CHAPTER THREE: CAPACITY ANALYSIS AND FACILITY REQUIREMENTS

INTRODUCTION

This chapter assesses the capacity of various airport components at Chandler Municipal Airport and compares them with the forecast demand presented in the previous chapter. Further analysis identifies the facilities needed to meet the forecasted demand. Consideration is given to the identified critical aircraft, the projected fleet mix, and usage of the Airport presented in the previous chapter. These factors along with the Airport's anticipated role will determine design criteria for the Airport and the associated facilities.

Within the FAA's airport master planning process, facility requirements are determined by:

- Comparing forecasted demand against existing capacity
- Identifying which elements of demand are not being met
- Determining what facilities are needed to accommodate the forecast demand
- Complying with FAA safety and design standards

This chapter builds upon the previous forecast chapter and analyzes each component of Chandler Municipal Airport's airside and landside facilities to determine the adequacy over the 20-year planning period. The analysis will identify what new facilities may be needed and when they may be needed to accommodate the projected demand.

In addition, the FAA provides guidance for the planning and design of airport facilities through Advisory Circulars (ACs) that promote airport safety, economy, efficiency, and longevity. Many of the facility requirements identified for Chandler Municipal Airport incorporate FAA planning and design standards presented in AC 150/5300-13, *Airport Design, Change 9*.

AIRFIELD CAPACITY

The generally accepted method of determining an airport's capacity is provided in FAA AC 150/5060-5, *Airport Capacity and Delay*. The following key terms are relative to the discussion of capacity:

- Demand – the magnitude of aircraft operations to be accommodated in a specified period of time, provided by the forecasts
- Capacity – a measure of the maximum number of aircraft operations that can be accommodated on an airport in one hour
- Annual Service Volume – or ASV, a reasonable estimate of the airport's annual capacity

- Delay – the difference between the actual time it takes an aircraft to operate on the airfield and the time it would take the aircraft if it were operating without interference from other aircraft, usually expressed in minutes

The methodology used in this Master Plan focuses on annual service volume (ASV), which is commonly used by the FAA as a quantifiable measure of operating capacity as well as hourly capacity. The calculation of ASV and comparison to projected demand is an important tool in the short and long-range planning processes at the Airport.

Factors Affecting Airfield Capacity

Airfield capacity is defined as the number of aircraft operations that an airfield configuration can process or accommodate during a specified interval of time when there is a continuous demand for service (i.e., an aircraft is always waiting to depart or land). Factors affecting the capacity of the existing airfield include the runway configuration, weather conditions, and the operational aircraft fleet mix. The extent to which flight training activities occur at the Airport is also a consideration. These factors were used to develop visual flight rule (VFR) and instrument flight rule (IFR) hourly capacities at Chandler Municipal Airport.

Airfield Layout. The primary factor for determining the operational capacity of an airport is the layout and geometry of the airfield's runways and taxiways. Chandler Municipal has two runways located in a parallel configuration. Primary Runway 4R/22L is 4,850 feet long by 75 feet wide, while parallel Runway 4L/22R is 4,401 feet long by 75 feet wide. The runways are separated by 700 feet from runway centerline to runway centerline. Both runways have a strength weighting of 30,000 pounds single-gear wheel loading (SWL). Each runway at the Airport is served by a full-length parallel taxiway. The taxiway serving runway 4L/22R has seven exits, while the taxiway serving runway 4R/22L has five exits.

Meteorological Conditions. Weather conditions affect runway utilization, orientation, and aircraft separation requirements. The climate in the Phoenix metropolitan area provides for VFR conditions over 98 percent of the time, while IFR conditions exist approximately 2 percent of the time. The distinction between VFR and IFR is important because, assuming all other factors are equal, fewer aircraft operations can occur during IFR conditions because aircraft operating within that environment require additional separation from one another.

Runway Use. The percentage of time that each runway configuration is used must also be factored into the capacity analysis. Discussions with air traffic control tower (ATCT) staff indicates that Runway 4R/22L is used primarily for training operations in order to keep traffic patterns on the south side of the Airport. Runway 4L/22R is used more frequently for transient activity. Approximately 60 percent of the total operations at the Airport are conducted on Runway 4R/22L. The direction of takeoffs and landings is equally split between Runways 4 and 22 based on wind conditions and ATCT.

Percent of Touch-and-Gos. A touch-and-go operation typically refers to training activity and occurs when an aircraft makes a landing and an immediate take-off without coming to a full stop or exiting the runway. Airports with a high percentage of touch-and-go activity typically have a higher operational capacity. It is estimated that 60 percent of the total annual operations at Chandler Municipal are considered touch-and-gos.

Airspace Limitations. The Chandler Municipal Airport is located in relatively close proximity to several other airports and is located under a "shelf" of the Phoenix Sky Harbor International Class B airspace, and adjacent to the Williams Gateway Class D airspace. Currently airspace limitations create minimal delays to aircraft arriving and departing Chandler Municipal. However, as aircraft activity continues to grow at the Airport and at other airports in the Phoenix region, the proximity to other airports in the region has the potential to cause delay at Chandler Municipal depending on weather conditions and activity levels at surrounding airports.

Runway Instrumentation. The Airport has three non-precision instrument approach procedures. The GPS, VOR, and NDB approaches allow access to the Airport during certain IFR weather conditions.

Aircraft Mix Index. The aircraft mix index is a mathematical expression used to categorize the mix of aircraft with different performance characteristics that are projected to use the Airport. Classes A and B aircraft consist of small and medium-sized propeller aircraft and some jets, all weighing 12,500 pounds or less. Class C aircraft are those weighing between 12,500 pounds and 300,000 pounds and include business jets as well as corporate class aircraft. Most corporate class aircraft which fall into Class C weigh less than 60,000 pounds. Chandler Municipal currently has an aircraft mix consisting of A, B, and C aircraft, but no Class D aircraft which are those over 300,000 pounds. The mix index for Chandler Municipal is currently estimated to be 10 percent, growing to 14 percent at the end of the forecast period. The mix index is based on existing fleet usage and the forecast projection of the Airport being utilized by more corporate class aircraft in future years. This index range is used as a reference for determining ASV.

Percent Arrivals. Typically, the lower the percentage of arrivals, the higher the hourly capacity of the airport. The aircraft arrival-departure split at general aviation airports is generally 50-50, as is estimated at Chandler Municipal Airport.

Peak Hour Capacity Analysis

The first step in the capacity analysis is the calculation of the hourly runway capacity. Peak hour airfield capacity is defined as the maximum number of aircraft operations that can be processed at an airport in an hour. This capacity level varies under VFR and IFR conditions, reflecting the fact that local prevailing wind and weather conditions fluctuate over the course of the year. As previously noted, there are several factors known to influence airport capacity. The VFR and IFR hourly capacities for Chandler Municipal Airport were based upon the following assumptions:

1. **Runway-use Configuration.** The appropriate runway use configuration was taken from Figure 2-1 in the Advisory Circular 150/5060-5, *Airport Capacity and Delay*.

2. **Percent Arrivals.** Arrivals equal departures.

3. **Percent of Touch-and-Go's.** Approximately 60 percent of the total operations are considered to be touch-and-go. This is above the highest range of 50 percent provided in Table 2-1 of the Advisory Circular.

4. **Taxiways.** Each runway at the Airport is served by a full-length parallel taxiway. The taxiway serving runway 4L/22R has seven exits, while the taxiway serving Runway 4R/22L has five. Utilizing the methodology outlined in AC 150/5060-5, Runway ends 4R, 22L, and 22R have exit factors of two, while Runway end 4L has an exit factor of three.

5. **Airspace Limitations.** The Chandler Municipal Airport is located in relative close proximity to several other airports and is located under a "shelf" of the Phoenix Sky Harbor International Class B airspace, and adjacent to the Williams Gateway Class D airspace. Currently airspace limitations create minimal delays to aircraft arriving and departing Chandler. However, as aircraft activity continues to grow at Chandler Municipal Airport and at other airports in the Phoenix region the proximity to other airports in the region has to potential to cause delay at Chandler Municipal depending on weather conditions and activity levels at surrounding airports.

6. **Runway Instrumentation.** The Airport has three non-precision instrument approach procedures. The GPS, VOR, and NDB approaches allow access to the airport during inclement weather conditions.

7. **Mix Index.** The mix index for Chandler Municipal is currently estimated to be 10 percent, growing to 14 percent at the end of the forecast period. The mix index is based on existing fleet usage and the forecast projection of the airport being utilized by more corporate class aircraft in future years.

Using the factors discussed above and the FAA's AC, the Airport's hourly capacity was calculated. Under optimum conditions, Chandler Municipal Airport currently has a VFR weighted hourly capacity of 225 operations, and a current IFR weighted hourly capacity of 63 operations. The future weighted hourly capacity declines to 211 operations per hour at the end of the forecast period. This decline is a result of the increased number of operations by more corporate class aircraft that are forecast to use the Airport. Based on annual forecast figures presented in the previous chapter, the Airport will likely experience a peak hour of 100 to 188 operations throughout the forecast period.

Annual Service Volume

Once the weighted hourly capacity is calculated, the annual service volume (ASV) can be determined. ASV is determined using the following equation:

$$ASV = C \times D \times H$$

The C equals the weighted hourly capacity, the D equals the average daily demand, and the H equals the average peak hour demand.

By applying methodologies found in the AC 150/5060-5, *Airport Capacity and Delay*, Chandler Municipal Airport currently has an annual service volume of approximately 527,000 operations. Overall capacity is reduced based on the fact that the percentage of touch-and-go operations is relatively high in relation to other airports and the fact that the Airport does have some airspace constraints. However, the capacity of the Airport is enhanced by the presence of an air traffic control tower.

The forecast for annual operations is expected to increase from 235,111 (2005) to 400,600 (2025) operations by the end of the forecast period. Using this comparison, the demand is projected to approach the Airport's annual capacity as shown in **Table 3.1**. As demand at the Airport begins to near the capacity, the delay experienced by aircraft arriving and departing Chandler Municipal Airport is also projected to increase. **Table 3.2** presents the low and high range of average delay for each aircraft, and the overall total annual delay for all aircraft.

Table 3.1
AVIATION DEMAND CAPACITY ANALYSIS

Element/Activity	Year 2005	2010	2015	2020	2025
Forecast Annual Demand	235,111	268,600	306,900	350,600	400,600
Average Day Peak Month (ADPM)	669	840	960	1,097	1,253
Peak Hour Operations	100	126	144	165	188
Daily Demand Ratio (D)	352	320	320	320	320
Hourly Demand Ratio (H)	6.67	6.67	6.67	6.67	6.67
Weighted Hourly Capacity (C)	225	222	218	215	211
Annual Service Volume (ASV)	**527,000**	**474,000**	**465,000**	**457,000**	**449,000**
Annual Demand of ASV (%)	45%	57%	66%	77%	89%

SOURCE: Wilbur Smith Associates
PREPARED: June 2006

Table 3.2
AIRFIELD DELAY ANALYSIS

Year	Average Delay Per Aircraft (in minutes)		Total Annual Delay (in minutes)	
	Low	High	Low	High
2005	0.10	0.3	23,511	70,533
2010	0.20	0.7	53,720	188,020
2015	0.25	0.8	76,725	245,520
2020	0.35	1.3	122,710	455,780
2025	0.60	2.0	240,360	801,200

SOURCE: Wilbur Smith Associates
PREPARED: June 2006

As indicated Table 3.1, Chandler Municipal Airport is currently operating at 45 percent of its annual capacity, but is anticipated to increase to 89 percent of capacity by 2025. Generally, it is not desirable for an airport's operations to exceed 60 percent of its airfield capacity without planning for capacity enhancements or implementing demand management strategies. In doing so, when airport activity reaches 80 percent of capacity, new airfield facilities may be constructed or demand management strategies would be put in place to control or reduce delay. Chandler Municipal Airport is anticipated to reach the 60 percent level between 2010 and 2015 and to exceed 80 percent between 2020 and 2025. Alternatives for increasing the Airport's capacity to meet the forecasted demand will be identified in the following chapter.

AIRSIDE REQUIREMENTS

Airside facilities generally include those that support the transition of aircraft from flight to ground or the movement of aircraft from parking or storage areas to departure and flight. These facilities consist of runways, taxiways, airfield marking and lighting, and navigational aids (NAVAIDs). In order to select the appropriate FAA design standards for the development of the airside facilities, the characteristics of the critical aircraft expected to utilize the Airport are considered.

Runway Orientation

Chandler Municipal Airport is equipped with two parallel runways positioned in a northeast – southwest direction to align the runways with the prevailing local wind direction. The orientation of the runway to the prevailing wind direction is critical to the safe operation of aircraft, especially small single-engine aircraft which are more susceptible to crosswinds. Crosswinds are winds which tend to be perpendicular to the runway or path of an aircraft while landing or taking off. Historical wind data was unavailable for Chandler Municipal Airport. For the purposes of this analysis, historical wind data was obtained for nearby Williams Gateway Airport for the period of 1983 through 1992. The FAA recommends 95 percent wind coverage for various crosswind components based on specific ARCs. The 95 percent wind coverage is computed on the basis of the crosswind not exceeding 10.5 knots for ARC A-I and B-I, 13.5 knots for ARC A-II and B-II, 16 knots for ARC A-III, B-III, and C-I through D-III, and 20 knots for ARC A-IV through D-VI as detailed in AC 150/5300-13, *Airport Design*.

The present ARC classification for Chandler Municipal Airport is B-II. Using the above referenced criteria, wind coverage would be computed for a 13.5 knot crosswind component. Although the wind coverage criteria recommends coverage based on the ARC of the runway, the runway has also been evaluated for a more conservative 10.5 knot crosswind. This is warranted due to the large number of smaller single-engine piston and twin-engine piston aircraft that utilize the Airport on a regular basis that are more susceptible to crosswinds. In addition, with the recommendation that the Airport's ARC be increased to C-II, the 16 knot coverage was also examined. **Table 3.3** presents the wind coverage for Chandler Municipal Airport. **Exhibit 3.1** depicts the coverage graphically.

Table 3.3
WIND COVERAGE

Runway		Percent Coverage		
		10.5 Knots (12 MPH)	13.5 Knots (15 MPH)	16 Knots (18 MPH)
All Weather Conditions				
Runways	4L/22R 4R/22L	98.75%	99.44%	99.84%

SOURCE: National Climatic Data Center
PREPARED: June 2006
STATION: Williams Gateway (IWA)
PERIOD: 1983-1992

Based on this analysis, Runways 4L/22R and 4R/22L meet the 95 percent wind coverage for B-II runways. Therefore, no additional runways are required due to lack of wind coverage.

Runway Length

Runway length requirements for Chandler Municipal Airport were evaluated in accordance with FAA AC 150/5325-4B, *Runway Length Requirements for Airport Design*. The minimum runway length requirement is based upon several factors including airport elevation, mean daily maximum temperature, and type aircraft expected to use the airport on a regular basis. The Airport's published altitude is 1,243 feet Mean Sea Level (MSL) and the mean daily maximum temperature of the hottest month is 105.8° Fahrenheit according to meteorological data for the Williams Gateway Airport weather station. As previously noted, aircraft with an ARC of C-II including business jets that are currently operating at Chandler Municipal are expected to utilize the Airport on a regular basis of at least 500 annual operations.

ALL WEATHER WIND COVERAGE

Runways	10.5 Knots	13.5 Knots	16.0 Knots
4R/22L	98.75%	99.44%	99.84%
4L/22R	98.75%	99.44%	99.84%

Source: *Williams AFB, Mesa, AZ*
Observations from 1983 to 1992

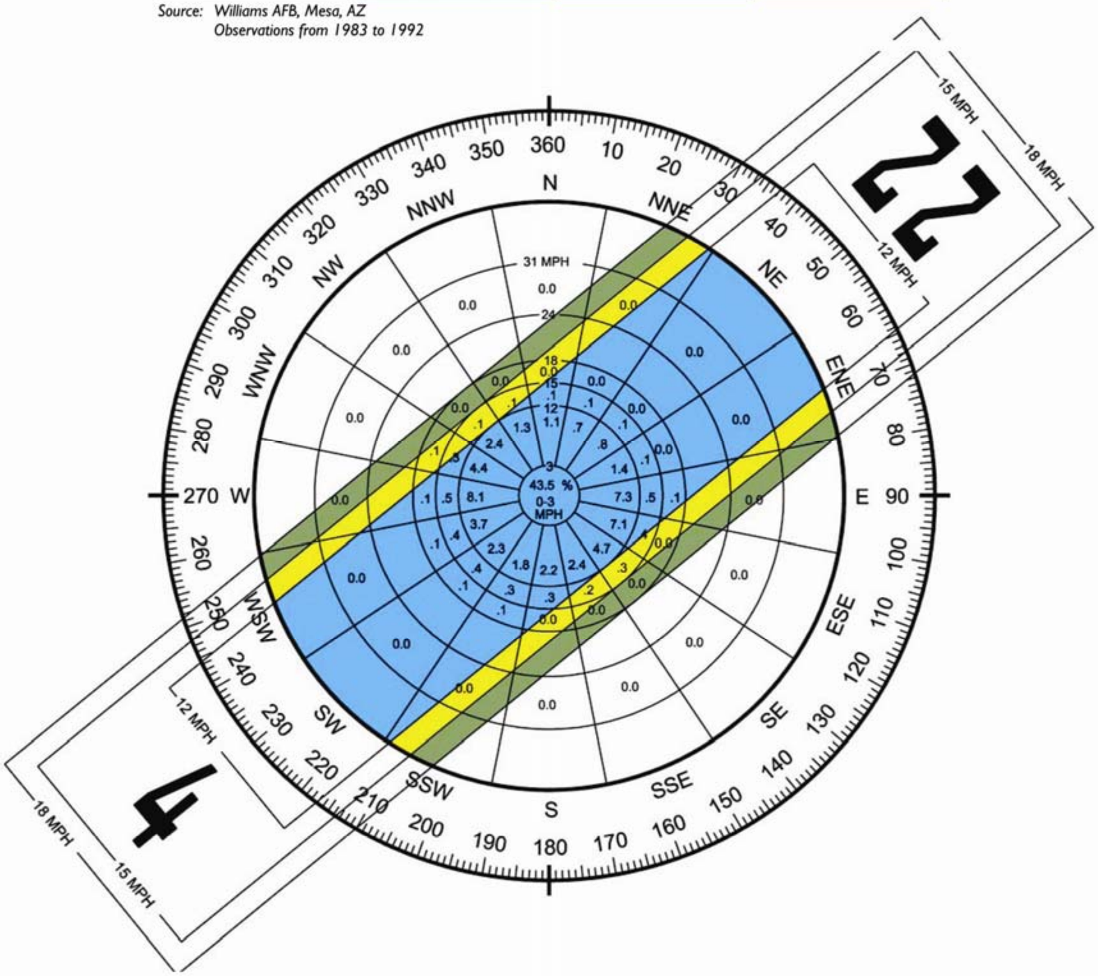


EXHIBIT 3.1
Chandler Municipal
Wind Coverage

Wilbur Smith Associates
ENGINEERS
PLANNERS
ECONOMISTS

Determination of appropriate markets and corresponding stage lengths is an important step in calculating the required runway length for the Airport. Typical corporate traffic consists of stage lengths between 500 and 1,000 miles. Characteristic Chandler or Phoenix metropolitan markets within these stage lengths include San Jose, Denver, Dallas, Houston, Kansas City, San Francisco, Seattle, and Portland. On a less frequent basis, aircraft may operate on stage lengths between 1,000 and 1,500 miles. Representative Chandler markets within these stage lengths include Atlanta, St. Louis, and Minneapolis.

Using these criteria, runway length requirements were calculated using the FAA's runway length computer program and are presented in **Table 3.4**. While the FAA's program does not specifically use ARCs, the FAA does relate certain ARCs to the aircraft types generated in their report from the runway length computer program. ARC categories A and B include small airplanes, which according to the results require a maximum of 4,800 feet to operate at Chandler Municipal. The Airport currently has sufficient runway length on its primary runway to accommodate all aircraft in the ARC A and B categories. However, many corporate class aircraft in the ARC C category require at least 5,300 feet of runway to operate year-round. In order for Chandler Municipal Airport to accommodate all of the corporate class aircraft on a year-round basis, a primary runway length of 7,000 feet would be needed. The secondary runway should be 4,400 feet in length to accommodate 100 percent of small airplanes with less than 10 passenger seats.

Table 3.4
RUNWAY LENGTH REQUIREMENTS FOR AIRPORT DESIGN

Airport Elevation …………	1,243 feet
Mean daily maximum temperature of the hottest month …………	105.8°
Maximum difference in runway centerline elevation …………	7 feet
RUNWAY LENGTHS RECOMMENDED FOR AIRPORT DESIGN	
Small airplanes with less than 10 passenger seats	
75 percent of these small airplanes …………	3,110 feet
95 percent of these small airplanes …………	3,700 feet
100 percent of these small airplanes …………	4,400 feet
Small airplanes with 10 or more passenger seats …………	4,800 feet
Airplanes of 60,000 pounds or less	
75 percent of these airplanes at 60 percent useful load …………	5,300 feet
75 percent of these airplanes at 90 percent useful load …………	8,200 feet
100 percent of these airplanes at 60 percent useful load…………	7,000 feet
100 percent of these airplanes at 90 percent useful load …………	11,100 feet
Airplanes of more than 60,000 pounds …………	6,500 feet

SOURCE: FAA AC 150/5325-4B
PREPARED: June 2006

Neither of the existing runways currently meets the 7,000-foot long primary runway requirement to accommodate corporate class aircraft that are already operating at the Airport, primarily during the winter months.

Runway Width

The width of a runway is determined by the critical aircraft and the type of instrument approach to the runway. The minimum width for a runway served by a precision instrument approach is 100 feet. The minimum width recommended by the FAA to accommodate ARC Category C aircraft is also 100 feet. Both runways at Chandler Municipal are currently 75 feet wide.[1] As identified in the previous chapter, Chandler Municipal Airport is forecast to experience increased usage by general aviation business aircraft in the ARC C category. To accommodate these aircraft it is recommended at a minimum that the width of the primary runway be 100 feet in useable width.

Runway Strength

There are several factors which influence the strength of pavement required to provide satisfactory aircraft service. These factors include, but are not limited to aircraft loads, frequency and concentration of operations, and the condition of subgrade soils.

Runway pavement strength is typically expressed based on common landing gear configurations. An example aircraft for each type of gear configuration are as follows:

- Single-wheel – each landing gear unit has a single tire; example aircraft include light general aviation aircraft and some business jet aircraft.
- Dual-wheel – each landing gear unit has two tires; example aircraft include the Cessna Citation X, Learjet 60, CRJ 100/200, and the Dash8.
- Dual-tandem – each main landing gear unit has four tires arranged in the shape of a square; example aircraft include the Boeing 707 and the KC135.
- Double dual-tandem – the main landing gear units have the same configuration as the dual-tandem configuration, however, there are twice as many main gear units; Boeing 747 aircraft have a double dual-tandem landing gear configuration.

The aircraft gear type and configuration dictates how aircraft weight is distributed to the pavement and determines pavement response to loading. The published pavement strengths of the runways at Chandler Municipal Airport are presented in **Table 3.5**.

[1] While both runways are currently marked for 75 feet in width according to FAA standards, the actual width of the existing pavement is 100 feet.

Table 3.5
PAVEMENT STRENGTHS

	Runway 4R/22L	Runway 4L/22R
Surface / Condition	Asphalt / Good	Asphalt / Good
Pavement Weight Limitations	30,000 lbs. Single Wheel Gear	30,000 lbs. Single Wheel Gear

SOURCE: www.airnav.com
PREPARED: June 2006

As previously noted, the Airport is expected to be served by more corporate class aircraft. These aircraft typically require a strengthened pavement, up to 60,000 pounds dual wheel loading. Should the decision be made to widen one or both runways to 100 feet, it is recommended that the pavement strength be designed to accommodate the designated critical aircraft including a higher pavement strength.

Taxiways

A taxiway is a defined path established for taxiing aircraft from the runway to a parking position, or from one part of the airport to another. It is recommended that an airport's primary runway be served by a full-length parallel taxiway allowing aircraft to enter or exit the runway as expeditiously as possible.

At present, Runway 4R/22L and 4L/22R are each served by full length parallel taxiways. These taxiways are 40 feet wide and meet the FAA's standards for the taxiway width.

Runway 4R/22L is also served by a partial parallel taxiway. Runway 4L/22R is served by seven exit taxiways while Runway 4R/22L is served by five exit taxiways.

Navigational Aids (NAVAIDs)

Navigational aids (NAVAIDs) are visual or electronic devices, airborne or on the ground, that provide point-to-point guidance information or position data to aircraft in flight. Airport NAVAIDs provide guidance to a specific runway end or to an airport. An airport is equipped with different capabilities in accordance with design standards that are based on safety considerations and airport operational needs. The type, mission, and volume of aeronautical activity used in association with meteorological, airspace, and capacity considerations determine an airport's eligibility and need for various NAVAIDs. Chandler Municipal Airport is currently equipped with non-precision approach capabilities.

Facility requirements at the Airport include the following two types of NAVAIDs: instrument approach NAVAIDs and visual NAVAIDs.

Instrument NAVAIDs

This category of NAVAIDs provides assistance to aircraft performing instrument approach procedures to an airport. An instrument approach procedure is defined as a series of predetermined maneuvers for guiding an aircraft under instrument flight conditions from the beginning of the initial approach to a landing, or to a point from which a landing may be made visually.

The standard type of precision approach available today is the ILS approach. The FAA, however, is continuing to expand development of a global navigation satellite system (GNSS) using the U.S. Department of Defense's global positioning system (GPS) of satellites for precision approaches. The GPS satellite-based navigation system is able to provide instant and precise aircraft position information for every phase of a flight. Non-precision GPS approaches are currently available at many airports, including Chandler Municipal. Precision GPS approaches have yet to achieve wide-spread implementation. To fully implement a precision approach, the following three types of electronic guidance must be in place:

- Azimuth guidance
- Altitude guidance
- Distance guidance

The Chandler Municipal Airport does not currently have precision instrument approach capability. The approaches serving the Airport do not provide altitude guidance and are thus termed non-precision approaches. Runway 4R is served by VOR, GPS, and NDB approaches. These approaches have visibility minimums of 1 mile or greater.

In the near future, more airports will be able to benefit from a precision approach with near-ILS descent and visibility minimums. These new instrument approaches are referred to as Approach Procedures with Vertical Guidance (APV) and are derived from the Wide Area Augmentation System (WAAS) technology which is a based on GPS navigation. Lateral Precision with Vertical Guidance (LPV) approaches rely on space-based satellite signals rather than land-based facilities, precluding terrain interference. APV/LPV approaches currently provide approach descent minimums to 250 feet above the runway elevation, with lower descent minimums expected to be published in 2007. GPS satellite data in concert with a ground-based transmitter can provide the three-dimensional guidance for a GPS near-precision approach. As this technology is further developed and commissioned on a wide-spread basis, Chandler Municipal Airport should work to augment and/or replace the Airport's existing approaches utilizing near-precision GPS technology. This technology could provide the Airport with approach minimums as low as one-half mile visibility.

In order for an airport to have an instrument approach with visibility minimums of three-quarters of a mile or less, a runway approach light system must be installed. For an approach with visibility minimums of three-quarters of a mile, an omni-directional approach lighting system (ODALS) is required. For an approach with one-half mile visibility, a medium intensity approach light system with runway alignment indicator lights (MALSR) is required. As part of this Master Plan, it is recommended that the Airport should plan for installation of an approach lighting system on Runway 4R. An approach lighting system would allow the development of a precision GPS approach that would provide the Airport with lower approach minimums and the ability for pilots to practice precision instrument approach procedures during instrument training operations at Chandler Municipal Airport.

Visual Landing Aids

Visual landing aids provide aircraft guidance to and alignment with a specific runway end, once the airport is within sight. Visual landing aids currently available at Chandler Municipal Airport include the following:

Runway Lighting. Runways 4R/22L and 4L/22R are each equipped with medium intensity runway lighting (MIRL). This lighting system will remain adequate throughout the 20-year planning period, even if lower minimums are obtained at the Airport through provision of a more precise instrument approach.

Other Runway Lighting and Guidance. Several additional NAVAIDs and visual aids are available at the Airport to assist in locating and landing aircraft at night and in poor weather conditions. NAVAIDs include a rotating beacon, lighted wind cone, and an Automated Weather Observing System (AWOS). These systems should be maintained during the 20-year planning period as they play a crucial role in the Airport's operation.

Air Traffic Control Tower. The Airport also is equipped with an Air Traffic Control Tower (ATCT). The ATCT is located northwest of the runways, near mid-field adjacent to the terminal building. The height and position of the current tower is considered sufficient to see all aircraft movement areas. Future airfield development should take into consideration the position, height and line of sight limitations of the tower so that air traffic controllers may see an aircraft's movement while on the ground.

Taxiway Lighting. Medium intensity taxiway lighting (MITL) provides aircraft lighting during taxiing. MITL are currently provided on the taxiways and will be adequate for the planning period.

Precision Approach Path Indicators (PAPIs). Runways 4R/22L and 4L/22R each are equipped with PAPIs. This equipment meets the current FAA criteria and should be maintained throughout the 20-year planning period.

Runway End Lighting. Runway End Identifier Lights (REILs) provides the pilot with a rapid and positive identification of the runway end location. The Airport currently has REILs on Runway ends 4R and 22L which are currently out of service. These REILs are planned for replacement as part of an existing project at the Airport. REILs should be provided in the future for Runway ends 4L and 22R as well.

Airport Design Standards

The planning and design of an airport is based on the airport's role and critical aircraft that use it. As mentioned in previous chapters, Chandler Municipal Airport is classified by the FAA as a reliever airport and will remain as such in future years.

As noted in Chapter Two, the development of airport facilities is impacted by the demand for those facilities, including the type of aircraft that are expected make use of those facilities and the number of annual operations that are conducted. In general, airport infrastructure components are designed to accommodate the most demanding aircraft, referred to as the critical aircraft, which will utilize the infrastructure on a regular basis. The factors used to determine an airport's critical aircraft are the approach speed and wing span of the most demanding class of aircraft that is anticipated to perform at least 500 annual operations at the airport during the planning period.

Information from AC 150/5300-13, Change 9, *Airport Design*, was used to determine the Airport Reference Code (ARC) and corresponding facilities for Chandler Municipal Airport. The ARC is a coding system used to relate airport design criteria to the operational and physical characteristics of the aircraft intended to operate on each runway.[2]

As discussed in Chapter Two, it is expected that, in future years, the Cessna Citation X aircraft will be the critical aircraft serving Chandler Municipal. This aircraft has a C-II ARC, which will be used to determine many airport design features, including the runway design criteria for the primary runway, Runway 4R/22L. The ARC for Runway 4L/22R is B-II and uses a different set of design criterion that matches requirements for smaller aircraft which utilize this runway. The use of different ARC codes related to different runways is common to general aviation airports with multiple runways that serve a variety of aircraft types.

Table 3.6 presents a comparison of the existing conditions and the FAA design criteria for each runway. As shown, increasing the ARC for Runway 4R/22L to C-II from B-II will require several improvements at the Airport in order to meet the FAA's design criteria. The ability of the airfield to incorporate these standards will be evaluated as part of the alternatives analysis.

[2] Please see Chapter Two for detailed information on the ARC.

Table 3.6
FAA DESIGN CRITERIA

Criteria	Runway 4R /22L (ARC C-II) Requirements*	Runway 4R /22L (ARC C-II) Existing	Runway 4L/22R (ARC B-II) Requirements*	Runway 4L/22R (ARC B-II) Existing
Runway Width	100 feet	**75 feet**[3]	75 feet	75 feet
Runway Centerline to:				
- Taxiway Centerline	400 feet	400 feet	240 feet	240 feet
- A/C Parking Area	500 feet	500 feet	250 feet	250 feet
Runway Object Free Area:		**R/W 4R: 500 ft**		R/W 4L: 500 ft
- Width	800 feet	**R/W 22L: 500 ft**	500 feet	R/W 22R: 500 ft
- Length Beyond Runway End	1,000 feet	**R/W 4R: 300 ft**	300 feet	R/W 4L: 300 ft
		R/W 22L: 300 ft		R/W 22R: 300 ft
Runway Safety Area:		**R/W 4R: 150 ft**		R/W 4L: 150 ft
- Width	500 feet	**R/W 22L: 150 ft**	150 feet	R/W 22R: 150 ft
- Length Beyond Runway End	1,000 feet	**R/W 4R: 300 ft**	300 feet	R/W 4L: 300 ft
		R/W 22L: 300 ft		R/W 22R: 300 ft
Taxiway Width	35 feet	40 feet	35 feet	40 feet
Taxiway Centerline to:				
- Fixed or Movable Object	65.5 feet	65.5 feet	65.5 feet	65.5 feet
Taxiway Object Free Area (Width)	131 feet	131 feet	131 feet	131 feet
Taxiway Safety Area (Width)	79 feet	79 feet	79 feet	79 feet

SOURCE: Wilbur Smith Associates
PREPARED: June 2006
*AC 150/5300-13, Change 9
The items in bold letters above are non-standard.

A discussion of the dimensional standards that have not been addressed as well as other standards is provided below.

Part 77 Obstruction Standards

Federal Aviation Regulations (FAR) Part 77 exist to identify objects which may be hazardous to air navigation. These standards apply to the use of navigable airspace by aircraft and to existing or planned airports. An obstruction may be an existing or proposed manmade object, object of natural growth, or terrain. Any changes to the airfield must provide the obstacle clearance necessary to meet the requirements designated within FAR Part 77. The critical surfaces are identified in drawings associated with the Airport Layout Plan (ALP). Existing Part 77 surfaces will be evaluated during the development of the ALP and any penetrations will be noted and addressed for removal or marking.

[3] As noted previously, the existing runway is marked at 75 feet but actually measures 100 feet in width.

Obstacle Free Zone (OFZ)

The OFZ is a three-dimensional volume of airspace that supports the transition of ground-to-airborne operations (or vice versa). The OFZ clearing standards prohibit taxiing or parked airplanes and other objects, except frangible NAVAIDs or fixed-function objects, from penetrating this zone. The OFZ consists of a volume of airspace centered on the runway. In addition, some precision instrument runways are required to meet standards regarding inner-approach, inner-transitional and precision OFZs.

The inner-approach OFZ is a defined volume of airspace centered on the approach area for runways with approach lighting systems. The inner-approach OFZ begins 200 feet from the runway threshold, at the same elevation as the runway threshold, and extends 200 feet beyond the last unit in the approach lighting system. It is the same width as the runway OFZ and rises at a slope of 50:1 away from the runway end.

The inner-transitional OFZ is a defined volume of airspace along the sides of the runway and the inner-approach OFZ. The inner-transitional surface OFZ applies only to precision runways and slopes out from the edges of the runway OFZ at a 3:1 ratio to a height of 150 feet above the Airport elevation.

The precision OFZ is defined as a volume of airspace above an area beginning at the runway threshold, at the threshold elevation, and centered on the extended runway centerline, 200 feet long by 800 feet wide.

The OFZ for runway 4R/22L is 250 feet wide and extends 200 feet beyond each runway end. The OFZ for Runway 4L/22R is also 200 feet wide and extends 200 feet beyond each runway end. Existing facilities at Chandler Municipal Airport comply with all OFZ design standards.

Runway Protection Zones (RPZ)

The RPZ is an area off the runway end identified to enhance the protection of people and property on the ground. RPZ size is a function of critical aircraft and the visibility minimums established for the approach to the runway. Visual runways have smaller RPZs because the landing minimums are higher and the runway is not used during periods of reduced visibility. Runways served by instrument approach procedures are required to be protected by larger runway protection zones. Larger RPZs are required for runways with instrument approach procedures with low visibility minimums for landing.

The RPZ contains two sub-areas, the runway object free area (ROFA) and the controlled activity area. These two sub-areas are discussed as follows:

Runway Object Free Area (ROFA). The ROFA is a two-dimensional ground area surrounding the runway that prohibits parked aircraft and objects, except NAVAIDs and objects with locations fixed by function, from locating there. For Runways 4R/22L and 4L/22R, the ROFA extends 300 feet beyond each runway end and has a width of 500 feet.

Controlled Activity Area. The controlled activity area is the portion of the RPZ beyond and to the sides of the ROFA. It is recommended that an airport own or control this area. The controlled activity area should be free of land uses that create glare and smoke. Also, the construction of residences, fuel-handling facilities, churches, schools, and offices are not recommended in the RPZs controlled activity area. Roads are typically not recommended to fall within the RPZ.

Runway 4R is currently served by three non-precision approaches with visibility minimums not lower than one mile. The existing approaches to Chandler Municipal provide adequate instrumentation for aircraft to land during most adverse weather conditions, but do not provide access at all times.

Table 3.7 shows the existing RPZ dimensions for each runway end based on the design standards according to the type of approach to the runway end.

Table 3.7
EXISTING RUNWAY PROTECTION ZONES

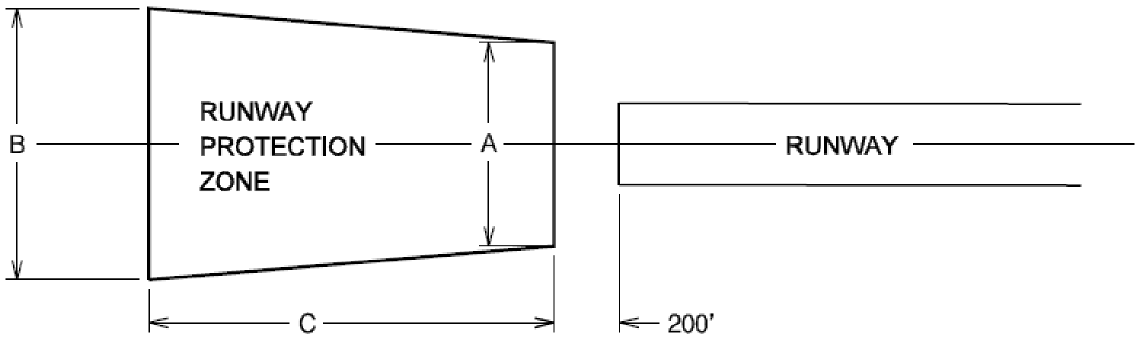
Runway	Type of Approach	Inner Width	Outer Width	Length	Approach Slope
4R	Non-Precision (1-Mile)	500’	700’	1,000’	34:1
22L	Visual	500’	700’	1,000’	20:1
4L	Visual	500’	700’	1,000’	20:1
22R	Visual	500’	700’	1,000’	20:1

SOURCE: AC 150 5300-13, *Airport Design*, Change 9
PREPARED: May 2006

As mentioned previously, RPZ size is a function of critical aircraft and the visibility minimums established for the approach to the runway. Visual runways have smaller RPZs because the landing minimums are higher and the runway is not used during periods of reduced visibility. Precision navigational aids are used to guide aircraft to runways equipped with advanced instrumentation during periods of reduced visibility; thus allowing the airport to remain open and increasing its utility. These instrumented approaches are required to be protected by the larger runway protection zones. In summary, the greater precision of the approach, the lower the visibility minimums for landing, the larger the RPZ.

The current RPZs at Chandler Municipal Airport are clear of incompatible uses and meet standards. A larger RPZ should be planned to accommodate an improved GPS instrument approach with lower minimums to Runway 4R. The future size of the RPZ for Runway 4R is dependent on the visibility minimums of the future improved GPS approach procedure. **Exhibit 3.2** on the following page details the required RPZ sizes for an approach with not lower than ¾-mile visibility and lower than ¾-mile visibility:

EXHIBIT 3.2
FAA RUNWAY PROTECTION ZONES DESIGN STANDARDS



Approach Visibility Minimums	A (Inner Width)	B (Outer Width)	C (Length)
Visual and/or Not Lower than 1-Mile (Existing)	500'	700'	1,000'
Not Lower than ¾-Mile	1,000'	1,510'	1,700'
Lower than ¾-Mile	1,000'	1,750'	2,500'

SOURCE: AC 150 5300-13, *Airport Design*, Change 9
PREPARED: July 2006

The larger RPZ for Runway 4R will require obtaining additional land or easements, depending upon which visibility minimums can be accommodated. The alternatives analysis will examine these issues in greater depth.

Runway Safety Area (RSA)

The RSA serves as a safety area if an aircraft overruns the paved runway surface. According to the FAA's definition, the RSA should be cleared and graded and have no potentially hazardous ruts or surface variations. This area should also be drained through grading or by storm sewers. General requirements for grading of the RSA are 0 to –3 degree grade for the first 200 feet from the runway end, with the remaining longitudinal grade ensuring that no part of the RSA penetrate the approach surface or drop below a –5 degree grade.

For Design Standard B-II runways, like those at Chandler Municipal Airport, the RSA is required to be 150 feet wide and extend 300 feet beyond the runway end. The RSAs at Chandler Municipal Airport meet B-II requirements. However, because the Airport is currently being used on a regular basis by ARC C-II aircraft and the recommended ARC is C-II, the RSA for Runway 4R/22L should be upgraded in the future to meet standards for the corporate class aircraft family. For Runway 4R/22L, C-II runway standards dictate that the RSA is required to be 400 feet wide and extend 1,000 feet beyond the runway end.

LANDSIDE REQUIREMENTS

Landside facilities are those necessary for handling of aircraft, passengers, and cargo while on the ground. These facilities provide the link between the air and ground transportation activities. Landside facilities examined in the analysis include hangars, aprons and tie down areas, terminal building, automobile parking, and access roadways.

Hangars

Hangars are used to store aircraft, provide protection from adverse weather conditions, and supply additional security. Hangars are also used for temporary storage while an aircraft is undergoing maintenance and/or repairs. The demand for hangar storage is generally a function of the number and type of based aircraft on an airport. The vast majority of hangars at Chandler Municipal Airport are utilized for private aircraft storage, as opposed to large aircraft maintenance hangers found at other airports. The types of hangars currently available at the Airport are discussed below.

T-hangar/Shade Structures. The growth in population in and around the City of Chandler and the overall lack of suitable alternatives for hangar space at other airports in the Phoenix metropolitan area, as well as the interest of private aircraft owners drive the need for increased T-hangar/shade structures used to protect single-engine and light multi-engine aircraft. The forecast for Chandler Municipal Airport shows a growth from 457 based aircraft to 740 based aircraft within the planning period. Currently the Airport has over a 10-year hangar waiting list. This list contains over 200 applicants for shade hangars, T-hangars and tie-downs, with the majority of applicants desiring T-hangars.

Conventional Hangars. Most of the hangars used on the airfield are dedicated for aircraft storage of small single- and multi-engine aircraft, not for aircraft maintenance or repair. The Airport currently has a limited number of conventional hangars associated with the fixed base operator (FBO) that have the ability to store corporate class aircraft not based at the Airport. As more corporate class aircraft utilize Chandler Municipal Airport, the demand for larger conventional hangars will increase. Therefore, the demand driving additional conventional hangar needs is dictated by the usage of the Airport by corporate class aircraft. Operations by corporate class aircraft are projected to increase significantly over the forecast period. Areas have been designated for construction of additional conventional hangars on the Airport. It is recommended that adequate facilities for this segment of the general aviation fleet be developed as these aircraft and the businesses that use them have the potential to provide a significant economic boost to the Airport and the community.

Aprons and Tie-down Areas

Chandler Municipal has a limited amount of apron pavement located along the northwest side of the airfield in front of the terminal building and FBO maintenance hangars. This apron is used primarily by aircraft operating to/from these facilities as well as itinerant aircraft utilizing the Airport. Transient and large aircraft use this apron as a staging/parking area frequently as well. This area also contains tie-down areas for both transient and locally based aircraft. Additional apron space will be needed to support the projected increase in transient operations and locally based aircraft, and the construction of additional tie-down and hangar facilities.

Total Storage Demand

To determine hangar and other storage requirements, an analysis of the existing facilities was conducted. It is estimated that approximately 55 percent of the existing aircraft are currently hangared while the remaining aircraft are tied down on the apron area.

Weather conditions at Chandler Municipal Airport include strong winds, blowing dust and extreme heat in the summer. This conditions warrant storage of aircraft most aircraft in hangars. Extreme summer temperatures can damage aircraft avionics, while prolonged exposure to the sun and blowing dust can cause damage aircraft paint and fabric covered surfaces. Fabric covered aircraft a particularly vulnerable to damage from the sun and strong winds. As previously noted, the existing storage waiting list is primarily for T-hangars. Since aircraft owners prefer covered storage, it is important to evaluate the percentages that aircraft would utilize conventional-type and shade tie-down hangars as opposed to individual T-hangars.

The analysis of storage needs is depicted in **Table 3.8**. It was assumed that approximately 75 percent of all single-engine, multiengine, rotorcraft and other aircraft will be hangared and that 100 percent of all based jet aircraft will be hangared. In terms of T-shade hangars, it is assumed that 10 percent of based single-engine aircraft will be stored in T-shade hangars. An assumption related to conventional hangars assumes that 100 percent of based jets will be stored in conventional hangars, as well as 100 percent of rotorcraft and 50 percent of multiengine aircraft.

As noted in Chapter One, the existing storage facilities at the Airport provide storage for approximately 238 based aircraft. As noted in Table 3.8, the current demand for storage is 348 based aircraft, indicating a need for 110 additional covered storage spaces. By the end of the 20-year planning period, in addition to the 110 currently needed, an additional 219 covered storage spaces will be needed if the projections are realized and based on the assumptions of storage activity. Of these, the majority is needed in the form of T-hangars (159 additional units), as well as conventional hangar spaces (for 42 aircraft). The analysis shows, however, that all forms of storage will need to be increased over the 20-year planning period to accommodate the projected increase in demand at Chandler Municipal Airport. It is important to note that the Airport continues to develop additional storage facilities as demand warrants and funding permits.

Table 3.8
AIRCRAFT HANGAR STORAGE REQUIREMENTS

CHD BASED AIRCRAFT BY TYPE					
		Projected Based Aircraft			
Aircraft Type	**Current Based Aircraft**	**2010**	**2015**	**2020**	**2025**
Single Engine	407	453	506	565	630
Multi Engine	33	37	42	47	53
Jets	1	3	6	10	15
Rotorcraft	16	18	20	23	26
Other[1]	0	4	7	11	16
Total	457	515	581	656	740
HANGAR DEMAND BY AIRCRAFT TYPE					
		Forecast Hangar Demand			
Aircraft Type	**Current Demand**	**2010**	**2015**	**2020**	**2025**
Single Engine	305	340	380	424	473
Multi Engine	30	33	38	42	48
Jets	1	3	6	10	15
Rotorcraft	12	14	15	17	20
Other	0	3	5	8	12
Total	348	393	444	502	567
HANGAR\STORAGE TYPE					
		Forecast Aircraft Storage Demand			
Storage Type	**Current Aircraft Storage Demand**	**2010**	**2015**	**2020**	**2025**
Tie-Downs	109	122	137	154	173
T- Shade Hangars	31	34	38	42	47
T Hangars	290	322	360	403	449
Conventional Hangars	28	36	45	57	70
Total Hangars	348	393	444	502	567
SUMMARY OF NEEDS					
		Forecast Hangar Area Square			
Footage Demand	**Current Hangar Area Square Footage Demand**	**2010**	**2015**	**2020**	**2025**
T - Shade Hangars (s.f.) (900 s.f. per position)	27,473	30,578	34,155	38,138	42,525
T - Hangars (s.f.) (1,400 s.f. per position)	405,405	451,395	504,630	563,535	628,740
Conventional Hangars Total (s.f.)	80,993	95,712	114,648	137,726	164,927
Conventional Hangar A/C Storage	36,775	45,975	58,350	73,975	92,775
Conventional Hangar A/C Maintenance[2]	44,218	49,737	56,298	63,751	72,152
Total Hangar Area (s.f.)	550,646	623,660	711,783	813,374	928,967

SOURCE: Airport Management Records, Wilbur Smith Associates
PREPARED: July 2006
[1] Other includes aircraft in the light sport category
[2] Assumed to be 10% of the overall airport hangar space

In addition to specific storage spaces, an analysis of square footage was conducted to determine the size of space that will be needed. The total footprint of storage space will need to nearly double over the 20-year planning period to meet the needs identified in the Master Plan.

Terminal Building

The demand for terminal building space at Chandler Municipal Airport relates to the need for facilities able to accommodate pilots, students, faculty, and staff at the Airport. These facilities should include a waiting area/gathering place, business offices, conference room, classroom, briefing room, lounge with vending machines, restrooms, etc. While this space is not necessarily limited to a single, separate terminal building, in the case of Chandler Municipal Airport, with the existing terminal structure in place, the adequacy of the current building was analyzed.

To determine the needs for general aviation terminal facilities, the number of users expected to utilize the facilities during the peak hour was examined. A planning average of 2 persons per aircraft was multiplied by the estimate of the peak hour itinerant operations. The number of peak hour passengers was multiplied by an estimate of 90 square feet per peak itinerant passenger to derive the terminal space demand. **Table 3.9** presents the terminal building requirements.

Table 3.9
GENERAL AVIATION TERMINAL BUILDING REQUIREMENTS

	Current	Projected Demand			
	2005	**2010**	**2015**	**2020**	**2025**
Peak Hour Operations	100	126	144	165	188
Itinerant Peak Hour Operations[1]	30	37	43	49	56
Peak Hour Passengers[2]	60	75	86	98	112
Current GA Terminal Space Available (10,000 s.f.)					
GA Terminal Space Demand[3]	**5,400**	**6,736**	**7,698**	**8,821**	**10,050**

SOURCE: Wilbur Smith Associates
PREPARED: June 2006
[1] 29.70% of Peak Hour Operations
[2] 2 X Itinerant Peak Hour Operations
[3] Estimated to be 90 s.f. per peak itinerant passenger

The Airport's current terminal is 5,500 square feet and was constructed in 1996. In addition to the terminal, the FBOs and other operators provide approximately 4,500 square feet of additional space, for a total of 10,000 square feet of total terminal space at the Airport. The existing terminal facilities are currently adequate to meet the needs of its users. However, additional terminal space may be needed, especially in the Airport's primary terminal as the FBOs and other operators change their utilization of existing space provided for this service.

Automobile Parking

Automobile parking is provided for employees, based aircraft owners, and visitors to Chandler Municipal Airport. Automobile parking is currently provided in various locations throughout the Airport to serve the demand. Currently, there are approximately 30 parking spaces that serve the terminal building. The FBO and tenant structures account for an additional 200 parking spaces. During peak periods, when classes begin or when large groups utilize the Airport, the supply of parking spaces for the terminal can become limited.

Typically, planning guidelines indicate that total parking should relate to the number of peak hour passengers anticipated to use the Airport. Utilizing the peak hour passenger estimate and 315 square feet per parking space, a total parking demand estimate was derived (see **Table 3.10**).

Table 3.10
AUTOMOBILE PARKING REQUIREMENTS

	Current	Projected Demand			
	2005	**2010**	**2015**	**2020**	**2025**
Peak Hour Passengers[1]	60	75	86	98	112
General Aviation Parking Spaces[2]	108	135	154	176	201
General Aviation Parking (s.f.)[3]	**34,020**	**42,437**	**48,499**	**55,572**	**63,318**

SOURCE: Wilbur Smith Associates
PREPARED: June 2006
[1] 2 X Itinerant Peak Hour Operations
[2] 1.8 X Itinerant Peak Hour Operations
[3] 315 s.f. per parking space

As shown in Table 3.10, demand for parking is expected to nearly double over the 20-year planning period. While the Airport currently has more parking spaces than future 20-year demand (230 existing and 20-year demand of 201), individual areas on the Airport may be undersized to meet future demands. Therefore, additional parking is recommended as a part of any terminal or other facility expansion. The parking lot adjacent the Chandler Municipal Airport ATC tower is planned to be used by a future FBO facility. This will require the construction of a replacement auto parking facility in the future.

Access Roadways

Chandler Municipal Airport is bordered on the north by Germann Road and on the south by Queen Creek Road. Access to the terminal area and businesses located along the northwest side of the Airport is available from both roadways via Airport Boulevard. Germann Road was recently upgraded to a four-lane roadway and is adequate to service the future needs of the Airport. Queen Creek Road is currently a two-lane roadway. The roadway is in the planning stages to be upgraded, most likely to four–lane, to serve expanding commercial and residential development in the area.

The recently completed Santan or Loop 202 Freeway runs east-west approximately one mile north of the Airport. This freeway has three lanes in each direction and provides quick access to and from the Airport via interchanges at McQueen and Cooper Roads.

The completion of this facility and the improved access it provides has and is projected to continue to spur residential and commercial development in the surrounding area. Because of the new freeway interchange at Cooper Road, Airport Boulevard is proposed to be realigned to connect with Cooper Road, just north of the Air National Guard facility. This will provide improved access to the north side of the airport terminal area. Additionally Stinson Way, south of Germann Road is proposed to be realigned to provide direct access to the terminal area. New access roads are also proposed for the new apron and hangar development area on the southeast side of the airport. Access to these roadways will be from dead-end section of Cooper Road which runs north from Queen Creek Road.

Fuel Storage

The Airport's fuel storage facility is located adjacent to the old heliport area. On this site, the City of Chandler and Chandler Air Service maintain 100 Low Lead (LL) and Jet A fuel storage tanks. The fuel farm includes a total of four below ground and two above ground storage tanks. Five of the tanks are designated for the storage of 100 LL and have a combined capacity of 48,000 gallons. The remaining storage tank is designated for Jet A storage and has a capacity of 12,000 gallons.

To determine fuel storage requirements at an airport, the existing capacity for a one-month period is evaluated. Typically, requirements are based on maintaining a one-month supply of fuel during an average month.

Based on the current operational fleet mix at Chandler Municipal Airport it was assumed that 90 percent of aircraft operations at the Airport are conducted by aircraft that use 100 LL fuel, with the remaining 10 percent conducted by aircraft using Jet A fuel. Based on historical fuel sales, a planning figure of 2.0 gallons per operation by aircraft using 100 LL and 5.5 gallons per operation by aircraft using Jet A was identified. The estimated gallons per operations were then multiplied by the forecast number of peak month operations to identify peak month fuel storage requirements for 100LL and Jet A fuels. The requirements are presented in **Table 3.11**.

This analysis indicates a need for monthly fuel storage for 100 LL of over 41,000 gallons, growing to almost 70,000 gallons by the end of the planning period. Currently, the capacity is only 48,000 gallons. Monthly fuel storage requirements for Jet A grow from 12,500 gallons to over 21,000 gallons by the end of the planning period. Currently, the capacity for Jet A is 12,000 gallons. Based on this analysis, the Airport's current fuel storage capacity is adequate to meet current requirements, but may need to be expanded in the future to meet projected demand.

Table 3.11
FUEL STORAGE REQUIREMENTS

	Current Demand	Projected Demand			
	2005	**2010**	**2015**	**2020**	**2025**
Total annual operations	235,111	268,600	306,900	350,600	400,600
Annual operations by aircraft using 100LL[1]	211,600	241,740	276,210	315,540	360,540
Annual operations by aircraft using Jet A[2]	23,511	26,860	30,690	35,060	40,060
Peak month - Aircraft operations using 100LL[3]	20,525	23,449	26,792	30,607	34,972
Peak month - Aircraft operations using JetA[3]	2,281	2,605	2,977	3,401	3,886
Monthly Fuel Storage Requirements					
100 LL[4]	**41,050**	**46,898**	**53,585**	**61,215**	**69,945**
Jet A[5]	**12,543**	**14,330**	**16,373**	**18,705**	**21,372**

SOURCE: Wilbur Smith Associates
PREPARED: June 2006
[1] 90% of total aircraft operations
[2] 10% of total aircraft operations
[3] 9.7% of annual operations
[4] 2.0 gallons per operation
[5] 5.5 gallons per operation

SUMMARY

This chapter identifies facility requirements necessary to serve the projected demand for aviation services at Chandler Municipal Airport over the 20-year planning period. The following chapter addresses the options available to meet the airside and landside facility requirements identified in this chapter.