose of the Agricultural (AG) District is to allow agricultural, ranching, and related uses with the City. The other purpose of the AG category is to act as a holding zone for land until a suitable rezoning and development occurs.” As such, it is assumed the Airport falls within the later definition, as it is not used for agricultural purposes. Furthermore, within the AG category, one of the permitted uses of land is for “public facilities” upon approval. The Airport therefore would qualify as a public facility.

Adjacent land north, northwest and west of the Airport is zoned Light Industrial Park (I-1) or as a Planned Development Area (PAD). The land adjacent to the Airport that is zoned PAD could become problematic for potential noise complaints if residential units are constructed. There is also vacant land zoned PAD approximately 4,000 feet off the end of Runway 21 in line with the runway centerline that could also become problematic for potential noise complaints if residential units are constructed.

Land to the east, southeast, and southwest is a mixture of Light Industrial Park (I-1), General Industrial Park (I-2), General Commercial (C-2), and Planned Development Area (PAD). Recognizing that there is some disparity between the existing Zoning Ordinance and the land use categories as described within the Goodyear 2025 General Plan, Chapter 8 of the General Plan addresses this by listing the various zoning districts under the correlating land use category. Per the General Plan, the listed zoning districts “may be considered within the correlating land use categories, so long as the proposed zoning adheres to the Development Standards.” The zoning districts permitted within the land use Industrial category as found within the Goodyear 2025 General Plan are agricultural (AG), general commercial (C-2), light industrial (I-1), general industrial (I-2), public facilities district (PFD), and planned area development (PAD).

There are no special zoning overlay districts that would impact the Airport according to the current zoning ordinance.

5.6.2 City of Avondale Zoning

The City of Avondale is located to the east of the City of Goodyear and lies within the Public Airport Disclosure Limits of the Phoenix Goodyear Airport. The City of Avondale Zoning Ordinance\(^5\), amended and restated February 16, 2016, comprises the existing regulations, standards, and zoning districts for


\(^6\) [http://www.goodyearaz.gov/home/showdocument?id=13480](http://www.goodyearaz.gov/home/showdocument?id=13480)
the City in conjunction with the *City of Avondale General Plan*. **Exhibit 5-4** depicts the City of Avondale’s Zoning Districts within the Public Airport Disclosure Limits of the Phoenix Goodyear Airport.

City of Avondale land within the Public Airport Disclosure Limits consists of a mixture of Commercial Districts (C-2), Residential Districts (R-4, R-3, R1-6, MH), Agricultural Districts (AG), Employment Districts (A-1, CP), Special Districts (CCD, MSED, SUD), and Planned Area Development Districts (PAD). Land that is located within the Public Airport Disclosure Limit and in close proximity to the Airport that is zoned Residential Districts could be problematic for potential noise complaints.

Land to the east and northeast of the Airport has been designated as Planned Area Development Districts. Multiple of the zoned Planned Area Development Districts located to the east and northeast have been designated for a mix of residential use and could be problematic in the future for potential noise complaints.
ZONING MAP | CITY OF GOODYEAR, AVONDALE & MARICOPA COUNTY*

Exhibit 5-4


* AREA SHOWN ~6 MILE RADIUS WITHIN PHOENIX GOODYEAR AIRPORT

---

LEGEND

- CITY CENTER
- AIRPORT 65 DNL (DAY - NIGHT NOISE LEVEL)
- GYR PUBLIC AIRPORT DISCLOSURE MAP LIMITS
- MUNICIPAL BOUNDARIES
- MUNICIPAL PLANNING BOUNDARY
5.7 Land Use and Zoning Summary

The findings of the land use and zoning evaluation will be an important element of the development alternatives. Land use and zoning compatibility with the Airport is essential for future development.

The evaluation summary of land use and zoning for the cities of Goodyear and Avondale is depicted in Table 5-2.

Table 5-2 Land Use and Zoning Summary

<table>
<thead>
<tr>
<th>CITY OF GOODYEAR</th>
<th>Compatible with Airport</th>
<th>Non-Compatibel with Airport</th>
<th>Overlays in Place or Planned</th>
<th>Comments</th>
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<tr>
<td>Existing Land Use</td>
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<td>No areas identified</td>
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<tr>
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</tr>
<tr>
<td>Zoning</td>
<td>Yes</td>
<td>Some PAD land may become non-compatible</td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CITY OF AVONDALE</th>
<th>Compatible with Airport</th>
<th>Non-Compatibel with Airport</th>
<th>Overlays in Place or Planned</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing Land Use</td>
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<td>No areas identified</td>
<td>No</td>
<td>Development Alternatives will consider impacts to existing and future land uses and zoning.</td>
</tr>
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<td>Future Land Use</td>
<td>Yes</td>
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<tr>
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<td>Some Residential and PAD land may be non-compatible</td>
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Bibliography


Western Regional Climate Center. (n.d.). Litchfield Park, Arizona (024977) Period of Record: 08/01/1917 to 06/06/2016. Retrieved from Western Regional Climate Center, Monthly Temperature: http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?az4977

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