2010 Airport Master Plan Update

Prepared for:

The City of Chandler

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Prepared by:

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"The preparation of this document was financed in part through a planning grant from the State of Arizona as approved by the State Transportation Board. The contents of this report reflect the views of the Consultant, which is responsible for the facts and the accuracy of the data depicted herein, and do not necessarily reflect the official views or policy of the State of Arizona. Acceptance of this report by the State of Arizona does not in any way constitute a commitment on the part of the State of Arizona to participate in any development depicted therein, nor does it indicate that the proposed development is environmentally acceptable in accordance with applicable public laws."

PREFACE

In late 2005, the City of Chandler initiated a Master Plan Update for Chandler Municipal Airport (CHD). With funding assistance from the Arizona Department of Transportation, the City undertook the steps to complete the study according to Federal Aviation Administration (FAA) guidance. In early 2007, the City approved the draft Master Plan for submission to ADOT and the FAA for their review and comment.

Through the review of ADOT and FAA comments on the draft documentation, additional revisions were identified beyond the scope of the initial project. In 2010, an addendum was implemented to address all final comments and submission to FAA and ADOT for acceptance.

Based on the length of time that has transpired, it is important to recognize that the base year utilized throughout the *2010 Chandler Municipal Airport Master Plan Update* is 2005. Airside data have been updated to reflect current conditions (April 2010) but all other data is consistent with existing conditions as of late 2005/early 2006.

TABLE OF CONTENTS

CHAPTER TWO: PROJECTIONS OF AVIATION DEMAND

CHAPTER THREE: CAPACITY ANALYSIS AND FACILITY REQUIREMENTS

CHAPTER FOUR: DEVELOPMENT ALTERNATIVES

CHAPTER FIVE: ENVIRONMENTAL OVERVIEW

CHAPTER SIX: AIRPORT DEVELOPMENT SCHEDULE AND FINANCIAL ANALYSIS

APPENDIX C: AIRPORT LAYOUT PLAN DRAWINGS

LIST OF TABLES

CHAPTER ONE: INVENTORY

CHAPTER TWO: PROJECTIONS OF AVIATION DEMAND

CHAPTER THREE: CAPACITY ANALYSIS AND FACILITY REQUIREMENTS

CHAPTER FOUR: DEVELOPMENT ALTERNATIVES

CHAPTER SIX: AIRPORT DEVELOPMENT SCHEDULE AND FINANCIAL ANALYSIS

APPENDIX A: AIRSPACE CONFLICTS ANALYSIS

APPENDIX B: ECONOMIC IMPACT OF AIRPORT INFRASTRUCTURE DEVELOPMENT

LIST OF EXHIBITS

CHAPTER ONE: INVENTORY

CHAPTER TWO: PROJECTIONS OF AVIATION DEMAND

CHAPTER THREE: CAPACITY ANALYSIS AND FACILITY REQUIREMENTS

CHAPTER FOUR: DEVELOPMENT ALTERNATIVES

CHAPTER FIVE: ENVIRONMENTAL OVERVIEW

APPENDIX A: AIRSPACE CONFLICTS ANALYSIS

CHAPTER ONE: INVENTORY

INTRODUCTION

The *2010 Chandler Municipal Airport Master Plan Update* defines a concept for development at Chandler Municipal (CHD) over the course of a 20-year planning period and is prepared in collaboration with Federal and State agencies, local officials, and interested Airport users. A goal of the study is to identify facility needs and evaluate development alternatives in order to provide guidance for the future development of the Airport based on conditions existing in late 2005 and 2006. The plan recommends improvements in accordance with specific Federal Aviation Administration (FAA) criteria, taking into consideration anticipated changes in aviation activity and trends at the local, regional, state, and national levels.

The primary objective of this Airport Master Plan for Chandler Municipal Airport is to produce a comprehensive planning guide for the continued development of a safe, efficient, and environmentally compatible aviation facility that meets the goals of the Chandler Municipal Airport Commission, Maricopa County, Airport users and tenants, and the surrounding Airport service area. The study focuses on aeronautical forecasts, the need for and justification of development, and a staged plan for recommended enhancements. Proposed airport development must adhere to standards that provide for safe aviation facilities while accommodating future demand. The staged plan typically looks at planning horizons of 0 to 5 years (short-term), 6 to 10 years (intermediate-term), and 11 to 20 years (long-term). The first phase generally addresses existing facility deficiencies or non-compliance to the FAA's airport design standards. The subsequent phases address the facilities and resources needed to accommodate predicted growth based on reasonable assumptions. Additional goals and objectives related to the Airport and the plan are described in a subsequent section of this chapter.

The initial step in the planning process is to develop a thorough inventory of existing conditions at the Airport, and in and around the Airport's market area. This chapter presents the data pertinent to the Airport and its service area necessary for subsequent phases of analysis.

The inventory process incorporates a broad spectrum of information including goals and objectives, data on landside and airside facilities, surrounding land uses, weather conditions, area airspace, historical activity levels, and socioeconomic factors. Data collected as part of the inventory effort establishes the foundation for the remainder of the Master Plan. The information summarized in this chapter was obtained through on-site visits, discussions with Airport staff, review of previous Airport planning documents, review of FAA records, and review of various local and regional planning documents. Inventory data is presented in the following sections:

- Goals and Objectives
- Airport History
- Airport Location and Access
- Airport Role
- Airport Activity
- Existing Airport Facilities
- Airspace and Approaches
- Climatic and Meteorological Conditions
- Area Land Use Patterns and Zoning
- Area Socioeconomic Data
- Other Area Airports
- Summary

This inventory data serves as a foundation for analyses conducted throughout the planning process.

GOALS AND OBJECTIVES

The *2010 Chandler Municipal Airport Master Plan Update* was initiated in late 2005 to update the last Airport Master Plan which was prepared in 1998. The earlier planning effort identified several improvements for the Airport, many of which have been completed since that time. The 2010 study is intended to update the analysis from the previous plan, ensuring the Airport is developed to meet FAA and Arizona Department of Transportation, Aeronautics Division (ADOT) requirements as well as the needs of Chandler residents and businesses.

This Airport Master Plan Update process and all of its elements were conducted consistent with the requirements of FAA and ADOT. Furthermore, the plan addresses the goals, key issues, and objectives of the City of Chandler, the official Airport sponsor. Specific goals established by the City and with input from the public and the study's established Planning Advisory Committee (PAC) related to the Airport included the following:

- Manage and develop the Airport to provide maximum levels of aviation safety on the ground
- Work to develop airspace usage around the Airport to maximize aviation safety
- Plan and develop Airport facilities to meet the needs of Airport users with an emphasis on smaller general aviation aircraft users
- Work to cultivate development potential on the Airport to achieve self sufficiency
- Seek to maximize economic development potential for the community around the Airport
- Minimize environmental impacts to Chandler residents through the planning and development of the Airport

The goal of the Airport Master Plan Update is to ensure that the plan provides guidance on developing the Airport to meet these goals.

Specific issues to be considered in the planning process include:

- Demand for aviation in and around Chandler region
- Ability of Airport to accommodate projected demand
- Alternative methods for meeting the needs of existing and future users
- Funding and financing capability of Airport and ability to meet development needs

Working with the City, Chandler residents and businesses, and the PAC established for the Airport Master Plan Update, the master planning process will provide reasonable recommendations for improvements to Chandler Municipal Airport so that the City of Chandler can consider these in their decision-making efforts.

AIRPORT HISTORY

Chandler Municipal Airport was opened in 1948 with federal aid. The original site consisted of a single runway (Runway 18/36). In 1960 the City constructed a new runway with a northeast-southwest orientation (existing Runway 4L/22R). The entire development at the Airport has been constructed and funded under the auspices of the City of Chandler.

Key dates in the Airport's on-going development include the following:

- In **1948**, the airport site was purchased from Roosevelt Water Conservation District for $8,000.
- In **1950**, the City completed its first airport improvement project (Runway 18/36 and the drilling of a well).
- In **1960**, a new runway (existing Runway 4L/22R) and full parallel taxiway measuring 2,610 feet in length were constructed. In addition to the new runway and taxiway system, an apron area was constructed.
- In **1961**, Runway 4L/22R was equipped with lighting.
- During the **1970s** Runway 4L/22R and its parallel taxiway were extended 1,200 feet to the south. Additional runway lighting was installed on the runway extension, visual approach slope indicators (VASI) were installed on both runway ends, perimeter fencing was installed, and a new apron area was constructed.
- During the mid **1980s**, 116 t-hangars were constructed.
- In **1982**, a new Airport Master Plan was completed for the Airport.
- In **1983**, Runway 4L/22R and its taxiway were extended 600 feet to the northeast and a new apron was constructed.
- In **1984**, an Environmental Impact Statement (EIS) was conducted for the future development of a new runway system.

- In **1985**, the City purchased 55 acres of property for future expansion at the Airport for $1.8 million. The expansion would be for a four-lane access road, internal service roads on airport property, the relocation of the terminal building and fuel farm, the realignment of the apron, vehicle parking lot, relocation of shade hangars, the design of a drainage system, and the design of an apron and taxiways to the new hangar area.
- Between **1986** and **1988**, the Airport acquired 175 acres of land for the new runway system for over $9 million.
- During the **1990s**, an additional 137 acres of land were acquired for development.
- In **1994**, the new runway (Runway 4R/22L) was constructed to 4,870 feet in length. A new heliport was also opened for use.
- In **1996**, a new 5,500-square foot terminal building completed construction and was opened.
- In **1998**, an air traffic control tower completed construction and was opened. Additionally, the Airport's master plan was updated.
- In **2000**, 86 privately developed t-hangars and 7 acres of new apron completed construction and were opened.
- In **2001**, an additional 28 acres of land was purchased for hangar and apron development.

Source: *A History of the Chandler Municipal Airport*, Renee Menard; *Chandler Municipal Airport – Property Acquisition* Summary; and Airport Management Records.

Since the late 1980s, the City of Chandler has received in excess of $5 million from ADOT-Aeronautics Division to improve the Airport. Over that same period, FAA airport improvement program (AIP) monies account for over $18 million for airport improvement projects at the Airport. Development projects funded within the past five years include the construction of 86 privately developed t-hangars, a new apron area, an update to the Airport's master plan, relocation of the heliport, and the first phase of new executive hangars.

The Airport's historic and continuing development has allowed it to evolve to meet the changing needs of its tenants, aviation users, and market area. Recent development projects at the Airport include the relocation of the heliport area and construction of three executive hangars. These facilities will be examined in more detail in the inventory of existing airport facilities.

AIRPORT LOCATION AND ACCESS

As shown in **Exhibit 1.1**, Chandler Municipal serves the southeastern side of the Phoenix metropolitan area. The City of Chandler is the sixth largest city in Arizona and as of the 2000 U.S. Census, the City was one of the fastest growing cities in the United States. The Phoenix metropolitan area encompasses approximately 23 cities and towns. The Metro area elevation is approximately 1,117 feet and is located in the heart of the Sonoran Desert and extends from Scottsdale in the northeast, to Glendale and

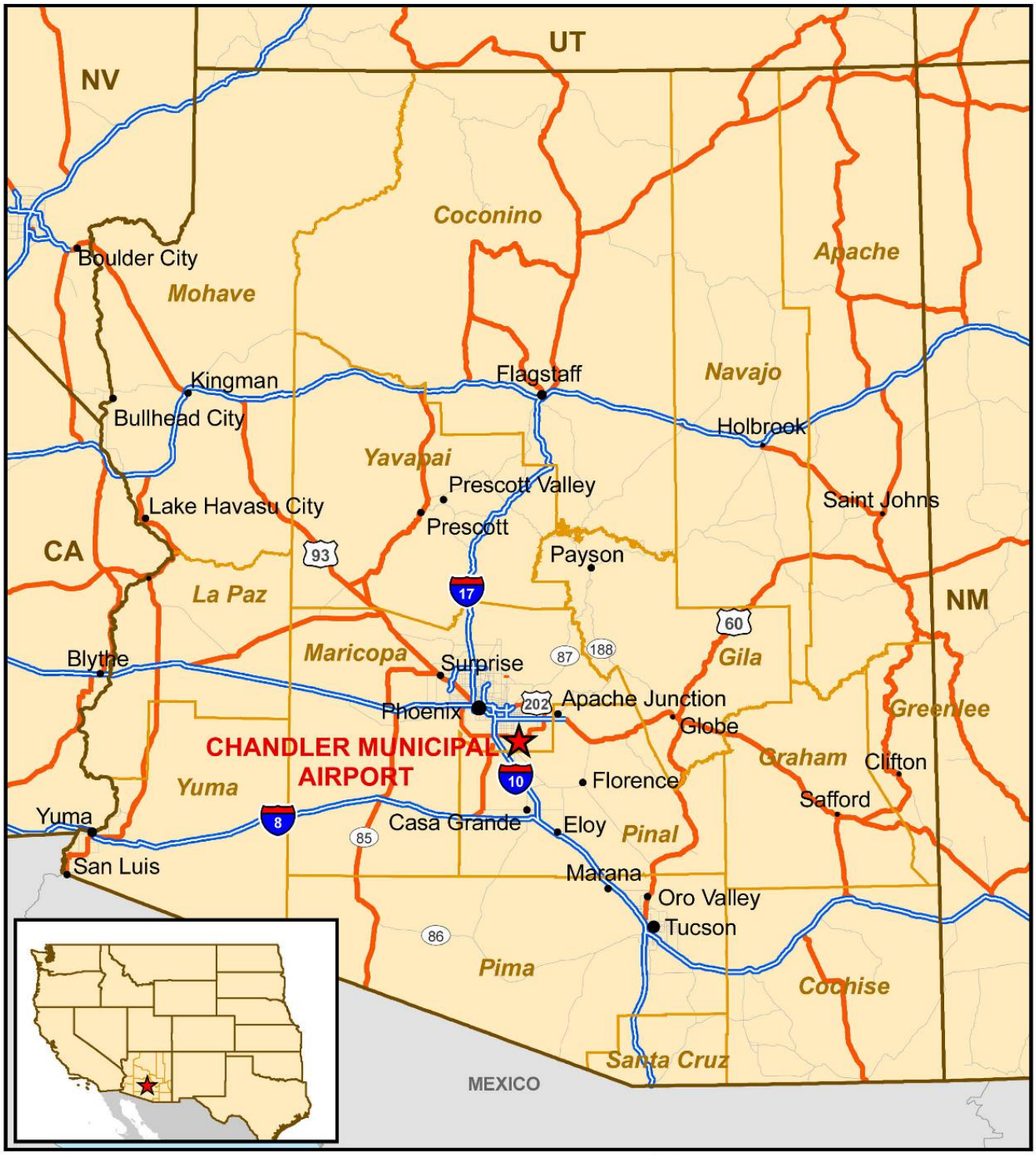
numerous expanding towns in the west. In the heart of the Greater Phoenix area is Tempe and to the east lies the City of Mesa. Desert mountains surround the area, creating “The Valley of the Sun."

Communities surrounding the Airport and the local surface transportation network are depicted in **Exhibit 1.2**. Interstates 10 and 17 provide major regional and national ground transportation access to the Phoenix metropolitan area. Easy access to Interstates 10 and 17 from the Airport is provided via either State Highway 101 or 202.

Chandler Municipal is located approximately 20 miles southeast of downtown Phoenix in Maricopa County. The Airport is located within the City of Chandler’s corporate limits. Airport property is bounded by several roadways. The general boundaries of the Airport site are as follows:

- **North Boundary** – East Germann Road
- **South Boundary** – East Queen Creek Road and South Cooper Road
- **East Boundary –** South Gilbert Road
- **West Boundary** – South McQueen Road and Airport Boulevard

Existing characteristics and planned future improvements of the local surface transportation network and internal Airport circulation roads are examined in more detail in a subsequent section.



Legend

- Chandler Municipal Airport
- Populated Places
- States
- Arizona Counties
- Limited Access Highways
- Highways
- Major Roads

Source: NTAD 2004, ESRI ArcMap 9 Data

EXHIBIT 1.1
National & Regional Location

Legend

- Arizona Counties
- US Census Bureau Urbanized Areas
- Parks
- Airport Property
- Airside Facilites
- Major Roads
- Minor Roads
- 202 Loop
- Under Construction
- Water

Source: NTAD 2004, ESRI AcrMap 9 Data, US Census TIGER 2000
Prepared: December 2005

EXHIBIT 1.2
Airport Area

AIRPORT ROLE

From the outset of the planning process, it is important to understand the role of Chandler Municipal in the national aviation system, as well as the State of Arizona and Phoenix metropolitan area. One goal of the master plan is to ensure that the Airport has the necessary facilities to adequately accomplish the various roles that it may play in the local, regional, and national transportation system.

At the national level, the National Plan of Integrated Airport Systems (NPIAS) identifies airports that are significant to the national air transportation system. The NPIAS is used by the FAA in managing and administering the Airport Improvement Program (AIP) and supports the FAA's strategic goals for safety, system efficiency, and environmental compatibility.

Airports included in the NPIAS are classified as having one of the following roles within the national system:

- **Primary Commercial Service Airports** – Publicly owned commercial service airports that have more than 10,000 passenger boardings or enplanements each calendar year and receive scheduled passenger service. Phoenix Sky Harbor International Airport is the only primary commercial service airport in the area. Other primary commercial service airports in Arizona include: Laughlin/Bullhead International in Bullhead City, Flagstaff Pulliam in Flagstaff, Grand Canyon National Park in Grand Canyon, Page Municipal in Page, Grand Canyon West in Peach Springs, Tucson International in Tucson, and Yuma International in Yuma.
- **Nonprimary Commercial Service Airports** – Publicly owned commercial service airports that have at least 2,500 and not more than 10,000 passenger boardings each year. Arizona has four nonprimary commercial service airports: Kingman, Ernest A. Love Field, Show Low Regional, and Lake Havasu City.
- **Reliever Airports** – Airports designated by the FAA to relieve congestion at commercial service airports and to provide improved general aviation access to the overall community. These may be publicly or privately-owned. Reliever airports in the Phoenix region include: Chandler Municipal, Glendale Municipal, Phoenix Goodyear, Falcon Field, Phoenix Deer Valley, Williams Gateway, and Scottsdale.
- **General Aviation Airports** – Airports included in the national system that are not categorized as commercial service or reliever airports. General aviation airports can be publicly or privately-owned. There are 38 NPIAS general aviation airports in Arizona.

Chandler Municipal Airport is currently classified as a reliever airport to Phoenix Sky Harbor International. Chandler Municipal plays an important role in supporting general aviation for the Phoenix metropolitan area and the region by supporting local businesses and residents as well as transient users. Historic airport activity statistics for each component of overall airport activity are summarized in the following section.

AIRPORT ACTIVITY

In addition to providing an understanding of the levels and types of aviation activity that occur at Chandler Municipal, historic Airport activity can be used to identify recent trends that may impact future activity levels. Historic data for the aircraft operations and based aircraft components of Airport activity are summarized in the following sections. These two components of Airport activity will be examined in greater detail in *Chapter Two, Projections of Aviation Demand*.

Aircraft Operations

A common measure of airport activity is the number of aircraft operations occurring on an annual basis. An aircraft operation is defined as either a landing or a departure. For example, a touch-and-go operation, where an aircraft lands and takes off without leaving the active runway, counts as two operations. Aircraft operations are categorized in several ways, one of which is whether the operation is itinerant or local in nature. Itinerant operations are those conducted by aircraft coming from outside the Airport's traffic pattern. Local operations are conducted by aircraft remaining in the local traffic pattern, conducting simulated instrument approaches at the Airport, or by aircraft going to or from the Airport and a practice area within a 20-mile radius of the tower. Touch-and-go training activity is an example of local activity. Once categorized as itinerant or local operations, aircraft activity is further categorized by the nature of the operator. Transient aircraft operations are categorized into one of the following groups: air carrier, air taxi, general aviation, or military. Local operations are categorized as either general aviation or military.

A summary of total aircraft operations for Chandler Municipal for the period 2000 to 2005 is presented in **Table 1.1**.

Table 1.1
HISTORIC AIRCRAFT ACTIVITY

	ITINERANT OPERATIONS				LOCAL OPERATIONS		
Year	Air Carrier	Air Taxi	General Aviation	Military	General Aviation	Military	Total
2000	0	1,771	75,713	25	172,281	21	**249,811**
2001	0	2,237	64,675	20	165,472	45	**232,449**
2002	0	1,828	67,302	12	161,377	19	**230,538**
2003	0	1,939	64,780	10	152,929	13	**219,671**
2004	0	2,530	61,626	41	168,850	32	**233,079**
2005	0	2,739	62,816	34	169,489	17	**235,095**

SOURCE: Airport Management records
PREPARED: January 2006

As shown in Table 1.1, total aircraft operations at Chandler Municipal Airport have fluctuated between 2000 and 2005. Much of this can be attributed to the events of September 11th. Aircraft operation trends presented in Table 1.1 illustrate recent trends in general aviation that are affecting Chandler Municipal Airport and many other airports across the nation. *Chapter Two, Projections of Aviation Demand*, develops projections

of future aircraft activity at the Airport and examines the recent and anticipated future trends regarding general aviation which are also used to develop forecasts for each of the components of Chandler Municipal's aircraft activity.

Based Aircraft

A based aircraft is defined as an aircraft that is permanently stored at an airport, typically in a hangar building or tied down on an airport apron area. Historic based aircraft counts for the Airport taken from the FAA's Form 5010 and Airport Management records for the years 1998 through 2005 are presented in **Table 1.2**.

Table 1.2
HISTORIC BASED AIRCRAFT

Year	Single Engine	Multi Engine	Jet	Military	Helicopter	Other	Total
1998	323	21	0	0	10	0	**354**
1999	316	23	0	0	11	0	**350**
2000	358	24	0	0	10	0	**392**
2001	352	26	0	0	10	0	**388**
2002	379	19	0	0	13	0	**411**
2003	387	31	0	0	15	0	**433**
2004	399	31	0	0	15	0	**445**
2005	407	33	1	0	16	0	**457**

SOURCE: FAA Form 5010 and Airport Management records
PREPARED: January 2006

The number and types of based aircraft at an airport typically fluctuate as aircraft owners relocate and/or change the type of aircraft they own. In addition, on-airport flight schools and charter services that may be provided by fixed base operators (FBOs) frequently adjust their aircraft operating fleet to match the demand for their services. Projections of the based aircraft operating at Chandler Municipal are developed in a following task of the master planning process and facility developments required to support future based aircraft are also identified.

EXISTING AIRPORT FACILITIES

An essential element of the master planning process at Chandler Municipal is identifying the location and characteristics of existing facilities and ultimately determining their ability to meet the future needs of the Airport and its users. The inventory of existing facilities at Chandler Municipal Airport was completed through physical inspection, discussions with Airport management and staff, and review of existing Airport studies, airport layout plans, and related studies.

To facilitate the inventory process, existing airport facilities at Chandler Municipal are categorized and examined in the following sections:

- Airport Property
- Airfield Facilities
- Landside Facilities

- Support Facilities and Equipment
- Utilities
- Surface Access and Parking System

These inventory categories comprise important components of the Airport's infrastructure. For the Airport to efficiently accommodate future demand, each component must provide sufficient capacity while at the same time seamlessly integrate with other infrastructure components to support general aviation, limited military operations, and tenant needs.

Airport Property

Existing facilities at Chandler Municipal are located on approximately 542 acres currently owned by the City of Chandler. Current Airport property is identified in **Exhibit 1.3**.

Airfield Facilities

Airfield facilities are those facilities that accommodate aircraft operations and support the transitioning of aircraft from the air to the ground, and vice versa. At Chandler Municipal, airfield facilities currently include the following: runways and taxiways, lighting and signage, and aprons and tie-downs. Existing airfield facilities are summarized in the following sections and other factors impacting the airfield are also presented.

Runways and Taxiways

Chandler Municipal is currently served by parallel runways, Runway 4R/22L and Runway 4L/22R, 4,870 feet in length and 4,401 feet in length, respectively. The runways' geodetic bearings and the magnetic variation of the area determine the runway orientations and location of the runways relative to one another. The dimensions, conditions, and weight bearing capacity of the two runways are summarized in **Table 1.3**.

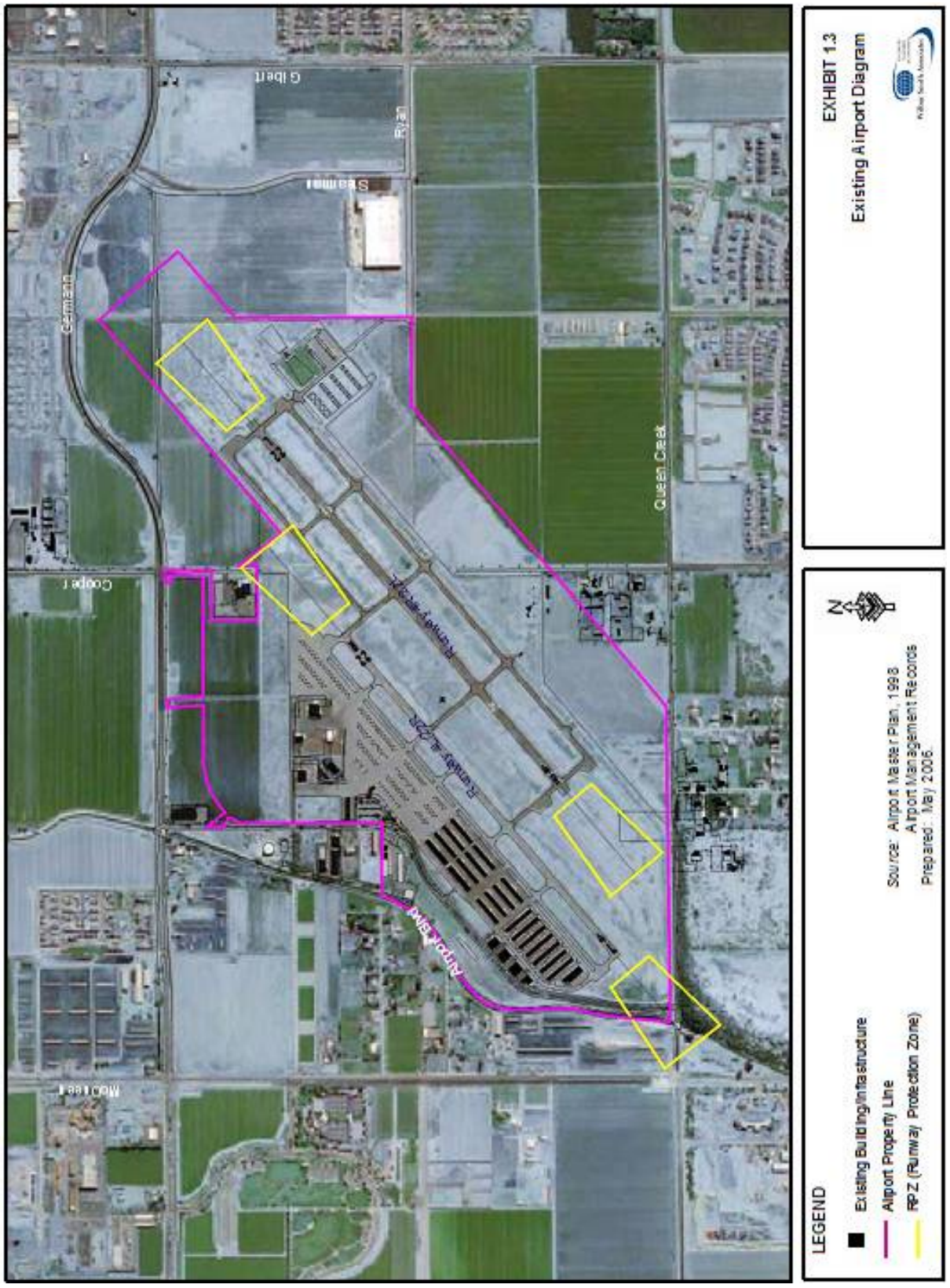


EXHIBIT 1.3
Existing Airport Diagram
LEGEND
Existing Building/Infrastructure
Airport Property Line
RPZ (Runway Protection Zone)
Source: Airport Master Plan, 1998
Airport Management Records
Prepared: May 2006
N
Gilbert
Ryan
Germann
Queen Creek
Cooper
Runway 4-22
Runway 12-30
Airport Drive

Table 1.3
EXISTING RUNWAY FACILITIES

	Runway 4R/22L	Runway 4L/22R
Length	4,870'	4,401'
Width	75'	75'
Surface/Condition	Asphalt/Good	Asphalt/Good
Weight Limitations	30,000 SWL*	30,000 SWL*

*SWL = Single Wheel Loading
SOURCE: 1998 Airport Master Plan, Airport Management records, www.airnav.com
PREPARED: January 2006

The runway system at Chandler Municipal is supported by a network of taxiways. The taxiways facilitate safe and efficient aircraft operations by allowing taxiing aircraft to remain clear of the active runway. Each runway is supported by a full-length parallel taxiway of comparable weight bearing capacity. A number of connector taxiways provide access to and from the runway and other airport areas including the terminal apron area, FBO apron areas, and transient apron areas.

Runway and taxiway system requirements at an airport are determined by a variety of factors including the number of aircraft operations occurring at the airport, the types of aircraft conducting those operations, the elevation of the airport, and the meteorological conditions in the airport area. The capacity of the existing runway system and its ability to accommodate the anticipated fleet mix at Chandler Municipal over the planning period are examined in a later chapter.

Runway wind coverage for aircraft is defined in terms of allowable rated crosswind by type of aircraft using the airfield. If the airfield is utilized solely by small aircraft the critical crosswind component would be 12 mph. Where types of aircraft classified as larger than utility (generally those aircraft weighing in excess of 12,500 lbs) are using the facility, a crosswind component of 15 mph is used. Chandler Municipal Airport is projected to continue to serve aircraft in excess of 12,500 pounds. Therefore, a crosswind component of 15 mph is used for the wind analysis.

Exhibit 1.4 shows runway wind coverage based upon historical weather observations at Williams Gateway Airport, which is the closest available long-term historical data source. It is recognized that local variations in wind patterns do occur. However, this reporting station is reasonably representative of the wind patterns present.

The analysis indicates that, under all weather conditions, crosswind velocities will not exceed 15 mph 99 percent of the time for both runways.

Heliport

The Airport adopted a Federal Aviation Regulation (FAR) Part 150 Noise Compatibility Study (Part 150 Study) in 1999. The objective of this study was to improve the compatibility between aircraft operations and noise-sensitive land uses in the area. One of the recommendations of this study was to relocate the heliport away from the

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

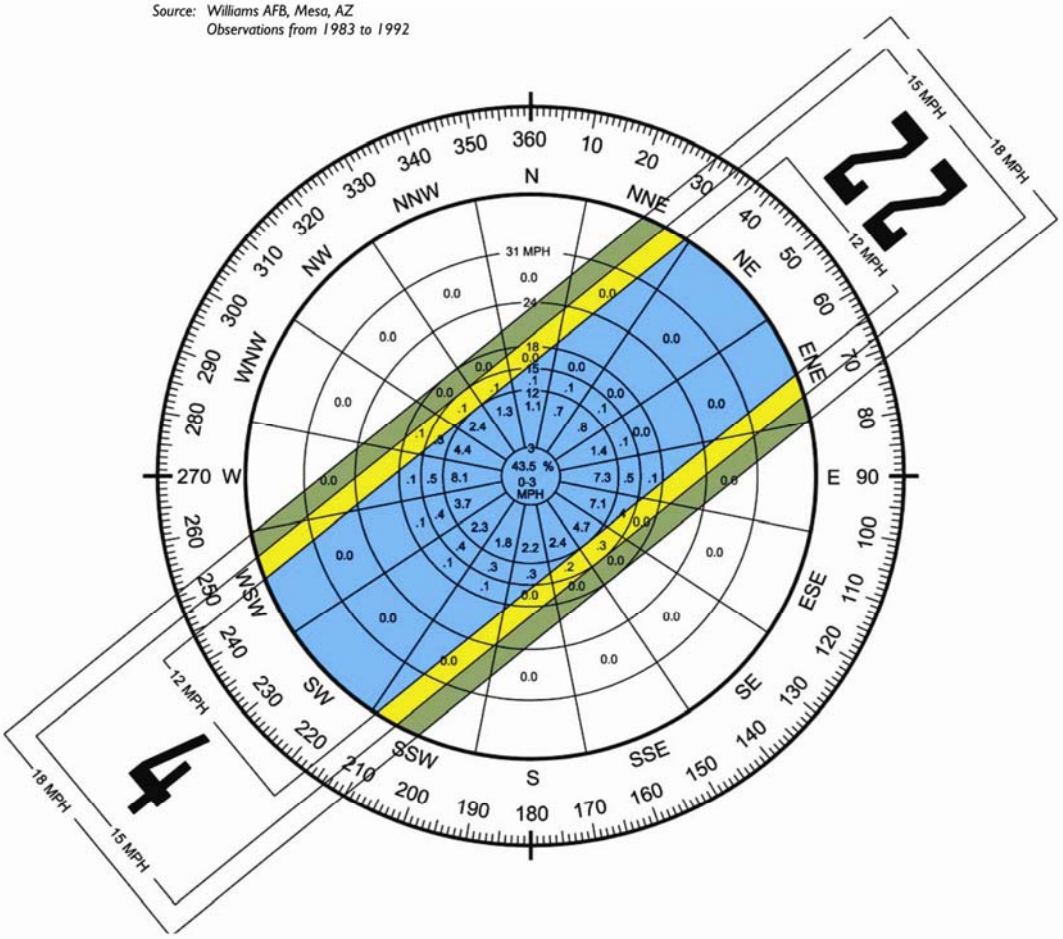


EXHIBIT 1.4
Chandler Municipal Wind Coverage

ENGINEERS PLANNERS ECONOMISTS
Wilbur Smith Associates

southwest side of the airfield. In 2005 the Airport relocated its heliport to the northeast side of the airfield as a result of the noise abatement recommendations in the 1999 Part 150 Study. The helipad facility's Final Approach and Takeoff Area (FATO) is 120 feet long by 100 feet wide. Additionally, it is supported by a taxiway and a helicopter parking apron.

Lighting, Signage, and Navigational Aids

Airport lighting and signage is important to supporting the control and movement of aircraft in the airfield area. It also helps pilots visually identify their location relative to the airport and the airfield area. Navigational aids, or NAVAIDS, are electronic or visual devices that provide guidance to pilots during the landing or takeoff of an aircraft.

Existing airfield lighting and NAVAID equipment at Chandler Municipal is summarized in **Table 1.4**.

Table 1.4
EXISTING AIRFIELD LIGHTING AND NAVAIDS

	Runway 4R/22L		Runway 4L/22R	
	4R	**22L**	**4L**	**22R**
Runway Edge Lighting	MIRL		MIRL	
Taxiway Lighting	MITL		MITL	
Runway Marking	Non-Precision		Basic	
PAPI	4-light PAPI	4-light PAPI	4-light PAPI	4-light PAPI
Approach Lights	No, REILs	No, REILs	No	No
Touchdown Point	Yes, no lights	Yes, no lights	Yes, no lights	Yes, no lights
Approach	Non-Precision	Visual	Visual	Visual
NAVAIDS	Non-Directional Beacon, Global Positioning System, LORAN-C, VORTAC			
Weather Aids	AWOS-3			

SOURCE: www.airnav.com; Airport Management records
PREPARED: January 2006

As shown in Table 1.4, both runways are equipped with medium intensity runway lighting (MIRL). Runway 4R/22L has non-precision markings and Runway 4L/22R has basic markings. The taxiways have medium intensity taxiway lighting (MITL). Other airfield lighting and NAVAID equipment identified in Table 1.4, and their respective functions, include the following:

- **PAPI** – There are 4-light precision approach path indicators (PAPIs) on both ends of Runways 4R/22L and 4L/22R. PAPIs provide visual guidance to pilots during their approach.
- **REILs** – Runway end identifier lights (REILs) are located on both ends of Runway 4R/22L.
- **NDB** – Non-directional beacons (NDBs) transmit non-directional radio signals to assist pilots in determining bearings.
- **GPS** – Global positioning system (GPS) uses satellites placed in orbit to determine altitude, speed, and navigational information for pilots.

- **LORAN-C** – A LORAN-C is a ground-based navigational aid utilizing transmitters located across the United States. A LORAN-C can allow pilots to navigate to any airport in the U.S.
- **VORTAC** – Very high frequency omnidirectional range with TACAN capability (VORTAC) provides distance and direction information to pilots.
- **AWOS-3** – An Area Weather Observation System (AWOS) is a system that allows pilots to have the most accurate account of weather at an airport that is available. This equipment transmits Airport-specific weather information and is transmitted at frequency 128.325 MHZ or by calling (480) 814-9952.

The ability of existing airfield lighting and NAVAID equipment to efficiently accommodate existing and future demand at Chandler Municipal is determined in a subsequent chapter.

Aprons and Tie-Downs

Airport apron areas serve a variety of purposes and are generally classified based on the users they are intended to support, the activities conducted on the apron area and/or their location on the airport. Existing apron areas at Chandler Municipal, their location, size, and function, are listed below:

- Terminal Area Apron Area
- FBO Apron Areas
- Heliport Apron Area

These apron areas account for approximately 90,000 square yards of aircraft parking which provide 251 aircraft tie-down spaces. The tie-down spaces are for based aircraft, transient aircraft, and aircraft utilizing FBO facilities. The majority of aircraft parking apron area is located in the terminal area on the main ramp. The ability of these apron areas to accommodate anticipated future Airport tenant needs is examined in a subsequent chapter.

Aircraft tie-down positions are located on each of the apron areas mentioned above. These tie-down positions accommodate the parking of general aviation aircraft, both based and transient, and are managed either by the City or the FBOs.

Landside Facilities

Landside facilities at airports consist of a wide variety of buildings and equipment that support airport operations. For the purposes of this analysis, the following facilities at Chandler Municipal Airport are categorized and examined as landside facilities:

- General Aviation Terminal
- Fixed Base Operators
- Aircraft Hangars

- Other Landside Facilities

General Aviation Terminal

The general aviation terminal has a total area of approximately 5,500 square feet and houses administration, and pilot and passenger areas; the terminal was constructed in 1996. The terminal building consists of a pilot's lounge, flight planning area, restrooms, lobby, conference room, office space, and Airport administration offices. The old terminal building is now occupied by Tailwind Flight Centre.

Fixed Base Operators

Fixed Base Operators (FBOs) support a variety of aviation activity at Chandler and are the primary providers of services and facilities for general aviation operators at the Airport. The majority of facilities at the Airport, including FBO facilities, is located to the northeast of the general aviation terminal and apron areas. There is currently only one FBO operating on the Airport, Chandler Air Service. Chandler Air Service provides hangar and tie-down storage space, fueling services, aircraft maintenance, aircraft rental, and flight training.

The FBO leases approximately four acres of land from the City of Chandler. The FBO owns and operates two hangar buildings, an apron, and other various facilities that are located on the leased ground.

Airport Rescue and Firefighting

There are no airport rescue and firefighting (ARFF) facilities in place at the airport. Chandler Fire Station 1 is the closest fire station to the Airport. It is located 1 ¼ miles from the Airport at the crossroads of Hamilton and Pecos. If for some reason Fire Station 1 is unable to respond an emergency at the Airport, any of the other engine and ladder stations are capable of responding to an emergency on the airfield. All of the City's engine and ladder fire stations conduct annual drills at the Airport to ensure they are familiar with the facilities.

Aircraft Hangars

Aircraft hangar structures at the Airport currently include facilities that support the activities of the FBO and general aviation operators. Two recently constructed corporate (condo) hangar developments on the Airport are located southwest of the terminal area and a third condo hangar development is under construction as of January 2006. Hangar facilities at the Airport consist of conventional hangars, t-hangars, shade hangars, and condo hangars. All of the conventional hangars are occupied by either the FBO or other specialized aviation service operators (SASO). These facilities provide for 238 covered storage spaces for aircraft (see **Table 1.5**).

Table 1.5
AIRCRAFT HANGAR STORAGE

Name	Building Label	Type	No. Hangar Units	Typical Inside Dimension	Total Square Feet
City Owned	Alpha	Lg. T-hgr	8	54' x 45'	14,674
City Owned	Bravo	Sm. T-hgr	10	42' x 36'	11,628
City Owned	Charlie	Sm. T-hgr	10	42' x 36'	11,628
City Owned	Delta	Sm. T-hgr	10	42' x 36'	11,628
City Owned	Echo	Lg. T-hgr	8	54' x 45'	14,674
City Owned	Fox	Sm. T-hgr	10	42' x 36'	11,628
City Owned	Golf	Sm. T-hgr	10	42' x 36'	11,628
City Owned	Hotel	Sm. T-hgr	10	42' x 36'	11,628
City Owned	India	Sm. T-hgr	10	42' x 36'	11,628
City Owned	Juliet	Sm. T-hgr	10	42' x 36'	11,628
City Owned	Kilo	Sm. T-hgr	10	42' x 36'	11,628
City Owned	Lima	Sm. T-hgr	10	42' x 36'	11,628
Sub-totals			*116*		*145,628*
Hangars Unlimited	Mike	Sm. T-hgr	10	44' x 38'	12,920
Hangars Unlimited	November	Sm. T-hgr	11	40' x 36'	12,240
Hangars Unlimited	Oscar	Sm. T-hgr	11	40' x 36'	12,240
Hangars Unlimited	Papa	Sm. T-hgr	11	40' x 36'	12,240
Hangars Unlimited	Quebec	Sm. T-hgr	10	44' x 42'	14,280
Hangars Unlimited	Romeo	Sm. T-hgr	11	40' x 36'	12,240
Hangars Unlimited	Sierra	Sm. T-hgr	11	40' x 36'	12,240
Hangars Unlimited	Tango	Lg. T-hgr	6	55' x 44'	12,007
Sub-totals			*81*		*100,407*
Hangars Unlimited*	Uniform	Conventional	2	86' x 44'	6,578
Hangars Unlimited	Victor	Conventional	4	56' x 50	10,200
Hangars Unlimited	Whiskey	Conventional	4	56' x 42	8,500
Hangars Unlimited	X-ray	Conventional	4	50' x 44	8,360
Hangars Unlimited*	Yankee	Conventional	4	49' x 40'	7,840
Hangars Unlimited*	Zulu	Conventional	4	49' x 40'	7,840
Hangars Unlimited*	Alpha-Alpha	Conventional	4	49' x 40'	7,840
Hangars Unlimited*	Alpha-Bravo	Conventional	2	45' x 42	3,780
Sub-totals			*28*		*60,938*
F & G Hangars*	Alpha-Charlie	Conventional	8	60' x 60'	14,400
F & G Hangars*	Alpha-Charlie	Conventional	8	50' x 40'	8,000
Sub-totals			*8*		*22,400*

Table 1.5, Continued
AIRCRAFT HANGAR STORAGE

Name	Building Label	Type	No. Hangar Units	Typical Inside Dimension	Total Square Feet
Venture Aviation	N/A	Conventional	1	80' x 80'	6,400
Chandler Aviation	N/A	Conventional	1	120' x 80'	9,600
Chandler Air Service	1	Conventional	1	50' x 40'	2,000
Chandler Air Service	2	Conventional	1	120' x 100'	12,000
Quantum Helicopters**	N/A	Conventional	1	60' x 60'	3,600
Sub-totals			*5*		*33,600*
Total			***238***		***362,973***

*In design or construction at time data (August 2005) was compiled.
** Owned by City of Chandler, leased to Quantum Helicopters
SOURCE: Airport Management records
PREPARED: January 2006

It should be noted that the Airport maintains a 10-year waiting list for hangar storage that requires a paid deposit. Additionally, the City is currently working with developers to lease ground for the design, construction, and operation of additional hangars.

Other Landside Facilities

Chandler Municipal is home to a diverse array of tenants that utilize Airport facilities and lease land and/or buildings from the City. The ability of the Airport to meet the current and future needs of these tenants is an important consideration in the master planning process. As of August 2005, there were 10 contractual agreements in place between the Airport and entities wishing to conduct business on the Airport and/or provide services to those using the Airport. A summary of existing Airport tenants located at Chandler Municipal, both on Airport property and adjacent, is presented in the following sections.

Chandler Air Service

Chandler Air Service is the Airport's only full-service FBO and is located on the northeast side of the terminal building. Chandler Air Service offers flight school training that is FAA approved, general aircraft maintenance, aircraft fueling, aircraft rental, and fuel sales. The FBO operates from two buildings. The first is a 12,000-square foot maintenance/hangar storage building with 5,000 feet of office space and an additional 800 square feet for Hangar Café, the Airport's only restaurant. It should be noted that Hangar Café subleases its space from Chandler Air Service. The second building is a conventional hangar that is approximately 2,000 square feet and is used for maintenance and hangar space as well as office space.

Chandler Air Service also provides both AvGas (10,000 gallon above ground tank) and Jet A fuels (12,000 gallon above ground tank). In addition to the storage tanks,

Chandler Air Service also operates fuel trucks for both fuel types as well as provides self-service AvGas. Chandler Air Service maintains 36 tie-down spaces.

Airport Business Center of Chandler, Inc

Airport Business Center of Chandler, Inc. is a real estate business and leases office and warehouse space to aviation businesses. Current tenants include Varga Enterprises, Inc., SoftComm Products, Inc., Aguila Aerospace Services LLC, Curtis Superior Valve Co., Inc., and Aircraft Engine Specialist LLC.

Aircraft Engine Specialist LLC

Aircraft Engine Specialist LLC specializes in overhaul and repair of Lycoming and Continental aircraft engines and engine accessories. Aircraft Engine Specialist is located adjacent to airport property.

Aguila Aerospace Services LLC

Aguila Aerospace Services LLC specializes in non-destructive testing. It should be noted that Aquila Aerospace Services is located adjacent to airport property.

Chandler Aviation

Chandler Aviation provides a complete line of maintenance services, annual aircraft inspections, sheet metal repairs, fabric repairs, and engine overhauls in a 120-foot by 80-foot conventional hangar (a total of 9,600 square feet). Chandler Aviation's operation is located just east of the terminal and is also located on the northeast apron area. Additionally, Chandler Aviation maintains 16 tie-down spaces.

Curtis Superior Valve Co.

Curtis Superior Valve Co., Inc. is located adjacent to airport property. Curtis Superior Valve is a manufacture of aircraft fuel and oil drain valves primarily for general aviation and military aircraft.

Exec Avionics

Exec Avionics occupies 2,500 square feet of hangar space through a lease agreement. They also maintain 600 square feet of office space. Exec Avionics provides full-service avionics sales and repairs at the Airport.

Hangar Café

Hangar Café is the only restaurant at the Airport. The Café is open for breakfast and lunch with outdoor seating available. As previously mentioned, Hangar Café sublets approximately 800 square feet of space in Chandler Air Service's larger hangar.

Hangars Unlimited

Hangars Unlimited, a division of HU Inc., a Washington corporation, is a land leasehold development system which builds and sells aviation storage hangars. The hangars are built in blocks and a Condominium Association is formed which simplifies ownership for the buyer. Currently, Hangars Unlimited leases 109 hangars in various stages of development. The hangars are a combination of t-hangars and conventional hangars. It should be noted that Hangars Unlimited offices are not located on Airport property.

Holmes Aviation

Holmes Aviation specializes in engine overhauls, repairs, and accessories. The company also occupies space within the larger Chandler Air Service conventional hangar through a sublease agreement.

Quantum Helicopters

As of January 2006, Quantum Helicopters is located on the western portion of the airfield adjacent to the old heliport area, however, the company is in the process of building new facilities on the eastern side of the airfield adjacent to the new heliport area. Quantum Helicopters currently leases a 3,600-square foot hangar from the City of Chandler. Quantum has 2,000 square feet of office space as well. Quantum provides helicopter flight training and charter service.

SoftComm Products, Inc

SoftComm Products is manufacturer of general aviation headsets, intercoms, and flight computers. The company currently sublets space from Varga Enterprises, Inc. It should be noted that SoftComm Products is located adjacent to Airport property.

Tailwind Flight Centre

Tailwind Flight Centre provides the Airport with flight training and aircraft rental and is located south of the existing general aviation terminal in the old terminal building.

Varga Enterprises, Inc.

Varga Enterprises is a mail order retail and wholesale aircraft parts distributor. Varga Enterprises has a full-line instrument and hose shop. It should be noted that Varga Enterprises is located adjacent to Airport property.

Support Facilities and Equipment

In addition to airside and landside facilities at the Airport, there are a variety of support facilities and equipment that facilitate the operations of Airport users and tenants. Depending on function, some specific facilities are owned by the City of Chandler while others are owned and operated by individual tenants. In some cases, tenant-owned equipment is stored on or within Airport-owned facilities. The specific support facilities inventoried in this chapter include fuel storage and distribution.

The Airport's fuel storage facility is located adjacent to the old heliport area. On this site, the Airport maintains fuel storage tanks to support the fueling of AvGas fuel. The fuel farm includes four underground storage tanks: two 8,000 gallon tanks, one 10,000 gallon tank, and one 12,000 gallon tank storing AvGas. As previously mentioned, Chandler Air Service provides both AvGas and Jet A fuels. The City receives a fuel flowage fee from Chandler Air Service in the amount of $0.10 per gallon of fuel pumped. The City also operates a self-service AvGas fuel island located adjacent to Tailwind Flight Centre. The fuel facilities provided by the City and Chandler Air Service comply with Arizona Department of Environmental Quality (ADEQ) requirements. Further, the City and Chandler Air Service are the only fuel providers at the airport.

Utilities

Utility services are provided to the Airport and its tenants by several local companies and the City of Chandler. The existing utility infrastructure at Chandler Municipal Airport is summarized as follows:

- **Water Service** – Water Service is provided by the City of Chandler.
- **Sanitary Sewer Service** – The City of Chandler provides sanitary sewer service to the general aviation terminal building, the old terminal building, old heliport, and condo hangars. Sanitary sewer for all other facilities at the airport is accommodated through septic systems.
- **Electrical Power** – Salt River Project (SRP) provides all electrical power to the Airport. It should be noted that all power lines located on Airport property have been buried underground except at the t-shade hangars and north of the Airport's property.
- **Gas Service** – Natural gas is not currently available at the Airport.
- **Telecommunications** – Qwest Communications provides telecommunication services to the Airport. The terminal building is equipped with digital telephone/data lines.

Surface Access and Parking System

The ability of Airport users to efficiently access the Airport via the Chandler area's surface transportation infrastructure is an important consideration in the master planning process. Furthermore, Airport users require convenient access to parking facilities once

at the Airport. An inventory of the Airport's surface access and parking system is presented in the following sections:

- Airport Access Roads
- Airport Parking Facilities

Airport Access Roads

Arizona State Highway 202 is the primary regional access roadway serving the Airport. The highway is classified as an expressway and is a divided, six-lane highway connecting the City of Chandler with Maricopa County and other suburban areas. State Highway 202 serves as a primary route for traffic destined for Phoenix and other parts of the eastern metropolitan area. State Highway 202 is a "loop" road that provides east-west access to the area, including access to Interstate 10 to the west. Vehicular traffic accessing the Airport can use State Highway 202, U.S. Highway 60, or a number of secondary roads such as Gilbert Road, Germann Road, Queen Creek Road, and McQueen Road.

Suburban development in the Airport area has helped to stress the ability of highway structures to efficiently accommodate growing traffic demand. Increasing congestion of these roadways has not impacted access to the Airport dramatically.

Airport Parking Facilities

The vast majority of Airport parking facilities support the terminal area and adjacent FBO and tenant areas. The designated parking area in the terminal area can accommodate 30 vehicles. The FBO and tenant areas account for approximately 200 additional spaces that are paved.

Airport Fencing and Security

The airport is surrounded by a commercial and residential real estate. Additionally, major roadways are in the immediate vicinity of the Airport. Wildlife are often seen on and adjacent to Airport property. These types of encroachment, especially on the runways and taxiways, are a serious safety concern to aircraft. To protect the safety of aircraft operations and provide security environment, a six-foot chain link fence topped with barbed wire was installed around the airfield. There are several automatic vehicle entry gates, manually operated swing gates, and pedestrian access gates installed along the fence. In addition to the perimeter fencing and security gates, the Chandler Police Department performs a facility check on a regular basis throughout the day.

Pavement Condition

A report entitled, "Chandler Municipal Airport – Pavement Management Report," dated October 2003 prepared by Applied Pavement Technologies, Inc. was obtained by the Arizona Department of Transportation. This information provided the construction history for airside pavements at the Airport and presented the detailed results of a visual pavement condition survey conducted in January 2003.

For inspection purposes, each section was divided into sample units. Representative sample units were then randomly chosen at the network level frequency within each section for actual survey and data recordation.

The PCI (pavement condition index) is based on a number of distinct distress types, quantities and severities commonly found on airport pavements. After all distresses for each sample unit are measured and catalogued, the PCI is computed as a numerical rating index between 0 and 100, with a PCI of 100 being a pavement in "Excellent" condition.

The pavements at Chandler Municipal range from 57 to 95 upon inspection in November 2003. It should be noted that the Airport is currently updating its Pavement Management Report. The findings should be available by the end of 2006.

AIRSPACE AND APPROACHES

Free and unencumbered use of the airspace above and around Chandler Municipal Airport is crucial to the safe and efficient operation of aircraft at the Airport. An important consideration in the master planning process is the protection and maintenance of navigable airspace. The following sections summarize existing airspace characteristics on and around Chandler Municipal as well as the instrument approach procedures at the Airport. Various aspects of the Airport's navigable airspace are summarized in the following sections:

- Airport Traffic Pattern and Procedures
- Air Traffic Control Facilities and Procedures
- Aeronautical Radio Communications
- Instrument Approaches and Equipment
- Regional Airspace Considerations
- Avoidance of Noise Sensitive Areas

These sections provide an understanding of the existing airspace characteristics of the Airport and regional factors that impact aviation activity at Chandler Municipal Airport.

Airport Traffic Pattern and Procedures

The approach, departure, and taxiing of aircraft on the parallel runway system and taxiways at Chandler Municipal is managed by the Airport's Air Traffic Control Tower (ATCT). Runway usage is determined based on the weather conditions at the Airport, including wind direction and speed, and the amount of aviation activity occurring at the Airport at any given time. When conditions and activity levels allow, Airport users are typically directed to use the closest runway environment to minimize taxiing requirements which during calm winds and ideal conditions is Runway 4L/22R.

As a result of prevailing winds and atmospheric conditions at the Airport, on an average annual basis, the majority of aircraft operations occur to the northeast, with approaches to and departures from Runway 4R and Runway 4L. The remaining annual activity operates in a southwesterly flow with approaches to and departures from Runway 22R and Runway 22L.

The centerlines of the parallel runways at Chandler Municipal Airport are separated by approximately 1,750 feet. There are no adverse effects to aircraft operating simultaneously due to the separation between Runways 4R/22L and 4L/22R during visual flight rules (VFR).

In VFR conditions, periods when there is at least 1,000 foot cloud base and 3 miles visibility, general aviation traffic is typically assigned to Runway 4L/22R. Runway 4R/22L is also used to accommodate general aviation activity during peak periods of activity.

During periods of instrument flight rule (IFR) conditions, those periods when weather conditions do not meet VFR requirements, arriving IFR aircraft use NDB, VOR or GPS approaches to Runway 4R.

Air Traffic Control Facilities and Procedures

The Air Traffic Control Tower (ATCT) at Chandler Municipal is in operation 15 hours a day and is charged with controlling the movements of all aircraft within a four nautical mile radius of the Airport up to an altitude of 3,000 feet MSL. In addition to the Chandler Municipal ATCT, there are other entities that share responsibility in managing the movement of aircraft during fight to and from the Airport as well as during approach and departure procedures. The specific roles that each of the following has in managing aviation traffic at Chandler Municipal are summarized in the following sections:

- Albuquerque Air Route Traffic Control Center (ARTCC)
- Phoenix Terminal Radar Approach Control (TRACON)

Albuquerque Air Route Traffic Control Center

The Albuquerque Air Route Traffic Control Center (Albuquerque ARTCC) controls all IFR aircraft and some VFR operations within controlled airspace across a multi-state area, including the Phoenix metropolitan area. The Albuquerque ARTCC controls aircraft movements at altitudes greater than 10,000 feet above ground level (AGL) and is responsible for establishing the initial approach sequencing of aircraft and providing adequate separation from all other known traffic. As enroute aircraft approach Chandler Municipal Airport and get within approximately 25 to 40 mile radius of the Volunteer VORTAC, they become the responsibility of the Phoenix Terminal Radar Approach Control (TRACON). Typically, once an aircraft departing from Chandler Municipal reaches 10,000 feet AGL they become the responsibility of the Albuquerque ARTCC.

Phoenix Terminal Radar Approach Control

The Phoenix TRACON controls aircraft under 10,000 feet AGL during their approach to and departures from Chandler Municipal. It is the responsibility of the Phoenix TRACON to provide separation for participating aircraft in the vicinity of the TRACON boundary area and direct them to the Airport by instructing pilots to fly specific altitudes and headings called radar vectors. This process is used for all IFR arriving traffic regardless of its destination airport in the TRACON boundary. As aircraft approach the Chandler Municipal airspace area, the TRACON "hands-off" or transfers control responsibility to the Chandler Municipal Air Traffic Control Tower (ATCT). This process is reversed for aircraft departing Chandler Municipal Airport.

Aeronautical Radio Communications

Communications between pilots, controllers, and other FAA personnel in the environs of Chandler Municipal Airport are facilitated by aeronautical radio communication equipment. These pieces of communication equipment operate on assigned radio frequencies and provide unique Airport-specific information related to air traffic guidance and Airport-area weather conditions. Important radio communication facilities at Chandler Municipal Airport are described below and their frequencies are on the following page.

- **ATIS** – The Air Traffic Information System (ATIS) equipment transmits a continuous broadcast of recorded non-control information for certain terminal areas. At Chandler Municipal this information is transmitted at 128.325 MHZ.
- **UNICOM** – The UNICOM (Uniform Communications) frequency at Chandler Municipal operates at 122.95 MHZ.
- **Phoenix Radar Approach/Departure Control** – The Terminal Radar Approach/Departure Control (TRACON) manages the arrival and departure of aircraft in Chandler Municipal airspace on the 123.7 frequency.
- **Chandler Municipal ATCT** – The takeoff and landing of aircraft at Chandler Municipal is managed by Chandler Municipal ATCT personnel via communication

with aircraft on several frequencies depending on heading/location of aircraft and the amount of activity in the Airport area. The primary frequencies used are 126.1 MHZ for aircraft north and west of the Airport, and 133.1 MHZ for aircraft south and east of the Airport.

- **Ground Control** – Chandler Municipal ATCT personnel also control the movement of pilots and aircraft once they are on the ground at Chandler Municipal with radio communications at 124.2 MHZ.
- **WX AWOS** – This equipment transmits Airport-specific weather information and is transmitted at frequency 128.325 MHZ or by calling (480) 814-9952.

Radio communication facilitated by these Airport facilities promotes safe and efficient aircraft operations.

Instrument Approaches and Equipment

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 a point from which a landing may be made visually. Instrument approaches rely on navigational aid (NAVAID) equipment to provide the necessary guidance to pilots in flight. Available NAVAIDs at Chandler Municipal are summarized in the previous Airfield Facilities section of this chapter.

Instrument approach procedures are classified as precision approaches or non-precision approaches based on the guidance provided to pilots. Precision approaches are procedures that provide both vertical guidance, typically via a glide slope, and horizontal guidance, typically with a localizer, to aircraft. Non-precision approach procedures and equipment provide only horizontal guidance to pilots. Instrument approach equipment and available non-precision approaches at Chandler Municipal include the following:

- **Area Navigation with Global Positioning System (RNAV (GPS))** – A non-precision approach type utilizing radio signals from Area Navigation equipment and/or radio signals from a network of navigational satellites.
- **Very-High Frequency Omnidirectional Radio (VOR)** – A non-precision approach that utilizes a radio signal from an on or off airport facility to aid in an instrument approach.
- **Non-Directional Beacon (NDB)** – A radio signal from an on or off airport facility used for non-precision approach procedures. An NDB is considered an older and less accurate system than a VOR.

It should be noted that the 1994 and 2001 *Federal Radionavigation Plan* outlines the phase out of ground-based NAVAIDS, including NDBs. It is anticipated that their primary importance will be replaced by Global Positioning Systems (GPS). The NDB approach to Runway 4R is planned to be phased out by the FAA.

Instrument approaches at Chandler Municipal and their respective current decision height and site distance minima are summarized in **Table 1.6**.

Table 1.6
CURRENT INSTRUMENT APPROACHES

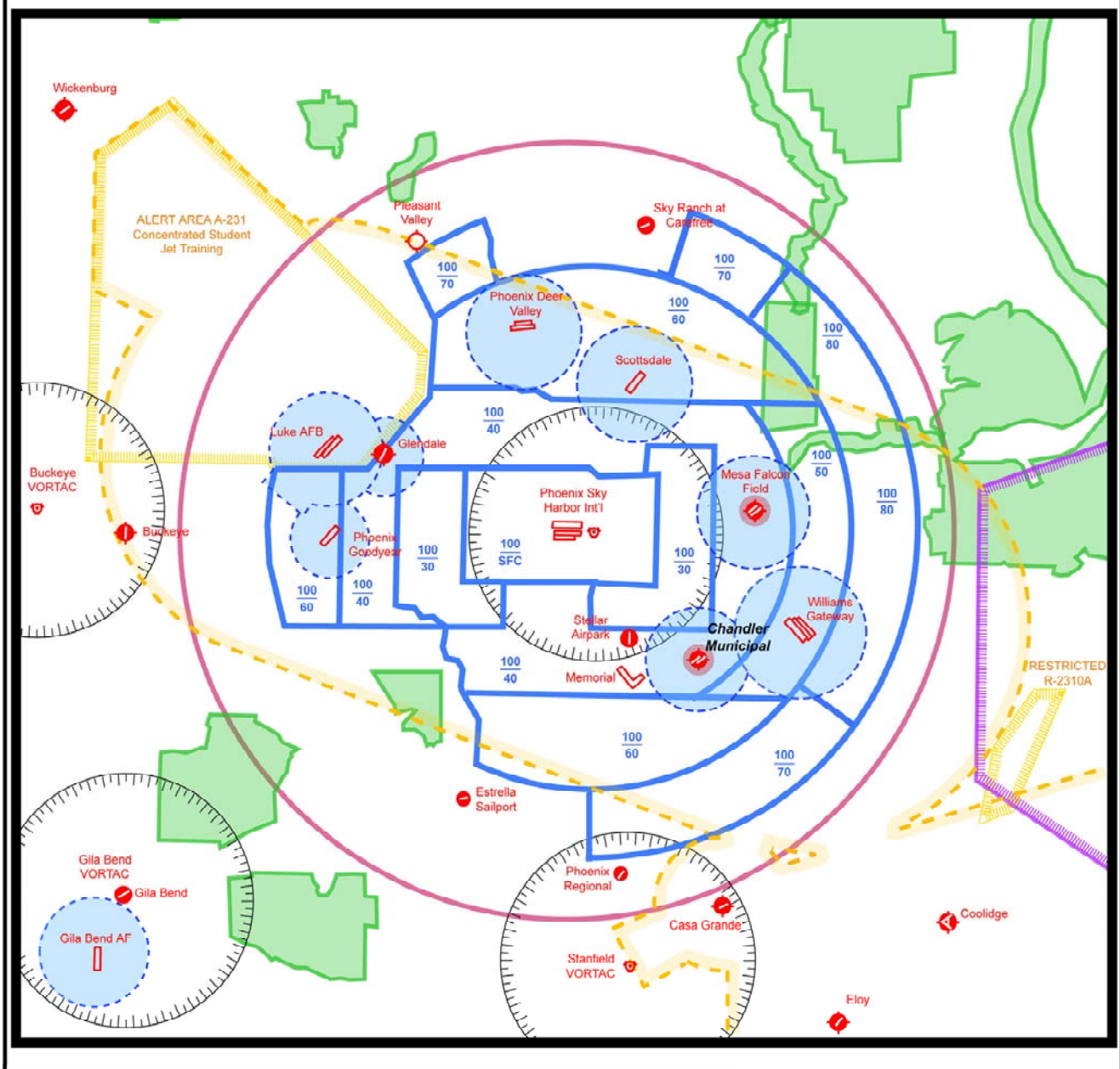
Runway End	Approach Type	Decision Height (MSL)	AGL	Site Distance
4R	RNAV (GPS)	1,680'	437'	1 mile
4R	NDB	1,780'	537'	1 mile
4R	VOR	1,680'	437'	1 mile

SOURCE: U.S. Terminal Procedures, August 4, 2005
PRESENTED: January 2006
Note: Minimums represented are for Category A and B aircraft only.

The decision height minimum (depicted in terms of mean sea level) denotes the height above ground level (AGL) at which the pilot must be able to visually identify the runway environment. If the pilot reaches this altitude and cannot visually identify the runway environment, a missed approach procedure must be conducted and the aircraft may re-initiate the approach procedure or proceed to an alternative destination. The site distance minimum represents the minimum visibility in statute miles, prescribed for landing while using an instrument approach procedure. The ability of these approach procedures to safely and efficiently accommodate current and future activity levels at the Airport is determined in a following task in the master planning process.

Regional Airspace Considerations

General airspace characteristics and classifications in the environs of Chandler Municipal Airport are examined in the following sections and factors that impact, or could potentially impact, aircraft operations at and around the Airport are identified. The current airspace characteristics of the region, as depicted on the Phoenix Sectional Aeronautical Chart, are presented in **Exhibit 1.5**.



Legend

- Wilderness Preserves
- Other than hard-surfaced runway
- Hard-surfaced runways 1500 ft. to 8,069 ft. in length
- Hard-surfaced runways > than 8,069 ft. in length or some multiple runways less than 8,069 ft.
- VORTAC
- Compass Rose
- Prohibited, Restricted, Warning and Alert Areas
- Military Operations Area (MOA)
- Class B Airspace
- Class D Airspace
- Class E Airspace
- 30 Nautical Mile Mode C Veil
- Non-Directional Beacon (NDB)

Source: Phoenix Sectional Aeronautical Chart 73rd Edition * Include Airspace Amendments Effective May 12, 2005
Prepared: October 2005

EXHIBIT 1.5
Regional Airspace

Through Federal Aviation Regulations (FARs), airspace classifications have been developed to promote the safe and efficient movement and control of aircraft during flight and approach/departure procedures. Airspace classifications are identified on sectional aeronautical charts published by the FAA's National Aeronautical Charting Office. FAR Part 71 and FAR Part 73 establish classifications of airspace with the following characteristics:

- **Class A Airspace** – Class A airspace is not shown on aeronautical charts. It begins at 18,000 feet above mean sea level (MSL) and extends to higher altitudes. Only pilots flying IFR can enter this airspace and prior permission is required. Class A airspace does not significantly impact the operation of Chandler Municipal.
- **Class B Airspace** – Class B airspace is found around major airports. Pilots must get permission to enter this airspace from the controlling agency, typically the Terminal Radar Approach Control (TRACON) facility associated with the airport and region. The Class B airspace located in the region surrounds Phoenix Sky Harbor International and provides controlled airspace along some primary arrival routes to Chandler Municipal.
- **Class C Airspace** – Class C airspace is the airspace from the surface to 4,000 feet above the airport elevation. Although the configuration of each Class C airspace area is individually tailored, the airspace usually consists of a surface area with a 5 mile radius, and an outer circle with a 1 mile radius that extends from 1,200 feet to 4,000 feet above the airport elevation. An aircraft must establish two-way radio communication with the controlling agency providing air traffic services prior to entering the airspace and thereafter maintain those communications while within the airspace. VFR aircraft are only separated from IFR aircraft within the airspace. Class C airspace does not exist in the Chandler Municipal area.
- **Class D Airspace** – Class D airspace exists at any airport with an operating air traffic control tower where Class B or Class C airspace does not exist. Class D airspace typically extends 5 miles from the airport to an altitude of 2,500 feet AGL. Pilots must establish two-way radio communication with the controlling agency, usually the air traffic control tower, before entering this classification of airspace. Because there is Class B airspace surrounding Chandler Municipal, Class D airspace and its associated restrictions do impact aircraft operations at Chandler Municipal. It should be noted that when the Chandler Municipal ATCT is inactive, the Class D airspace surrounding the Airport reverts to Class E airspace.
- **Class E Airspace (with floor 700 feet above surface)** – Class E airspace typically surrounds airports having instrument approaches and encompasses portions of the instrument approach paths. The flight requirements within Class E airspace result in increased aircraft separation requirements thereby promoting safety and minimizing potential incidents between IFR and VFR aircraft in this airspace. Class E airspace protects portions of instrument approach paths associated with the Phoenix metropolitan area and Chandler Municipal Airport.

- **Class G Airspace** – Class G airspace is referred to as uncontrolled airspace and is not depicted on aeronautical charts. This classification of airspace comprises all airspace not identified as another class. IFR flights typically do not operate in Class G airspace, as no ATC services are provided. VFR flights are permitted as long as visibility and cloud clearance minimums are met. Class G airspace does not significantly impact operations at Chandler Municipal.
- **Restricted Areas** – Restricted areas contain airspace identified by an area on the surface of the earth within which the flight of aircraft, while not wholly prohibited, is subject to restrictions. Restricted areas denote the existence of unusual, often invisible, hazards to aircraft; examples include artillery firing, aerial gunnery, or guided missiles. Penetration of restricted areas without authorization from the using or controlling agency may be extremely hazardous to the aircraft and its occupants. An area located approximately 25 miles southeast of Chandler Municipal Airport is designated as restricted airspace. Restricted Areas R-2310 A, B, and C operate at various times and altitudes ranging from 10,000 to 35,000 feet.
- **Prohibited Areas** – Prohibited areas contain airspace within which the flight of unauthorized aircraft is prohibited. Such areas are established for security or other reasons associated with the national welfare. Prohibited areas are published in the National Register and are depicted on aeronautical charts. There are no areas of prohibited airspace proximate to Chandler Municipal Airport.
- **Military Operations Areas (MOAs)** – MOAs consist of airspace of defined vertical and lateral limits established for the purpose of separating certain military training activities from IFR traffic. Whenever a MOA is being used, nonparticipating IFR traffic maybe be cleared through a MOA if IFR separation can be provided by air traffic control. Otherwise, air traffic control will reroute or restrict nonparticipating IFR traffic. Pilots operating under VFR should exercise caution while flying within a MOA when military activity is being conducted. Prior to entering an active MOA, pilots should contact the controlling agency for traffic advisories. The Outlaw MOA is located approximately 22 miles east of Chandler Municipal Airport. The operations conducted within the Outlaw MOA are typically conducted Monday through Friday between the hours of 7:00 am and 8:00 pm, and between the altitudes of 3,000 and 8,000 feet AGL. The Outlaw MOA does not significantly impact aircraft operations at the Airport.
- **Alert Areas** – Alert areas are depicted on aeronautical charts to inform nonparticipating pilots of areas that may contain a high volume of pilot training or an unusual type of aerial activity. Pilots should be particularly alert when flying in these areas. All activity within an alert area shall be conducted in accordance with the Code of Federal Regulations (CFRs), without waiver, and pilots of participating aircraft as well as pilots transiting the areas shall be equally responsible for collision avoidance. There are no area alerts near Chandler Municipal.
- **Military Training Route (MTR) –** Several military training routes are located south of Chandler Municipal Airport. These routes are used by military training

aircraft which operate at speeds in excess of 250 knots and altitudes to 10,000 feet MSL. Pilots are strongly cautioned to be alert for high-speed military jet training aircraft.

As the summary descriptions of airspace classifications indicate and **Exhibit 1.6** shows, different classes of airspace have different characteristics, dimensions, altitudes, and requirements based on the types of activity that they are intended to support. Existing airspace classifications in the vicinity of Chandler Municipal and those that could have the potential to impact aircraft operations at the Airport have been identified. Any potential impacts that these airspace classifications and areas may have on the Airport will be examined prior to identifying the recommended development plan for the Airport.

Avoidance of Noise Sensitive Areas

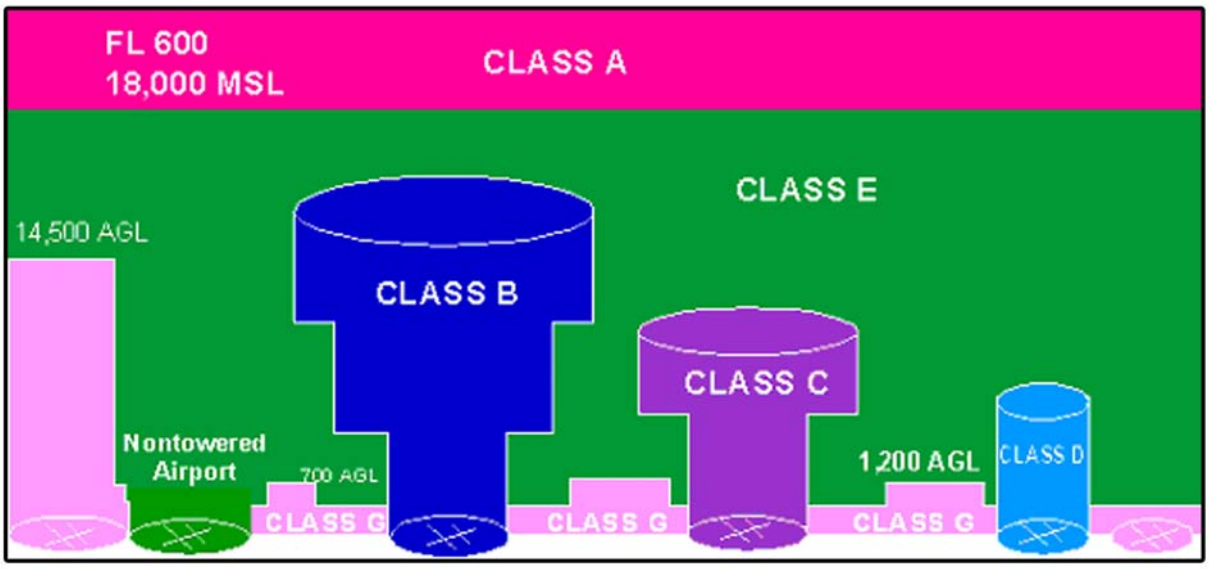
The Airport conducted a FAR Part 150 Noise Compatibility Study (Part 150 Study) that was adopted in 1999. The objective of the noise compatibility planning process was to improve the compatibility between aircraft operations and noise-sensitive land uses in the area, while allowing the Airport to continue to serve its role in the community, State, and nation. The Part 150 Study included measures to abate aircraft noise, control land development, mitigate the impact of noise on non-compatible land uses, and implement and update the program. Many of the recommendations from the Part 150 Study were related to the noise generated by helicopters operating at the Airport and relocating the heliport. Where possible, this and other Part 150 Study recommendations were implemented over the last several years.

CLIMATIC AND METEOROLOGICAL CONDITIONS

Climatic and meteorological conditions are important considerations in the analysis and development of aviation-related facilities. Considerations related to temperature, wind speed, wind orientation, and visibility help to identify facility requirements at specific airports. Effective airport planning and development can minimize the impacts that climatic and meteorological conditions have on aircraft operations and can promote the maximum utilization of airport facilities.

Data related to weather conditions at Chandler Municipal is available from nearby Williams Gateway Airport through the National Oceanic and Atmospheric Administration (NOAA). Climatic and meteorological data relevant to the master planning process at Chandler Municipal can be summarized as follows:

- The predominant wind direction at Chandler Municipal is from the southwest and over 90 percent of the recorded wind speed at the Airport is under 10 knots.
- Normal daily mean temperatures at the Airport range from 54.2 degrees Fahrenheit in January to 92.8 degrees Fahrenheit in July.
- The average daily mean temperature at the Airport is 72.8 degrees Fahrenheit.



Airspace Classes	Communications	Entry Requirements	Separation	Special VFR in Surface Area
A	Required	ATC clearance	All	N/A
B	Required	ATC clearance	All	Yes
C	Required	Two-way communications prior to entry	VFR/IFR	Yes
D	Required	Two-way communications prior to entry	Runway operations	Yes
E	Not required for VFR	None for VFR	None for VFR	Yes
G	Not required	None	None	N/A

Legend

AGL - Above Ground Level
FL - Flight Level
MSL - Mean Sea Level

Source: USDOT and FAA; Effective: September 16,1993
Prepared: December 2005

EXHIBIT 1.6
U.S. Airspace Classifications

- The absolute maximum average temperature at the Airport is 104.2 degrees Fahrenheit in June and the absolute minimum average temperature is 43.4 degrees Fahrenheit in January.
- Average annual precipitation in Chandler and the Phoenix metropolitan area is 8.29 inches and includes trace amounts of snow/ice per year.
- Rain is fairly evenly distributed throughout the year with summer months being relatively wetter and referred to as "monsoon season."

The impacts that these climatic and meteorological conditions have on Chandler Municipal and the operation of aircraft at the Airport are examined in detail in the facility requirements task of the master planning process.

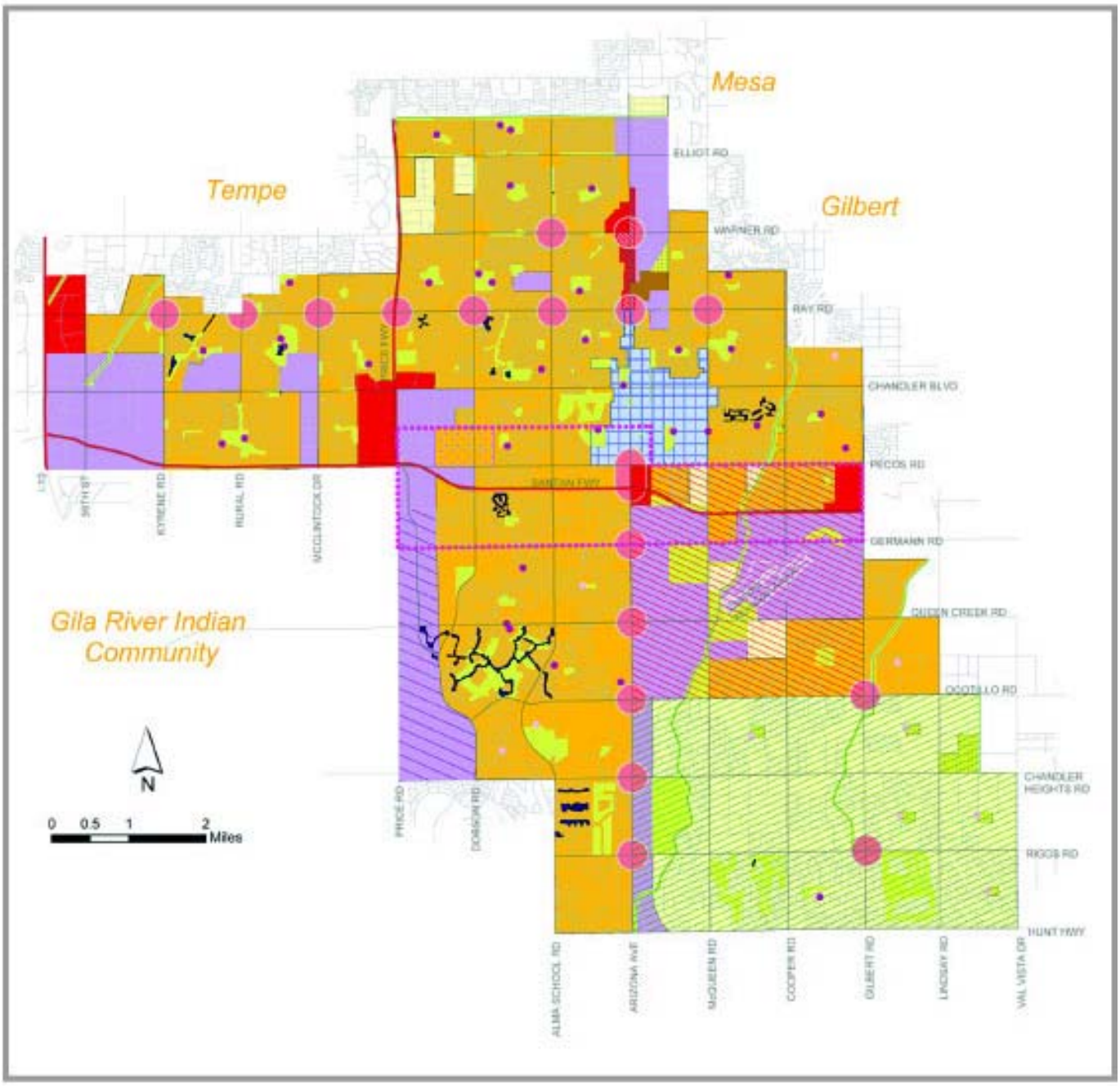
AREA LAND USE PATTERNS AND ZONING

Identifying land use and zoning characteristics in the environs of airports is an important task in the master planning process because of significant impacts that incompatible development in the airport area can have on the facility's continued operation and development. Working with the relevant planning commissions, counties, municipalities, or other entities to promote compatible land uses and zoning in the environs of Chandler Municipal can allow the Airport to continue to operate and develop in a manner that minimizes the impacts of the Airport on non-compatible land uses.

The City of Chandler has adopted a specific zoning district, AP-1-Airport District, to regulate the development of land owned or leased by the City of Chandler as well as height restricts as they apply to FAA Part 77 requirements. These regulations specify allowed uses or uses that can be considered under a Use Permit process to verify compatibility with the Airport. Additionally, these regulations specify development standards in the interest of the safety and compatibility with airport operations and to ensure the development quality of a public land use.

Current land uses of lands south of Queen Creek and east of McQueen Road primarily include industrial/support uses, transitional/mixed uses, and commercial uses along the immediate borders of the Airport's property. Residential areas are located primarily to the south and east of the Airport.

In November 1998, the City of Chandler adopted the *Chandler Airpark Area Plan*. This plan was developed to guide future development in and around the airport area. The airpark area encompasses approximately nine square miles surrounding the Airport. The goal of plan is to protect the Chandler Municipal Airport from residential encroachment and economic development within the area. The City of Chandler later adopted (March 2002) the *Chandler General Plan* which updated its land use plan, as shown in **Exhibit 1.7**. In this plan, Chandler Municipal Airport and the Chandler Airpark are identified and have the appropriate land use zoning adjacent to both entities. The surrounding areas serve as a "buffer" to the residential areas located to the north and



Legend

- Rural (Very Low Density) Residential
- Low Density Residential
- Low-Medium Density Residential
- Redevelopment Area
- Public School
- Commercial Nodes
- Regional Commercial
- Employment
- High-Tech Employment
- Recreation/ Open Space
- Proposed School
- Strip Commercial
- Airpark Area
- Southeast Chandler Area
- Santan Freeway Corridor Area
- Gateway Area

Source: City of Chandler
Prepared: June 2006

EXHIBIT 1.7
Chandler Land Use Map

Wilbur Smith Associates

southeast. It should be noted that the *Airpark Area Plan* follows the overall goals and policies of the *General Plan* and is compatible with surrounding uses which are planned.

Arizona has several statutes in place that were developed to reflect the importance of addressing airport noise. The first, Airport Influence Area (ARS: 28-8485), was implemented in 1997. At this same time, to encourage the preservation of military airports in Arizona, Military Airport Registry was also implemented (ARS: 28-8483 and 28-8484), which was later amended to Military Airport Disclosure. The Public Airport Disclosure (ARS: 28-8486) was implemented in 2000.

The Airport Influence Area statute allows the development of an airport influence area to serve as a notification that properties are located in the vicinity of an airport that may be impacted by noise levels or aircraft overflights. If an airport influence area is established, a record must be filed in each county that contains property in the area such that notification of homeowners within the area occurs. The airport influence area is not restricted in size to noise contours, but can be established to address issues such as overflights from training or significant activity levels that occur as a result of aircraft operating patterns. At this time Chandler Municipal Airport has not adopted this statute.

The City of Chandler has however adopted an Airport Impact Overlay District that encompasses the nine square miles covered by the Airpark Area Plan. This zoning district is marked on the City's zoning maps as an overlay zoning district establishing rules and regulations in addition to any other rules and regulations otherwise established by a property's zoning district. The zoning district's purpose is to establish four airport overlay areas to distinguish between the severity of the levels of noise impact and accident potential so that appropriate uses and acoustical performance standards can be established to mitigate the adverse impacts of aircraft noise, and hazards to protect the public's health, safety, and welfare. Further, prior to the issuance of any building or development permit for property within the Airport Impact Overlay District, the City requires the recordation of an avigational easement and release from liability for airport related damage claims.

The Public Airport Disclosure statute requires that the public airports work with the Arizona Department of Real Estate to develop a map "showing the exterior boundaries of each territory in the vicinity of a public airport." The territory is defined as property that is within the traffic pattern airspace, including property that is within a certain DNL, determined based on county population. For counties with a population of less than 500,000, 65 DNL is the standard; for counties with more than 500,000 in population such as Maricopa County, 60 DNL is the standard. It is important to note that the FAA uses 65 DNL as its basis for determining incompatible land use compared to the State's use of 60 DNL for large counties such as Maricopa. The map is then recorded with the applicable county recorder(s) and made available to the public – there is no requirement for distribution. Chandler Municipal Airport currently has a disclosure map on file with the Arizona Department of Real Estate. This map will be updated as part of the master planning process.

AREA SOCIOECONOMIC DATA

The relationship between socioeconomic factors and an airport's role and activity levels is an important consideration in the master planning process. In addition to providing a general understanding of the existing conditions in an airport area, socioeconomic data is instrumental in developing future projections of aviation activity. Summary socioeconomic data for the City of Chandler, Maricopa County, and Chandler Municipal Airport's market area are presented in the following sections.

Table 1.7 presents historic population data for the City of Chandler and Maricopa County and provides a comparison to comparable data for the State of Arizona and the United States.

Table 1.7
HISTORIC REGIONAL POPULATION DATA

Year	City of Chandler	Maricopa County	Arizona	United States
1990	90,533	2,132,249	3,684,097	249,622,814
2000	176,581	2,954,157	5,165,765	282,177,838
2001	190,091	3,029,150	5,297,684	285,093,870
2002	201,262	3,104,077	5,441,125	287,974,001
2003	211,984	3,179,155	5,580,811	290,810,789
2004	224,644	3,254,363	5,707,121	293,545,244
1990 -2004 CAGR	6.71%	3.07%	3.18%	1.16%

CAGR: Compound Annual Growth Rate
SOURCE: Woods & Poole, Inc. City of Chandler Long Range Planning Division April, 2005, U.S. Bureau of Labor Statistics
PREPARED: January 2006

Table 1.8 summarizes historic data related to employment and unemployment in the City of Chandler, Maricopa County, the State of Arizona, and the United States from 1990 to 2004.

Table 1.8
HISTORIC EMPLOYMENT DATA

Year	City of Chandler	Maricopa County	Arizona	United States
		Employment		
1990	50,222	1,068,480	1,909,879	139,380,891
2000	100,442	1,543,315	2,819,304	166,758,782
2001	102,865	1,580,553	2,844,359	166,908,258
2002	102,876	1,612,455	2,873,564	167,033,565
2003	105,516	1,653,834	2,953,036	169,545,983
2004	110,262	1,694,213	3,032,571	172,058,819
1990 -2004 CAGR	5.78%	3.35%	3.36%	1.52%
		Unemployment Rate		
1990	3.2%	4.3%	5.3%	5.6%
2000	2.5%	3.3%	4.0%	4.0%
2001	3.2%	4.1%	4.7%	4.7%
2002	4.1%	5.5%	6.0%	5.8%
2003	3.8%	5.0%	5.7%	6.0%
2004	3.4%	4.4%	5.0%	5.5%

CAGR: Compound Annual Growth Rate
SOURCE: Woods & Poole, Inc. City of Chandler Long Range Planning Division April, 2005, U.S. Bureau of Labor Statistics
PREPARED: January 2006

Tables 1.9 and 1.10 summarize historic data related to employment by industry for the City of Chandler and Maricopa County for 2000.

Table 1.9
EMPLOYMENT BY INDUSTRY (2000)
CHANDLER MUNICIPAL AIRPORT MARKET AREA

Sector	City of Chandler	Maricopa County
Agriculture, forestry, fishing and hunting, and mining	618	9,151
Construction	6,288	123,255
Manufacturing	17,488	165,409
Wholesale trade	3,811	53,869
Retail trade	11,012	172,636
Transportation and warehousing, and utilities	4,957	72,752
Information	3,213	45,209
Finance, insurance, real estate, and rental and leasing	8,260	135,494
Professional, scientific, management, administrative, and waste management services	9,086	164,602
Educational, health and social services	14,477	229,895
Arts, entertainment, recreation, accommodation and food services	6,594	127,600
Other services (except public administration)	3,359	64,336
Public administration	3,483	63,084

SOURCE: US Census Bureau, 2000 Census
PREPARED: January 2006

Table 1.10
EMPLOYMENT BY INDUSTRY (1970-2000)
MARICOPA COUNTY

Changes from 1970 to 2000	1970	% of Total	2000	% of Total	New Employment	% of New Employment
Total Employment	430,567		1,896,035		1,465,468	
Wage and Salary Employment	376,509	87.4%	1,613,418	85.1%	1,236,909	84.4%
Proprietor's Employment	54,058	12.6%	282,617	14.9%	228,559	15.6%
Farm and Agricultural Services	14,302	3.3%	32,095	1.7%	17,793	1.2%
Farm	9,391	2.2%	7,515	0.4%	-1,876	NA
Ag. Services	4,911	1.1%	24,580	1.3%	19,669	1.3%
Mining	464	0.1%	2,899	0.2%	2,435	0.2%
Manufacturing (incl. forest products)	73,272	17.0%	168,487	8.9%	95,215	6.5%
Services and Professional	244,820	56.9%	1,361,536	71.8%	1,116,716	76.2%
Transportation & Public Utilities	20,522	4.8%	93,636	4.9%	73,114	5.0%
Wholesale Trade	21,915	5.1%	97,247	5.1%	75,332	5.1%
Retail Trade	75,926	17.6%	319,943	16.9%	244,017	16.7%
Finance, Insurance & Real Estate	39,159	9.1%	216,805	11.4%	177,646	12.1%
Services (Health, Legal, Business, Others)	87,298	20.3%	633,905	33.4%	546,607	37.3%
Construction	26,603	6.2%	142,288	7.5%	115,685	7.9%
Government	71,106	16.5%	188,730	10.0%	117,624	8.0%

SOURCE: Sonoran Institute, *Population, Employment, Earnings, & Personal Income Trends – Maricopa County, AZ,* 12/2003
PREPARED: January 2006

The summary data presented in Tables 1.7, 1.8, 1.9, and 1.10 reflects the continuous growth experienced by the City of Chandler and its market area for the socioeconomic factors examined in this analysis. It is also important to note that the unemployment rate for the market area has been significantly lower than the national and state averages for the past five years. Job growth in the market of the services sector and retail trade services has contributed to the overall employment growth in the county.

These socioeconomic factors and on-going economic development associated with the Maricopa County and the Phoenix metropolitan area are important considerations in the development of projections of aviation demand in the market area. The following chapter examines historic socioeconomic data in more detail, presents socioeconomic projections for the market area, and uses this data in the process of developing aviation activity projections for Chandler Municipal Airport.

OTHER AREA AIRPORTS

In addition to examining market area demographic and socioeconomic characteristics, it is also important to understand the dynamics of aviation activity in the Chandler Municipal area and the impacts that other nearby airports may have on aviation demand. The location of other airports and the level of service and activity that they support is an important consideration in developing a long-range development plan for Chandler Municipal Airport. The nearest commercial service airport, Phoenix Sky Harbor International, is less than 15 nautical miles from Chandler Municipal. Nearby general aviation airports and their relevant characteristics are summarized in **Table 1.11**.

Table 1.11
OTHER AREA AIRPORTS

Airport	FAA ID	Distance from Chandler Municipal	RWY Length	Approach Type	Based Aircraft (2005)
Casa Grande Municipal	CGZ	19 NM	5,200'	Precision	98
Coolidge	P08	28 NM	5,528'	Non-Precision	2
Eloy Municipal	E60	30 NM	3,900'	Visual	41
Estrella Sailport	E68	21 NM	3,740'	Visual	3
Falcon Field	FFZ	12 NM	5,102'	Non-Precision	891
Glendale Municipal	GEU	27 NM	7,150'	Non-Precision	259
Phoenix Deer Valley	DVT	28 NM	8,208'	Non-Precision	890
Phoenix Goodyear	GYR	29 NM	8,500'	Non-Precision	197
Phoenix Sky Harbor Int'l	PHX	14NM	11,489'	Precision	237
Memorial Airfield	34AZ	5 NM	8,577'	Visual	61
Scottsdale	SDL	20 NM	8,249'	Non-Precision	429
Stellar Airpark	P19	5 NM	3,913'	Non-Precision	144
Williams Gateway	IWA	8 NM	10,401'	Precision	93

SOURCE: FAA Form 5010, www.airnav.com
PREPARED: January 2006

The locations of these airports are illustrated in **Exhibit 1.8.**

SUMMARY

The inventory data presented in this chapter provides a framework from which analysis in the Chandler Municipal Airport Master Plan will proceed. Some inventory data, such as airport role, historic activity, area socioeconomic trends, and existing airport facilities are used to develop forecasts of future activity levels at the Airport and to determine future facility requirements. Much of the data presented in this chapter is used to conduct numerous analyses as the master planning process works towards identifying a recommended development plan for Chandler Municipal Airport.

Legend

- Chandler Municipal Airport
- General Aviation Airport
- Commercial Airport
- Arizona Counties
- Urbanized Areas
- Roads

Source: NTAD 2004, ESRI ArcMap 9 Data
Prepared: October 2005

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EXHIBIT 1.8
Other Area Airports

Wilbur Smith Associates

CHAPTER TWO: PROJECTIONS OF AVIATION DEMAND

INTRODUCTION

Projecting future aviation demand is a critical element in the overall master planning process. The activity forecasts developed in this chapter will be used in subsequent tasks to analyze the airport's ability to accommodate future activity and to determine the type, size, and timing of future airside and landside facility developments.

This chapter discusses the findings and methodologies used to project aviation demand at Chandler Municipal Airport. It must be recognized that there are always short-term fluctuations in an airport's activity due to a variety of factors that cannot be anticipated. The forecasts developed in this Master Plan Update provide a meaningful framework to guide future Airport development needs and alternatives.

The projections of aviation demand developed for Chandler Municipal Airport are documented in the following sections:

- Regional Demographics
- Historic Aviation Activity
- National Aviation Trends
- FAA Activity Forecasts
- Projections of Aviation Demand
- Critical Aircraft
- Peaking Analysis
- Instrument Approach Forecasts
- Summary

Projections of air cargo operations, as well as military operations are not addressed in this chapter. Chandler Municipal currently has no scheduled air cargo activity. Over the last five years, military activity has averaged only 50 operations per year. Circumstances are not anticipated to change related to air cargo or military activity in the future. Therefore, these two indicators are not included in the projections of aviation demand for Chandler Municipal Airport.

This forecast analysis includes methodologies that consider historical aviation trends at Chandler Municipal Airport and throughout the nation. Local historical data were collected from Federal Aviation Administration (FAA) Terminal Area Forecast (TAF) records, Airport records, and the 1998 Chandler Municipal Airport Master Plan. In addition, demographic data for the City of Chandler and the surrounding Phoenix Metropolitan area were used to track local trends and conditions that can impact general aviation demand levels. Projections of aviation activity for the Airport were prepared for the near-term (2010), mid-term (2015), and long-term (2020 and 2025) timeframes. These projections are generally unconstrained and assume the Airport will be able to develop the facilities necessary to accommodate based aircraft and future operations.

REGIONAL DEMOGRAPHICS

Regional demographic data were examined in the preceding inventory chapter. Where applicable, this demographic data can be used in the master planning process to relate future aviation activity levels at Chandler Municipal Airport to local demographic trends. This analysis examines the historical trends and future projections of the region's population, employment and earnings.

Since 1990 the City of Chandler has been of one of the fastest growing municipalities in the country. Among cities with a population over 100,000, the City of Chandler was the second fastest growing in the country between 1990 and 1996 and the fourth fastest growing between 2000 and 2003 according to the U.S. Census Bureau data.

There are a number of demographic factors that impact, to varying degrees, the demand for general aviation in any particular region. In addition to population trends, regional employment and earnings trends also have an impact on aviation demand. **Table 2.1** presents historic population and employment data for the City of Chandler and Maricopa County. Earnings data is also presented for Maricopa County. For comparison purposes, population, employment and earnings data for the State of Arizona and the United States is also presented.

Data presented in Table 2.1 indicates that from 1990 through 2004 the population of the City of Chandler grew at an average annual rate of 6.71 percent, over twice the annual rate of growth experienced in Maricopa County and the State of Arizona.

Employment growth in the City of Chandler averaged 5.78 percent annually from 1990 to 2004. This rate greatly exceeds the rate of growth for jobs nationally of 1.52 percent and is almost double the rate of job growth experienced in Maricopa County and the State of Arizona.

Statistical analysis typically indicates that regional earnings are one of the most important demographic factors influencing aviation demand. The assumption is made that as earnings, and consequently discretionary income grows, local residents have more to spend on all goods and services, including aviation-related goods and services. Gross earnings in Maricopa County are estimated to have grown at an average annual compound growth rate of 5.61 percent between 1990 and 2004. This is significantly above the national average of 2.91 percent, and slightly above the average for the State of Arizona of 5.06 percent.

Table 2.1
HISTORICAL POPULATION EMPLOYMENT AND EARNINGS DATA

Year	City of Chandler Population	Maricopa County Population	Arizona Population	United States Population
1990	90,533	2,132,249	3,684,097	249,622,814
2000	176,581	2,954,157	5,165,765	282,177,838
2001	190,091	3,029,150	5,297,684	285,093,870
2002	201,262	3,104,077	5,441,125	287,974,001
2003	211,984	3,179,155	5,580,811	290,810,789
2004	224,644	3,254,363	5,707,121	293,545,244
1990 -2004 CAGR	**6.71%**	**3.07%**	**3.18%**	**1.16%**
Year	**City of Chandler Employment**	**Maricopa County Employment**	**Arizona Employment**	**United States Employment**
1990	50,222	1,068,480	1,909,879	139,380,891
2000	100,442	1,543,315	2,819,304	166,758,782
2001	102,865	1,580,553	2,844,359	166,908,258
2002	102,876	1,612,455	2,873,564	167,033,565
2003	105,516	1,653,834	2,953,036	169,545,983
2004	110,262	1,694,213	3,032,571	172,058,819
1990 -2004 CAGR	**5.78%**	**3.35%**	**3.36%**	**1.52%**
Year		**Maricopa County Total Earnings[1]**	**Arizona Total Earnings[1]**	**United States Total Earnings[1]**
1990		$35,133.30	$51,966.82	$4,302,268.33
2000		$68,537.76	$94,139.35	$6,084,932.22
2001		$69,502.39	$95,565.12	$6,143,464.25
2002		$69,857.64	$97,024.24	$6,150,408.14
2003		$72,610.75	$100,028.63	$6,288,178.38
2004		$75,392.34	$103,649.20	$6,426,363.59
1990 -2004 CAGR		**5.61%**	**5.06%**	**2.91%**

CAGR: Compound Annual Growth Rate
SOURCE: Woods & Poole, Inc. City of Chandler Long Range Planning Division April, 2005, U.S. Bureau of Labor Statistics
PREPARED: January 2006
[1] - Millions in 1996 Dollars

Projections of population, employment, and earnings developed for Chandler and Maricopa County indicate that the City and County are expected to experience continued growth in all categories over the forecast period. The population of the City of Chandler is expected continue to grow rapidly over the next several years, and then begin to level off as the amount of developable land within the City of Chandler becomes limited. Maricopa County and the State of Arizona are projected to add population at significantly higher rates than the City of Chandler.

Employment growth in Chandler is projected to outpace population growth in the future. As businesses continue to add jobs, more people are projected to commute to the City of Chandler from surrounding communities. Chandler is home to many fast growing high technology manufacturing companies with Intel being by far the largest employer in the City of Chandler. **Table 2.2** identifies the top employers in the City of Chandler as of early 2006.

Table 2.2
TOP EMPLOYERS IN THE CITY OF CHANDLER

Company	Number of Employees
Intel	5,100
Intel Fab 12 and 22	4,400
Chandler School District	2,400
Countrywide Home Mortgage	2,350
Wells Fargo	2,200
Freescale Semiconductor	1,800
City of Chandler	1,523
Microchip Technology	1,485
Chandler Regional Hospital	1,100
Motorola	1,100
Orbital Sciences	1,100
Verizon Wireless	1,100

SOURCE: City of Chandler Economic Development
PREPARED: March 2006

Employment in the City of Chandler is projected to grow at an average annual rate of 1.67 percent, as opposed to 2.37 percent in Maricopa County, between 2010 and 2025. By comparison, employment in the State of Arizona is expected to grow at a slightly higher average annual rate of 1.97 percent, with the U.S. projected to grow at a slightly lower average annual rate of 1.23 percent. Growth in earnings in Maricopa County and the State of Arizona are both projected to exceed the national average. Earnings in Maricopa County are projected to grow at an average annual rate of 3.20 percent and by 3.06 percent in the State of Arizona. Nationally earnings are projected to grow at an average annual rate of 2.08 percent. **Table 2.3** presents demographic projections for the City of Chandler and Maricopa County. Projected growth rates for the State of Arizona and the U.S. are also included for comparison purposes.

Table 2.3
PROJECTED POPULATION EMPLOYMENT AND EARNINGS DATA

	Year	City of Chandler Population	Maricopa County Population	Arizona Population	United States Population
Historic	2004	220,705	3,524,175	5,707,121	293,545,244
Projected	2010	260,000	4,134,400	6,482,263	311,034,645
	2015	286,600	4,649,250	7,145,207	326,491,564
	2020	287,000	5,164,100	7,821,821	342,544,203
	2025	288,600	5,664,000	8,518,319	359,383,445
2010 - 2025 CAGR		**0.70%**	**2.12%**	**1.93%**	**0.97%**
	Year	**City of Chandler Employment**	**Maricopa County Employment**	**Arizona Employment**	**United States Employment**
Historic	2004	110,262	1,694,213	3,032,571	172,058,819
Projected	2010	134,900	2,112,000	3,510,210	187,135,175
	2015	150,500	2,408,500	3,908,889	199,698,512
	2020	166,100	2,705,000	4,308,251	212,262,142
	2025	173,000	3,002,000	4,708,399	224,825,649
2010 - 2025 CAGR		**1.67%**	**2.37%**	**1.98%**	**1.23%**
	Year		**Maricopa County Total Earnings[1]**	**Arizona Total Earnings[1]**	**United States Total Earnings[1]**
Historic	2004		$75,392.34	$103,649,198	$6,426,363,594
Projected	2010		$92,961.65	$126,422,163	$7,280,034,272
	2015		$109,523.29	$147,820,516	$8,071,704,169
	2020		$128,141.96	$171,811,048	$8,946,968,959
	2025		$149,119.36	$198,770,407	$9,915,861,492
2010 - 2025 CAGR			**3.20%**	**3.06%**	**2.08%**

CAGR: Compound Annual Growth Rate
SOURCE: Woods & Poole, Inc, Maricopa Association of Governments *Interim Socioeconomic Projections*, July 2003 and U.S. Bureau of Labor Statistics
PREPARED: February 2006
[1] - Millions 1996 Dollars

The projected growth rates of these demographics for the City of Chandler and Maricopa County indicate that demand for aviation services in this area will continue to remain strong. These factors will have a significant influence on the projection of aviation activity at Chandler Municipal Airport.

HISTORIC AVIATION ACTIVITY

Historic based aircraft and operations data for Chandler Municipal Airport provides the baseline from which future activity at the Airport can be projected. While historic trends are not always reflective of future periods, historic data does provide insight into how local, regional, and national demographic and aviation-related trends may be tied to the airport. A based aircraft is generally defined as an aircraft that is permanently stored at an airport. An aircraft operation represents either a take-off or landing conducted by an aircraft. For example, a takeoff and a landing would count as two operations.

Historic activity data for Chandler Municipal Airport has been compiled from several sources including Airport and air traffic control tower (ATCT) records. Information from

the Maricopa Association of Governments Regional Aviation System Plan was also used, as applicable.

The number of based aircraft at Chandler Municipal Airport has steadily increased from the year 1990 to 2005, with single-engine aircraft comprising the majority of the Airport's based aircraft fleet. **Table 2.4** presents the number of historical based aircraft by category from 1990 through 2005.

Table 2.4
HISTORIC BASED AIRCRAFT

Year	Single-engine	Multi-engine	Jet	Helicopter	Total Based Aircraft
1990	207	20	0	7	235
2000	358	24	0	10	392
2001	352	26	0	10	388
2002	379	19	0	13	411
2003	387	31	0	15	433
2004	399	31	0	15	445
2005	407	33	1	16	457
CAGR (2000-2005)	**2.60%**	**5.25%**	**N/A**	**9.86%**	**3.12%**
CAGR (1990-2005)	**4.61%**	**3.39%**	**N/A**	**5.67%**	**4.53%**

CAGR: Compound Annual Growth Rate
SOURCE: FAA Form 5010 and Airport Management records
PREPARED: February 2006

Historically the number of based aircraft in all categories has increased since 1990. Helicopters based at the Airport have had the largest average annual rate of growth with the vast majority of helicopters being associated with flight training operators based at Chandler Municipal Airport. The total number of based aircraft at Chandler Municipal Airport has grown at an average annual rate of 4.53 percent increasing from 235 in 1990 to 457 in 2005. Between 2000 and 2005 based aircraft increase at a slower average annual rate of 3.12 percent.

Annual operations represent the number of aircraft takeoffs and landings occurring at the Airport during a calendar year. The historic operations data includes operations conducted by both based aircraft as well as operations conducted by itinerant aircraft stored at other airports arriving at Chandler Municipal Airport for a variety of reasons including business, recreation, or flight training purposes. Historic aircraft operations data for Chandler Municipal Airport are summarized in **Table 2.5**.

Table 2.5
HISTORIC AIRCRAFT OPERATIONS

	ITINERANT OPERATIONS				LOCAL OPERATIONS		
Year	Air Carrier[1]	Air Taxi[2]	General Aviation	Military	General Aviation	Military	Total Operations
1996	0	1,043	59,847	91	95,204	27	156,212
1997	0	1,594	66,863	39	115,624	19	184,139
1998	0	904	67,429	46	128,108	24	196,511
1999	0	1,434	71,467	49	148,020	48	221,018
2000	0	1,771	75,713	25	172,281	21	249,811
2001	0	2,237	64,675	20	165,472	45	232,449
2002	0	1,828	67,302	12	161,377	19	230,538
2003	0	1,939	64,780	10	152,929	13	219,671
2004	0	2,530	61,626	41	168,850	32	233,079
2005	0	2,740	62,826	40	169,489	16	235,111

SOURCE: FAA Air Traffic Activity System
PREPARED: February 2006
[1]This category represents scheduled/non-scheduled charter service
[2]This category represents non-scheduled or for-hire service on aircraft with 60 seats or less

Historically general aviation operations have comprised over 98 percent of total operations at Chandler Municipal Airport. It is important to note the very low level of military activity at the Airport. Local and itinerant general aviation operations have increased continuously since 1996. The data presented from 1996 through 2005 represents full-year actual data as reported by the air traffic control tower. Total operations at Chandler Municipal Airport increased at an average annual rate of 4.65 percent from 1996 through 2005.

NATIONAL AVIATION TRENDS

In preparing the Master Plan for Chandler Municipal Airport, it is important to have a general understanding of recent and anticipated trends in the aviation industry. National trends provide insight for the development of aviation activity projections for the Airport. Some trends in the aviation industry will undoubtedly have a greater impact on Chandler Municipal Airport than others. Since almost all of the activity at Chandler Municipal Airport is associated with general aviation, this section focuses on past and anticipated trends in the general aviation industry.

The aviation industry and general aviation have experienced significant changes over the last 20 years. At the national level, fluctuating levels of general aviation usage caused by economic upturns/downturns resulting from the nation's business cycle have all impacted general aviation demand. At the local level, the explosive population growth in the Phoenix metropolitan area, coupled with solid economic conditions has greatly impacted general aviation demand in the region. This section examines general aviation trends, and the numerous factors that have influenced those trends in the U.S.

Recent trends, both national and local, are important considerations in the development of projections of aviation demand for Chandler Municipal Airport. National trends can provide insight into the potential future of aviation activity and anticipated facility needs. Data sources that were examined and used to support this analysis of national general aviation trends included the following:

- *Federal Aviation Administration, Aerospace Forecasts, Fiscal Years 2006-2017*
- *National Business Aircraft Association (NBAA), NBAA Business Aviation Fact Book, 2004*
- NetJets, Inc.
- *Honeywell Corporation, 2005 Business Aviation Outlook*

General Aviation Overview

General aviation aircraft are defined as all aircraft not flown by commercial airlines or the military. General aviation activity is divided into six use categories, as defined by the FAA. There are more than 18,300 public and private airports located throughout the United States, as reported by the FAA. More than 3,300 of these airports are included in the National Plan for Integrated Airport Systems (NPIAS), indicating their eligibility for federal funding assistance. Commercial service airports, those that accommodate scheduled airline service, represent a relatively small portion (538 or roughly 16 percent) of the airports in the NPIAS. General aviation airports, including relievers such as Chandler Municipal, comprise more than 2,800 facilities within the NPIAS. More than 15,000 additional airports, both private and public use, supplement those airports that are included in the NPIAS.

General Aviation Industry

A pronounced decline in the general aviation industry began in 1978, and lasted throughout most of the 1980s and into the mid-1990s. This decline resulted in the loss of over 100,000 manufacturing jobs and a drop in aircraft production from about 18,000 aircraft annually to only 928 aircraft in 1994. Contributing to the decline in general aviation during this period was the increasing number of liability claims against aircraft manufacturers, the loss of Veterans Benefits that covered many costs associated with student pilot training, and the recessionary economy. Product liability lawsuits arising from aircraft accidents resulted in dramatic increases in aircraft manufacturing costs.

Enactment of the General Aviation Revitalization Act (GARA) of 1994 provided significant relief to the aviation industry. This Act established an 18-year Statute of Repose on liability related to the manufacture of all general aviation aircraft and their components where no time limit was previously established. GARA spurred manufacturers including Cessna and Piper Aircraft to resume production of single-engine piston aircraft. Since 1994, statistics indicate an increase in general aviation activity, an increase in the active general aviation aircraft fleet, and an increase in shipments of fixed-wing general aviation aircraft.

More recently, the terrorist attacks of September 11th, 2001, and the recessionary national economy have had a dampening impact on these positive general aviation industry trends. Significant restrictions were placed on general aviation flying following September 11th, which resulted in severe limitations being placed on general aviation activity in many areas of the country. With the exception of the Washington, D.C. area, most of these restrictions have now been lifted. Business and corporate general aviation have experienced some positive gains resulting from additional use of general aviation aircraft for travel tied in part to new security measures implemented at commercial service airports and the increased personal travel times that have resulted.

Shipments and billings for general aviation aircraft in 2005 indicate that the downturn in general aviation aircraft deliveries from 2001 has clearly reversed. Shipments in 2005 were up 20.8 percent from 2004, with 3,580 aircraft shipped. Billings in 2005 increased 27.2 percent from 2004 to $15.1 billion. Even more notable was that aircraft deliveries and total billings exceeded for the first time levels seen prior to 2001, when 2,999 general aircraft were shipped with total billings of $14.0 billion.

Business Use of General Aviation

Business aviation is one of the fastest growing facets of general aviation. Companies and individuals use aircraft as a tool to improve their businesses efficiency and productivity. The terms business and corporate aircraft are often used interchangeably, as they both refer to aircraft used to support a business enterprise. FAA defines business use as “any use of an aircraft (not for compensation or hire) by an individual for transportation required by the business in which the individual is engaged.” The FAA estimates that business aircraft usage currently comprises more than 11 percent of all aviation activity. The FAA defines corporate transportation as “any use of an aircraft by a corporation, company or other organization (not for compensation or hire) for the purposes of transporting its employees and/or property, and employing professional pilots for the operation of the aircraft.” An additional 12 percent of the nation’s general aviation activity is considered corporate. Regardless of the terminology used, the business/corporate component of general aviation use is one that has experienced significant recent growth.

Increased personnel productivity is one of the most important benefits of using business aircraft. Companies flying general aviation aircraft for business have control of their travel. Itineraries can be changed as needed, and the aircraft can fly into destinations not served by scheduled airlines.

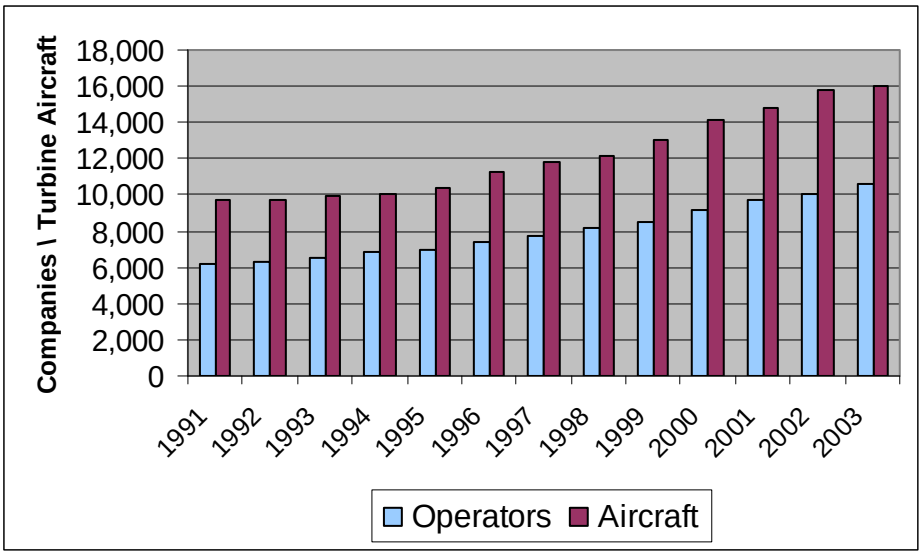
Business aircraft usage provides:

- Employee time savings
- Increased enroute productivity
- Minimized time away from home
- Enhanced industrial security

- Enhanced personal safety
- Management control over scheduling

Many of the nation's employers who use general aviation are members of the National Business Aircraft Association (NBAA). The NBAA's Business Aviation Fact Book 2004 (the latest available in March 2006) indicates that approximately 75 percent of all Fortune 500 businesses operate general aviation aircraft and 92 of the Fortune 100 companies operate general aviation aircraft. Business use of general aviation aircraft ranges from small, single-engine aircraft rentals to multiple aircraft corporate fleets supported by dedicated flight crews and mechanics. General aviation aircraft use allows employers to transport personnel and air cargo efficiently. Businesses often use general aviation aircraft to link multiple office locations and reach existing and potential customers. Business aircraft use by smaller companies has escalated as various chartering, leasing, time-sharing, interchange agreements, partnerships, and management contracts have emerged. Businesses and corporations have increasingly employed business aircraft in their operations. NBAA statistics depicted in **Exhibit 2.1** show the growth in the number of companies operating turbine powered general aviation aircraft and the number of aircraft operated by them for business use.

EXHIBIT 2.1
BUSINESS USE OF GENERAL AVIATION TURBINE AIRCRAFT



SOURCE: National Business Aircraft Association
PREPARED: February 2006

Fractional ownership arrangements have also experienced rapid growth. A fractional ownership arrangement is one in which an individual or corporation purchases at least 1/16th share of an airplane. The aircraft is then placed in a "pool" to share with other owners of aircraft. The pooled aircraft are managed by a company that provides aviation expertise including furnishing and training flight crews, and management services for those owners. NBAA estimated that 2,591 companies used fractional ownership arrangements in 1999; by 2004 that number had grown to 6,217 companies, more than

doubling over the five-year period. In addition, statistics indicate that the number of airplanes in the fractional aircraft fleet has also experienced strong growth over recent years. The principal operators in the fractional jet ownership market include CitationShares, NetJets, Bombardier Flexjet and the Flight Options/Travel Air operations. NetJets, the industry leader in fractional aircraft ownership, has purchased aircraft totaling more than $19 billion in value in the last six years alone. As of February 2006, the company managed a fleet of 624 aircraft with additional aircraft on order.

Other new and growing segments of the business aircraft fleet mix include business liners and a new generation of five to six-seat jets called very light jets (VLJs). Business liners are large business jets, such as the Boeing Business Jet and Airbus ACJ, which are reconfigured versions of passenger aircraft flown by large commercial airlines. VLJs are a relatively new category of aircraft that includes the Adam A-700, Eclipse 500, and Cessna Mustang. These small jets typically cost up to 75 percent less than typical business jet aircraft in terms of acquisition and up to 50 percent less in direct operating costs. The first VLJs are anticipated to be delivered to launch customers in the fall of 2006.

The anticipated changes in the nation's active general aviation fleet, including projected increases in the number of active jet aircraft have the potential to significantly impact aviation activity at Chandler Municipal Airport over the 20-year forecast period. Recent general aviation trends and projected changes in the nation's active general aviation fleet are considered in the projections of aviation demand developed for the Airport.

FAA ACTIVITY FORECASTS

The FAA publishes forecasts on an annual basis that summarize anticipated trends in most components of civil aviation activity. Each published forecast revisits previous activity forecasts and updates them after examining the previous year's trends in aviation and economic activity. Many factors are considered in the FAA's development of forecasts, some of the most important of which are U.S. and international economic growth and anticipated trends in fuel costs. FAA forecasts generally provide one of the most detailed analyses of historic and forecasted aviation trends and provide the general framework for examining future levels of regional and national aviation activity.

Examples of measures of national general aviation activity that are monitored and forecast by the FAA on an annual basis in the FAA Aerospace Forecasts include active pilots, active aircraft fleet, and active hours flown. Historic and projected activity in each of these categories is examined in the following sections. The data presented is based on the most recent available information, contained in *FAA Aerospace Forecasts, Fiscal Years 2006-2017*.

Active Pilots

Active pilots are defined by the FAA as those persons with a pilot certificate and a valid medical certificate. **Table 2.6** summarizes historic and projected U.S. active pilots by certificate type.

Table 2.6
HISTORIC AND PROJECTED U.S. ACTIVE PILOTS
BY TYPE OF CERTIFICATE

Certificate Type	2000	2005	2017 Projection	CAGR 2000 - 2005	CAGR 2005-2017
Students	99,110	87,213	106,164	-2.53%	1.65%
Recreational	340	278	260	-3.95%	-0.56%
Sport Pilot	NA	134	13,600	NA	NA
Private	251,561	228,619	223,750	-1.89%	-0.18%
Commercial	121,858	120,614	154,000	-0.21%	2.06%
Airline Transport	141,598	141,992	144,500	0.06%	0.15%
Rotorcraft only	7,775	9,518	14,700	4.13%	3.69%
Glider only[1]	9,387	21,369	22,440	17.88%	0.41%
Total	**631,629**	**609,603**	**679,414**	**-0.71%**	**0.91%**
Instrument Rated[2]	***315,100***	***311,500***	***390,683***	***-0.23%***	***1.91%***

CAGR: Compound Annual Growth Rate
SOURCE: FAA Aerospace Forecasts, Fiscal Years 2006-2017
PREPARED: February 2006
[1] In March 2001, the FAA Registry changed the definition of this pilot category. It added approximately 13,000 to this category.
[2] Instrument rated pilots should not be added to other categories in deriving total.

As shown in Table 2.6, the FAA projects steady growth in the active pilot population through 2017. Total active pilots are projected to increase from approximately 609,603 in 2005 to 679,414 by 2017, representing a CAGR of approximately 0.91 percent. Of the instrument-rated pilots, an even higher growth rate is anticipated over the same period, at 1.91 percent.

Active Aircraft Fleet

The FAA tracks the number of active general aviation aircraft in the U.S. fleet annually. Active aircraft are those aircraft currently registered and flying at least one hour during the year. **Table 2.7** summarizes recent active aircraft trends as well as FAA projections of future active aircraft, by aircraft type.

Table 2.7
HISTORIC AND PROJECTED U.S. ACTIVE GENERAL AVIATION FLEET MIX

Aircraft Type	2000	2005	2017 Projection	CAGR 2000 - 2005	CAGR 2005-2017
Single-engine Piston	149,422	144,530	149,670	-0.66%	0.29%
Multi-engine Piston	21,091	17,481	17,690	-3.69%	0.10%
Turboprop	5,762	8,030	10,430	6.86%	2.20%
Jet	7,001	8,628	17,270	4.27%	5.95%
Rotorcraft	7,150	7,595	12,685	1.21%	4.37%
Experimental	20,407	22,300	25,730	1.79%	1.20%
Sport Aircraft	N/A	N/A	13,625	N/A	N/A
Other	6,700	6,027	5,675	-2.09%	-0.50%
Total	**217,533**	**214,591**	**252,775**	**-0.27%**	**1.37%**

CAGR: Compound Annual Growth Rate
SOURCE: FAA Aerospace Forecasts, Fiscal Years 2006-2017 and Wilbur Smith Associates
PREPARED: February 2006

General aviation active aircraft trended downward between 2000 and 2005, although there was some evidence of positive growth in certain segments. The number of jet aircraft increased by more than 4 percent, while turboprop aircraft increase by almost 7 percent annually between 2000 and 2005. However, due of the relatively small number of jet and turboprop aircraft in the overall general aviation fleet, the growth in these aircraft could not make up for the overall decline of the active general aviation fleet. Total active aircraft decreased 0.27 percent annually over the last five years, with multi-engine piston aircraft leading the decline. Still, the growth of turboprops and jets is an important trend. The growing numbers or these aircraft indicate a movement in the general aviation community toward higher-performing, more demanding aircraft. The Honeywell Business Aviation Outlook 2005 projects that more than 9,900 new business aircraft will be delivered between 2005 and 2015, excluding business liners. Demand for VLJs is projected to be as high as 4,500 – 5,500 aircraft over the 10-year period. Growth in jet aircraft is projected to significantly outpace growth in all other segments of the general aviation aircraft fleet throughout the planning period.

The other aircraft category expected to experience large growth is sport aircraft. This category of aircraft, created by the FAA in September 2004 through its rulemaking process, targets the recreational segment of aviation, including a sizeable portion of the already existing ultralight community. A major part of the growth of this aircraft category is expected to come from already existing – but not registered – recreational aircraft that register under the new rule.

Active Hours Flown

Hours flown is another statistic used by the FAA to measure and project general aviation activity. Hours flown is a valuable measure because it captures a number of activity-related data including aircraft utilization, frequency of use, and duration of use. Total hours flown in general aviation aircraft have declined from 2000 to 2005 by an

annual average of 1.31 percent, as shown in **Table 2.8**. Part of this decline is a result of the grounding of general aviation following September 11th and follow-on restrictions imposed by the federal government.

Table 2.8
ACTIVE GENERAL AVIATION AND AIR TAXI HOURS FLOWN
(in thousands)

Aircraft Type	2000	2005	2017 Projection	CAGR 2000 - 2005	CAGR 2005-2017
Single-engine Piston	18,089	16,794	19,471	-1.47%	1.24%
Multi-engine Piston	3,400	2,363	2,696	-7.02%	1.10%
Turboprop	1,986	1,967	2,265	-0.19%	1.18%
Jet	2,755	3,008	9,606	1.77%	10.16%
Rotorcraft	2,308	2,440	3,875	1.12%	3.93%
Experimental	1,307	1,417	1,736	1.63%	1.71%
Sport Aircraft	N/A	N/A	1,101	N/A	N/A
Other	374	304	304	-4.06%	0.00%
Total	**30,219**	**28,293**	**41,054**	**-1.31%**	**3.15%**

CAGR: Compound Annual Growth Rate
SOURCE: FAA Aerospace Forecasts, Fiscal Years 2006-2017
PREPARED: February 2006

The FAA projects that hours flown will increase at a compound annual growth rate of 3.15 percent over their 12-year projection period. Compared to the projected average annual growth rate of the general aviation active fleet, approximately 1.37 percent, the projected increase in hours flown represents anticipated increases in aircraft utilization. Hours flown by general aviation aircraft are estimated to reach approximately 41 million by 2017, compared to 28 million in 2005. Part of this activity increase is expected from the introduction of VLJs, the first of which is planned for certification in late 2006. These jets will likely see high rates of utilization as air taxis and by fractional ownership companies.

Summary of FAA Forecasts

The cyclical nature of general aviation activity is illustrated in the historic data presented in this analysis. While general aviation activity experienced rebounded growth during the mid and late-1990s, the terrorist attacks of 2001 and the economic downturn dampened activity over the last several years. FAA projections of general aviation activity, including active pilots, active aircraft, and hours flown, all show varied growth through the FAA's forecast horizon of 2017. Following stalled growth and some declines during 2001 and 2002, most components of general aviation activity are projected to rebound and surpass previous activity levels. An important national trend that has the potential to impact general aviation activity at Chandler Municipal Airport is the growing proportion of small and business jet aircraft in the active general aviation fleet. The ability of Chandler Municipal Airport to accommodate increased activity by general aviation jet aircraft will be an important consideration in the Master Plan.

Another important consideration in the forecasting of aviation demand is the recent dramatic increase in the cost of aviation fuel. The *FAA Aerospace Forecasts, Fiscal Years 2006-2017* indicates that fuel prices are forecast to rise by 21.3 percent in 2005, decline by 9.6 percent in 2006 and then increase at an average annual rate of 0.9 percent over the remainder of the forecast period. In real terms, oil prices are expected to decline at a 1.0 percent annual rate over the forecast period of 2006 – 2017. Currently the record high fuel costs appear to have had little effect on the level of activity at the Chandler Municipal Airport. However continued fuel price increases could significantly reduce future levels of aviation activity particularly that of general aviation both nationally and at Chandler Municipal Airport.

PROJECTIONS OF AVIATION DEMAND

Projections of aviation demand at Chandler Municipal Airport for the forecast period are presented in the following sections:

- Based Aircraft Projections
- Aircraft Operations Projections

Various methodologies were examined and used to develop projections of based aircraft and aircraft operations at Chandler Municipal Airport. The results of these different methodologies are compared and a preferred projection of each is selected.

Based Aircraft Projections

Based aircraft are those aircraft that are permanently stored at an airport. Estimating the number and types of aircraft expected to be based at Chandler Municipal Airport over the forecast period impacts the planning for future Airport facility and infrastructure requirements. As the number of aircraft based at an airport increases, so too does the aircraft storage required at the facility. Based aircraft at the Airport were projected using several different methodologies. Each methodology is summarized and the results presented in following sections. These results are then compared and a preferred based aircraft projection is selected. Additionally the types of aircraft that will be based at the Airport are also included in this forecast. The preferred based aircraft projection for Chandler Municipal Airport will be carried forward in the master planning process for use in the demand/capacity analysis in which the adequacy of existing airfield facilities is evaluated to determine if capacity enhancing projects may be required to accommodate the projected number and types of based aircraft at the Airport.

Projections of based aircraft at Chandler Municipal Airport are discussed in the following sections:

- FAA Projected Growth Rate Methodology
- Regression Methodology
- Trendline Methodology
- Comparison of Based Aircraft Projections
- Projected Fleet Mix

The result of each projection methodology is compared and a preferred projection methodology is selected. Following the selection of the preferred based aircraft projection for the Airport, the based aircraft fleet mix at the Airport is also identified.

FAA Projected Growth Rate Methodology

This based aircraft projection methodology projects based aircraft at Chandler Municipal Airport by assuming that the growth of based aircraft at Chandler Municipal Airport will be equal to the rate forecast in the *FAA Aerospace Forecasts, Fiscal Years 2006-2017* for active general aviation aircraft.

The results of this methodology are summarized in **Table 2.9**.

Table 2.9
BASED AIRCRAFT PROJECTION
FAA PROJECTED GROWTH IN ACTIVE GA AIRCRAFT METHODOLOGY

	Year	Total Based Aircraft
Historic	2005	457
Active GA Aircraft CAGR 2005-2017		**1.37%**
Projected	2010	489
	2015	524
	2020	560
	2025	600

CAGR: Compound Annual Growth Rate
SOURCE: FAA Aerospace Forecasts, FY 2006-2017 Airport Records and Wilbur Smith Associates
PREPARED: March 2006

This methodology projects total based aircraft at Chandler Municipal Airport to grow at an average annual rate of 1.37 percent increasing from 457 in 2005 to 600 in 2025.

Regression Methodology

This methodology uses a mathematical formula to identify a relationship between the number of based aircraft at Chandler Municipal Airport and the population of the City of Chandler. In regression analysis, the value being forecast, the dependent variable is related to an independent or explanatory variable, in this case population. The relationship is estimated using historic data for the independent and dependent variables. The correlation between the variables used in a regression analysis is

measured by the R^2 value called the coefficient of determination. An R^2 value of 0 indicates there is no relationship between changes in the independent and dependent variables. R^2 values near 1.0 indicate a very strong relationship between the variables. The R^2 value derived in this analysis using historic based aircraft and population values is approximately 0.94 indicating a very close relationship between the two historical values. The results of this methodology are presented in **Table 2.10**.

Table 2.10
BASED AIRCRAFT PROJECTION
REGRESSION METHODOLOGY

	Year	Chandler Population	Total Based Aircraft
Historic	1998	161,097	354
	1999	171,047	350
	2000	176,581	392
	2001	190,019	388
	2002	201,262	411
	2003	211,984	433
	2004	224,644	445
	2005	236,601	457
Projected	2010	274,978	512
	2015	282,680	522
	2020	285,048	526
	2025	286,293	527

SOURCE: City of Chandler Long Range Planning Division (April 2005), Airport Records and Wilbur Smith Associates
PREPARED: March 2006

This methodology projects total based aircraft at Chandler Municipal Airport to grow at an average annual rate of 0.72 percent increasing from 457 in 2005 to 527 in 2025. This relatively low growth rate is a result of two periods of decline in the number of based aircraft at the Airport, which occurred during years when the total population of the City of Chandler continued to grow. This projection method assumes that during the forecast period the overall number of based aircraft will increase similar to growth in population.

It is important to note that a regression analysis evaluating the correlation of based aircraft to employment was also reviewed. This correlation was not as good, with the R^2 value of approximately 0.86, indicating less of a correlation than population.

Trendline Methodology

This methodology assumes based aircraft will continue to follow similar patterns of past change either in growth or decline. Based aircraft at Chandler Municipal Airport grew at an average annual rate of approximately 4.53 percent between 1990 and 2005, but only at 3.12 percent from 2000 to 2005. Based on the more recent trend, the average annual growth rate of 3.12 percent was applied to the 2005 base year number to derive

projected based aircraft for the Airport. Using this trendline methodology, total based aircraft at Chandler Municipal Airport are projected to reach 845 by 2025. **Table 2.11** presents detailed results of this methodology.

Table 2.11
BASED AIRCRAFT PROJECTION
TRENDLINE METHODOLOGY

	Year	Total Based Aircraft
Historic	1990	235
	2000	392
	2001	388
	2002	411
	2003	433
	2004	445
	2005	457
Historic Based Aircraft CAGR 2000 – 2005		**3.12%**
Projected	2010	533
	2015	621
	2020	725
	2025	845

CAGR: Compound Annual Growth Rate
SOURCE: Airport Records and Wilbur Smith Associates
PREPARED: February 2006

Due to the strong growth in based aircraft that occurred in the past at Chandler Municipal Airport, this methodology projects that the total number of based aircraft will almost double over the forecast period.

Comparison of Based Aircraft Projections

Table 2.12 shows the three based aircraft projection methodology results and compares them to the FAA's TAF projections for Chandler Municipal Airport and the 2005 Maricopa Association of Governments' Regional Aviation System Plan (RASP) Update. Average annual growth rates of the based aircraft projections from the Master Plan ranged from 0.72 percent to 3.12 percent. The FAA TAF forecasts based aircraft at Chandler Municipal Airport to grow at an average annual rate of 2.44 percent between 2005 and 2025. Population and employment for Chandler and the surrounding area are projected to experience continued robust growth. This coupled with forecast national trends of increased utilization of general aviation aircraft for business purposes point to continued strong growth in the number of aircraft based at Chandler Municipal Airport.

To develop the preferred based aircraft projection, the FAA's TAF growth rate of 2.44 percent was applied to the actual 2005 based aircraft. This approach yields a 20-year projection of 740 based aircraft. These results are consistent with historical growth

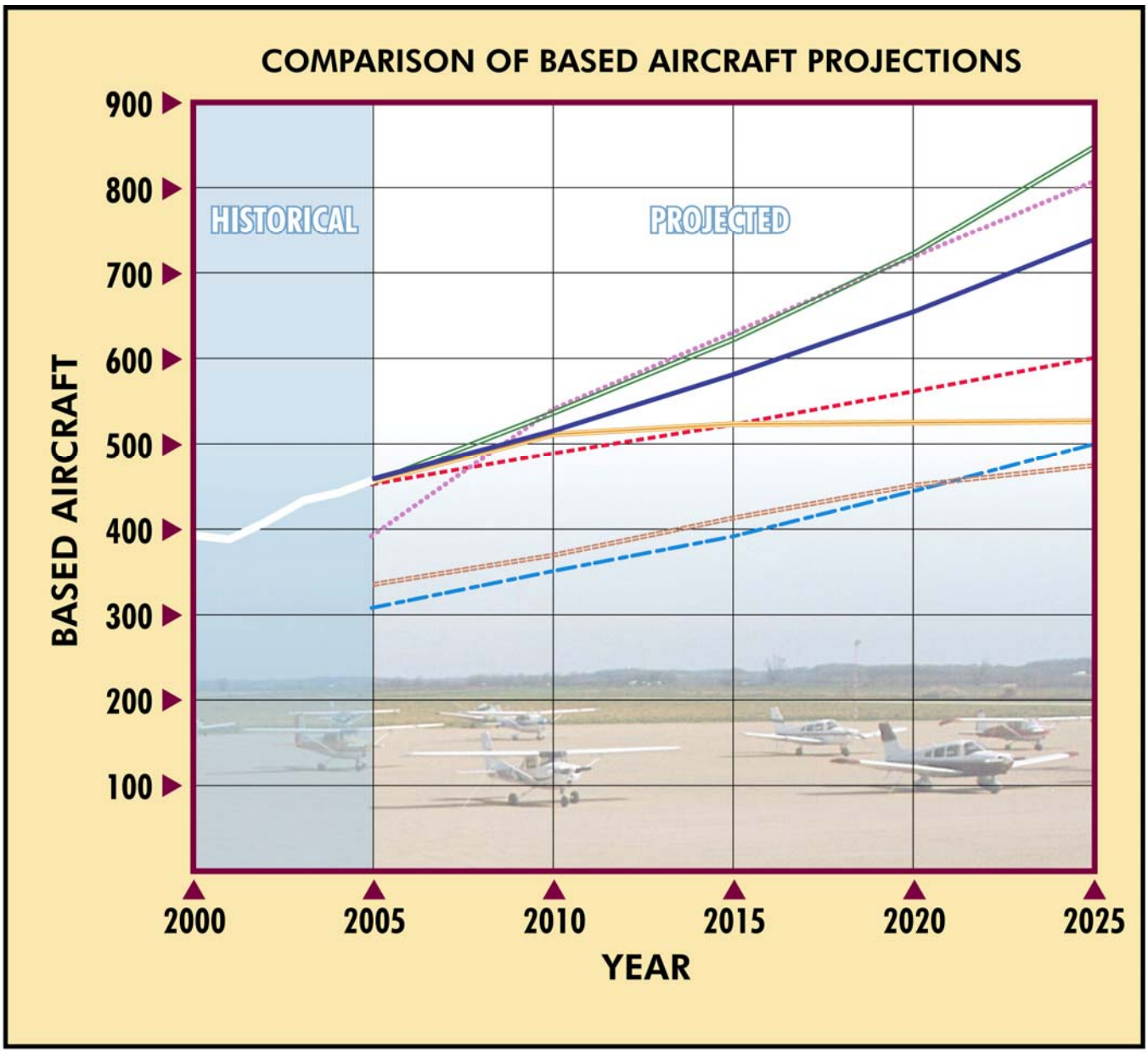
patterns at the Airport, growth projected as part of a regional analysis, and the FAA's projected rate of growth for Chandler Municipal Airport.

Table 2.12
COMPARISON OF BASED AIRCRAFT PROJECTIONS

	Year	FAA Projected Growth Rate Methodology	Regression Methodology	Trendline Methodology	FAA TAF Forecast[1]	MAG RASP[2]	1998 Master Plan Forecast[3]	Preferred Projection
Historic	2005	457	457	457	308	392	330	457
Projected	2010	489	512	533	349	539	370	515
	2015	524	522	621	392	629	410	581
	2020	560	526	725	444	718	450	656
	2025	600	527	845	499	807	480	740
CAGR		**1.37%**	**0.72%**	**3.12%**	**2.44%**	**2.93%**	**1.89%**	**2.44%**

CAGR: Compound Annual Growth Rate
SOURCE: Airport Records, Wilbur Smith Associates, FAA TAF, Maricopa Association of Governments
PREPARED: March 2006
[1] The FAA's TAF issued February 2006 uses a 2005 based aircraft figure of 308.
[2] The MAG RASP base year was 2000 when the Airport had 392 aircraft; the MAG RASP projected 450 based aircraft in 2005.
[3] The 1998 Master Plan update forecast base year was 1996 when the Airport had 254 based aircraft; the forecast projected 450 based aircraft in 2020.

The results of these based aircraft projection methodologies are depicted in **Exhibit 2.2**.



Legend

- FAA Projected Growth Rate Methodology
- Regression Methodology
- Trendline Methodology
- FAA TAF Forecast
- MAG RASP
- 1998 Master Plan Forecast
- Preferred Projection

EXHIBIT 2.2
Based Aircraft Projections

Wilbur Smith Associates

Projected Fleet Mix

To develop a projection of the Airport's based aircraft fleet mix, the preferred based aircraft forecast for Chandler Municipal Airport was allocated to five aircraft categories – single-engine, multi-engine, jet, helicopter, and other. The fleet mix projections were developed based on the fleet mix percentages exhibited at the Airport in 2005 and the *FAA Aerospace Forecast FY 2006-2017* projection of active general aviation aircraft. The 2005 based aircraft fleet mix at Chandler Municipal Airport is summarized below:

- Single-engine aircraft – 89.1 percent of total based aircraft
- Multi-engine aircraft – 7.2 percent of total based aircraft
- Jet aircraft – 0.2 percent of total based aircraft
- Helicopters – 3.5 percent of total based aircraft
- Other – 0 percent of total based aircraft

The projected general aviation fleet mix from the *FAA Aerospace Forecast FY 2006-2017* is presented in **Table 2.13**. The projection indicates that single-engine and multi-engine piston aircraft will make up a smaller percentage of the overall fleet declining by 8.14 percent and 1.15 percent, respectively. Jet aircraft are expected to comprise a larger portion of the general aviation fleet increasing from 4.02 percent to 6.83 percent of the overall active general aviation fleet.

Table 2.13
PROJECTED CHANGE IN U.S. ACTIVE GENERAL AVIATION FLEET MIX

Aircraft Type	2005	2017 Projection	2005 Percent of Total	2017 Percent of Total	2005 - 2017 Percent Change
Single-engine Piston	144,530	149,670	67.35%	59.21%	**-8.14%**
Multi-engine Piston	17,481	17,690	8.15%	7.00%	**-1.15%**
Turboprop	8,030	10,430	3.74%	4.13%	**0.38%**
Jet	8,628	17,270	4.02%	6.83%	**2.81%**
Rotorcraft	7,595	12,685	3.54%	5.02%	**1.48%**
Experimental	22,300	25,730	10.39%	10.18%	**-0.21%**
Sport Aircraft	N/A	13,625	N/A	5.39%	**N/A**
Other	6,027	5,675	2.81%	2.25%	**-0.56%**
Total	**214,591**	**252,775**			

SOURCE: FAA Aerospace Forecasts, Fiscal Years 2006-2017 and Wilbur Smith Associates
PREPARED: February 2006

Based on the FAA projections presented above, projected regional aviation trends, and recent changes at the Chandler Municipal Airport, small business jet aircraft are expected to make up a larger percentage of the total based aircraft. With the introduction of VLJs and the many large corporations based in the Chandler area, this trend is expected to increase the number of based small business jets at the Airport. The preferred based aircraft fleet mix projections are presented in **Table 2.14**.

Table 2.14
PREFERED BASED AIRCRAFT FLEET MIX PROJECTION

	Year	Total Based Aircraft	Single-engine	Multi-engine	Jet	Helicopter	Other[1]
Historic	2005	457	407	33	1	16	0
Projected	2010	515	453	37	3	18	4
	2015	581	506	42	6	20	7
	2020	656	565	47	10	23	11
	2025	740	630	53	15	26	16
2005 – 2025 CAGR		**2.44%**	**2.21%**	**2.44%**	**14.50%**	**2.44%**	**N/A**

CAGR: Compound Annual Growth Rate
SOURCE: Airport Records and Wilbur Smith Associates
PREPARED: March 2006
[1] Includes aircraft in the Sport Aviation Category

Aircraft Operations Projections

Many different factors impact the number of aircraft operations at an airport, including but not limited to, total based aircraft, area demographics, activity and policies at neighboring airports, and national aviation trends. These factors are considered in the following methodologies used to develop projections of future aircraft operations at Chandler Municipal Airport.

Projections of future operations at Chandler Municipal Airport are discussed in the following sections:

- Operations Per Based Aircraft Methodology
- Market Share Methodology
- Population Growth Methodology
- Comparison of Aircraft Operations Projections
- Preferred Aircraft Operations Projection
- Projected Local/Itinerant Split
- Projected Fleet Mix

The result of each projection methodology is compared and a preferred projection methodology is selected. Following the selection of the preferred operations projection for the Airport, the local/itinerant split at the Airport is also identified. Due to the low level of military activity at the Airport (typically less than 100, and more recently a five-year average of 50, military operations have not been separated for this analysis. The preferred aircraft operations projection for Chandler Municipal Airport will be used to

conduct a demand/capacity analysis in which the adequacy of existing airfield facilities will be evaluated to determine if capacity enhancing projects may be required to support future levels of aircraft operations at the Airport.

Operations Per Based Aircraft Methodology

The operations per based aircraft (OPBA) methodology is recognized by the FAA as an accepted means for relating the total number of aircraft operations to a known variable, in this case, based aircraft. OPBA is calculated by dividing the number of total general aviation operations that occur at an airport by the number of aircraft based at the airport. Total operations at Chandler Municipal Airport are projected by applying the Airport's OPBA ratio to the preferred projection of based aircraft. The OBPA ratio for this analysis was determined by averaging the historic OPBA ratios from 1998 through 2005. The details of this calculation are presented in **Table 2.15**. The results of this projection methodology are presented in **Table 2.16**.

Table 2.15
AVERAGE OPBA

Year	Based Aircraft	Aircraft Operations	OPBA
1998	354	196,511	555
1999	350	221,018	631
2000	392	249,811	637
2001	388	232,449	599
2002	411	230,538	561
2003	433	219,671	507
2004	445	233,079	524
2005	457	235,111	514
Average Operation Per Based Aircraft			**566**

SOURCE: FAA Air Traffic Activity System, February 2006 Airport Records and Wilbur Smith Associates
PREPARED: March 2006

Table 2.16
AIRCRAFT OPERATIONS PROJECTION
OPBA METHODOLOGY

	Year	Based Aircraft	OPBA	Aircraft Operations[1]
Historic	2005	457		235,111
Projected	2010	515	500	257,500
	2015	581	485	281,800
	2020	656	470	308,300
	2025	740	460	340,400

SOURCE: Airport Records and Wilbur Smith Associates
PREPARED: March 2006
[1] All aircraft operations forecasts have been rounded to the nearest hundred.

With a declining OPBA over the 1998 through 2005 period, a similar decline was projected to occur as the rate of based aircraft increases at the Airport. The Airport's OPBA was projected to decline at half of the rate that has been experienced over the

period due to the FAA's projection of a significant increase in the number of hours flown. The OPBAs were multiplied by the preferred based aircraft projection to obtain the projection of aircraft operations. Using this methodology, aircraft operations grow at an average annual rate of 1.87 percent increasing from 235,111 in 2005 to 340,400 in 2025.

Market Share of FAA Hours Flown Methodology

This aircraft operations projection methodology was based on the FAA's forecast of active general aviation and air taxi hours flown. The FAA Aerospace Forecasts, FY 2006-2017 estimates general aviation hours flown will grow at an average annual rate of 3.15 percent between 2005 and 2017. To identify general aviation hours flown through 2025, the 2017 value forecast by the FAA was grown at an annual rate of 3.15 percent. It was assumed that Chandler Municipal Airport would maintain its ratio of operations to the number of hours flown nationally by general aviation and air taxi aircraft. In 2005, that ratio was approximately 0.83 percent. The average ratio between 2000 and 2005 was 0.84 percent. Operations at Chandler Municipal Airport are projected by maintaining the average ratio of national hours flown and operations at Chandler Municipal Airport throughout the forecast period. Detailed results of this methodology are shown in **Table 2.17**.

Table 2.17
PROJECTED AIRCRAFT OPERATIONS
MARKET SHARE OF FAA HOURS FLOWN METHODOLOGY

	Year	FAA Active General Aviation and Air Taxi Hours Flown	Chandler Municipal Airport Operations	CHD's Share of FAA Active General Aviation and Air Taxi Hours Flown
Historic	2000	30,219,000	249,811	0.83%
	2001	27,016,000	232,449	0.86%
	2002	27,039,000	230,538	0.85%
	2003	27,483,000	219,671	0.80%
	2004	27,255,000	233,079	0.86%
	2005	28,293,000	235,111	0.83%
Average				**0.84%**
Projected	2010	33,315,000	279,800	0.84%
	2015	38,977,000	327,400	0.84%
	2020	45,057,000	378,500	0.84%
	2025	52,614,000	442,000	0.84%

SOURCE: FAA Air Traffic Activity System, February 2006, FAA Aerospace Forecasts, FY 2006-2017 and Wilbur Smith Associates
PREPARED: March 2006

This methodology projects total operations at Chandler Municipal Airport to grow at a compound average annual rate of 3.21 percent increasing from 235,111 in 2005 to 442,000 in 2025.

Population Growth Methodology

This methodology assumes that operations at Chandler Municipal Airport will grow at the same rate projected for the population of the City of Chandler. An aircraft operations projection was developed for Chandler Municipal Airport based on long range population projections prepared by City of Chandler Long Range Planning Division. This projection indicates the population of the City of Chandler will grow at an average annual rate of 1.29 percent from 2004 through 2025. The results of the population methodology are summarized in **Table 2.18**.

Table 2.18
AIRCRAFT OPERATIONS PROJECTION
POPULATION GROWTH METHODOLOGY

	Year	Total Aircraft Operations
Historic	2005	235,111
Projected Population Growth Rate 2004-2025		**1.29%**
Projected	2010	250,700
	2015	267,200
	2020	284,900
	2025	303,800

SOURCE: City and Chandler Long Range Planning Division April 2005, FAA Air Traffic Activity System, February 2006 and Wilbur Smith Associates
PREPARED: March 2006

The results of this methodology indicate that as the population of the City of Chandler grows during the forecast period, total aircraft operations at Chandler Municipal Airport will increase at the same rate reaching a total of 303,800 operations in 2025, representing a CAGR of 1.29 percent.

Comparison of Aircraft Operations Projections

Table 2.19 presents the results of the different aircraft operations projection scenarios examined in this analysis, as well as summarizes and compares with forecasts for Chandler Municipal Airport from the FAA TAF and the MAG Regional Aviation System Plan (RASP) Update. The compound average annual growth rates from the methodologies ranges from 1.29 percent based on the City of Chandler's projected population growth to 3.21 percent based on the FAA's projection of hours flown.

Table 2.19
COMPARISON OF AIRCRAFT OPERATIONS PROJECTIONS

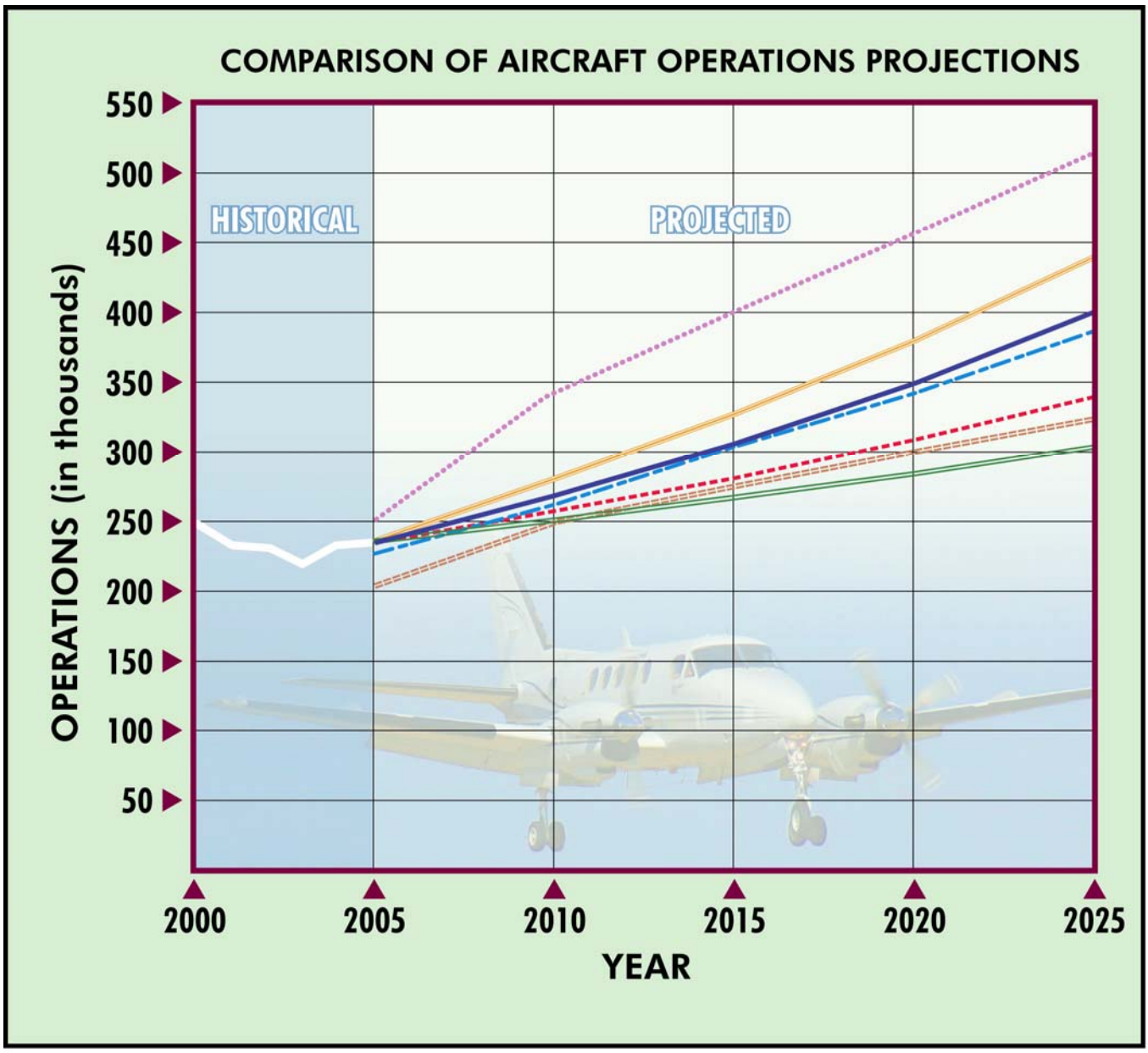
	Year	OPBA	Share of FAA Hours Flown Forecast	Population Growth	FAA TAF	MAG RASP	1998 Master Plan Forecast	Preferred Projection
Historic	2005	235,111	235,111	235,111	227,150	249,811	205,000	235,111
Projected	2010	257,500	279,800	250,700	263,183	343,700	250,000	268,600
	2015	281,800	327,400	267,200	302,364	400,600	275,000	306,900
	2020	308,300	378,500	284,900	342,026	457,600	300,000	350,600
	2025	340,400	442,000	303,800	387,126	514,400	325,000	400,600
CAGR 2005-2025		**1.87%**	**3.21%**	**1.29%**	**2.70%**	**2.93%**	**2.33%**	**2.70%**

CAGR: Compound Annual Growth Rate
SOURCE: Airport Records, FAA Air Traffic Activity System, February 2006 and Wilbur Smith Associates
PREPARED: March 2006

The results of these aircraft operations projections are depicted in **Exhibit 2.3**.

Similar to the projections developed by the FAA in the TAF for based aircraft, the FAA's projections for aircraft operations were not developed based on up-to-date aircraft operations information as provided by the air traffic control tower. The FAA TAF forecasts aircraft operations at Chandler Municipal Airport to grow at an average annual rate of 2.70 percent between 2005 and 2025. As previously noted, the area surrounding Chandler is projected to experience continued robust growth. This coupled with forecast national trends of increased utilization of general aviation aircraft for business purposes point to continued strong growth in aircraft operations at Chandler Municipal Airport.

To develop the preferred operations projection, the FAA's TAF growth rate of 2.44 percent was applied to the actual 2005 annual operations. This approach yields a 20-year projection of 400,600 annual operations. These results are consistent with historical growth patterns at the Airport, growth projected as part of a regional analysis, and the FAA's projected rate of growth for Chandler Municipal Airport.



Legend

- OPBA
- Share of FAA Hours Flown Forecast
- Population Growth
- FAA TAF Forecast
- MAG RASP
- 1998 Master Plan Forecast
- Preferred Projection

EXHIBIT 2.3
Aircraft Operations Projections

Wilbur Smith Associates

Projected Local/Itinerant Split

An important consideration when examining historic and projected Airport operations is whether they are local or itinerant. Local operations are those operations conducted by aircraft remaining in the Airport's traffic pattern. It should be noted that almost all local operations are training-related, whether it is primary flight training or proficiency training that is occurring. Itinerant operations are those conducted by aircraft coming from outside the traffic pattern. Changes in the local/itinerant operations split at an airport are an indicator of changes in the nature of activity occurring at the facility. **Table 2.20** shows the percentage split between itinerant and local traffic at Chandler Municipal Airport from 1996 to 2005, as well as the overall average for all years.

Table 2.20
HISTORIC LOCAL AND ITINERANT OPERATIONS

Year	Itinerant Operations	Local Operations	Total Operations	Itinerant Percent	Local Percent
1996	60,981	95,231	156,212	39.04%	60.96%
1997	68,496	115,643	184,139	37.20%	62.80%
1998	68,379	128,132	196,511	34.80%	65.20%
1999	72,950	148,068	221,018	33.01%	66.99%
2000	77,509	172,302	249,811	31.03%	68.97%
2001	66,932	165,517	232,449	28.79%	71.21%
2002	69,142	161,396	230,538	29.99%	70.01%
2003	66,729	152,942	219,671	30.38%	69.62%
2004	64,197	168,882	233,079	27.54%	72.46%
2005	65,606	169,505	235,111	27.90%	72.10%
Average	**53,383**	**159,716**	**213,098**	**31.97%**	**68.03%**

SOURCE: FAA Air Traffic Activity System, February 2006
PREPARED: March 2006

Since 1996 the percentage of local flights has fluctuated from a high of 72.46 percent to a low of 60.96 percent, and overall has grown significantly each year, reflecting an increase in flight training and proficiency flights at the Airport. Local operations have increased from 60.96 percent in 1996 to 72.10 percent in 2005.

For the projection of itinerant and local traffic, it was assumed that the current ratio recorded for 2005 would continue throughout the planning period. This was based on the fact that the average is relatively close to the current split between local and itinerant operations, and that training a proficiency flights are forecast to remain a large component of the overall operations at the Chandler Municipal Airport. The results of these projections are shown in **Table 2.21**.

Table 2.21
LOCAL AND ITINERANT OPERATION PROJECTIONS

	Year	Itinerant Operations	Local Operations	Total Operations	Itinerant Percent	Local Percent
Historic	2005	65,606	169,505	235,111	27.90%	72.10%
Projected	2010	74,939	193,661	268,600	27.90%	72.10%
	2015	85,625	221,275	306,900	27.90%	72.10%
	2020	97,817	252,783	350,600	27.90%	72.10%
	2025	111,767	288,833	400,600	27.90%	72.10%

SOURCE: FAA Air Traffic Activity System, February 2006 and Wilbur Smith Associates
PREPARED: February 2006

CRITICAL AIRCRAFT

The development of airport facilities is impacted by both the demand for those facilities, typically represented by total based aircraft and operations at an airport, as well as the type of aircraft that are expected make use of those facilities. 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.

The FAA groups aircraft into Aircraft Categories and Airplane Design Groups based on their approach speed and wingspan, respectively. The criteria for these categories are presented in **Table 2.22**.

Table 2.22
AIRCRAFT CATEGORIES AND DESIGN GROUPS

Aircraft Category	Approach Speed	Example
A	< 91 knots	Cessna 172
B	91 to < 121 knots	King Air 200
C	121 to < 141 knots	B737
D	141 to < 166 knots	B767
E	166 knots or more	SR-71
Airplane Design Group	**Wingspan**	**Example**
I	< 49 feet	Cessna 172
II	49 to < 79 feet	King Air 200
III	79 to < 118 feet	B737
IV	118 to < 171 feet	B767
V	171 to < 197 feet	B747
VI	197 to < 262 feet	A380

SOURCE: FAA
PREPARED: March 2006

Specific aircraft within these aircraft categories and airplane design groups are depicted in **Exhibit 2.4**.

After identifying an airport's critical aircraft, it is then possible to determine the facility's Airport Reference Code (ARC). The ARC is a coding system that relates airport design criteria to the operational and physical characteristics of the airplanes that are intended to operate at an airport. An airport's ARC is a composite designation based on the Aircraft Category and Airplane Design Group of that airport's critical aircraft.

For Chandler Municipal Airport, the most recent airport layout plan (ALP) completed in May 2000 lists the existing critical aircraft to be the Beech King Air. The most demanding aircraft in this series is the King Air 350, which has an approach speed of 109 knots and a wing span of 57.9 feet. These measurements produce an ARC of B-II.

Based on available operating data at the Airport and through discussions with Airport operators and personnel, larger aircraft are operating at the Airport on a more frequent basis, especially during the winter season. These aircraft include Learjets (24, 25A, and 45), Gulfstream IVs, and Canadair CL-600s. These aircraft have approach speeds that equate to the C and D category and airplane design groups II and III. It is highly likely that as business in and around Chandler continue to grow that the Airport will experience more operations from larger and faster aircraft. The critical aircraft selected for purposes of the Master Plan for Chandler Municipal Airport is the Cessna Citation X, which falls in the C-II category. It should be noted, however, that larger aircraft such as the Gulfstream IV (ARC D-II) could utilize the Airport on a regular basis, defined by the FAA as 500 annual operations. Analysis of the facility differences between C-II and D-II will be conducted in a subsequent chapter.

PEAKING ANALYSIS

Another primary consideration for facility planning at airports relates to the peak hour, also referred to as design level, activity. This operational characteristic is important to understand because some facilities should be sized to accommodate the peaks in activity, for example, the aircraft apron or terminal areas. Standard airport planning practices use the peak hour of the average day of the peak month (ADPM) as the peak level to plan for instead of the absolute peak level that occurs throughout the entire year.

Historical operations data available from the FAA Air Traffic Activity Systems (ATADS) database was used to identify the peak month of activity at Chandler Municipal Airport. Based on monthly data for federal fiscal years 1996 to 2005, the peak month averages 9.7 percent of the annual operations. The actual month with the peak has included both March and May, both of which have 31 days in them. Therefore, to determine the average or design day of the peak month (ADPM) the peak month value was divided by 31. In addition to average day, a busy day calculation was conducted. The busy day occurs during a typical week in the peak month. Through discussions with air traffic

control tower staff and review of daily operations during typical months, it was determined that the busy day typically represented approximately 33 percent higher operations than the average day. This rate of increase for the busy day was assumed to continue throughout the planning period. The peak or design hour was assumed to equal 15 percent of the ADPM based upon observation and consultant experience at airports with similar activity levels and roles. **Table 2.23** presents the results of this peaking analysis.

Table 2.23
PEAK ACTIVITY FORECAST

	Year	Annual Operations	Peak Month	Average Day	Busy Day	Peak Hour
Historic	2005	235,111	20,730	669	891	100
Projected	2010	268,600	26,054	840	1,120	126
	2015	306,900	29,769	960	1,280	144
	2020	350,600	34,008	1,097	1,460	165
	2025	400,600	38,858	1,253	1,660	188

SOURCE: 1995 – 2005 FAA Air Traffic Activity System and Wilbur Smith Associates
PREPARED: March 2006

INSTRUMENT APPROACH FORECASTS

Forecasts of annual instrument approaches are used by the FAA in evaluating an airport's requirements for navigational aid facilities. The FAA defines an instrument approach as an approach to an airport with the intent to land by an aircraft in accordance with an instrument flight rule (IFR) flight plan, when visibility is less than three miles and/or when the ceiling is at or below the minimum initial approach altitude.

Historical data on instrument approaches at Chandler Municipal Airport were gathered from the FAA ATADS database from 1996 through 2005 (calendar year). **Table 2.24** presents this historical data as well as the projection of annual instrument operations through 2025. To project future annual instrument operations, the ratio of instrument operations to total operations was considered. Since 1996, this ratio has increased from 0.25 percent to 0.75 percent, a compound annual growth rate of 4.41 percent. To project future instrument operations, a similar increase was anticipated over the 20-year planning period, increasing the percentage of total operations that are instrument approaches from 0.75 percent in 2005 to 1.00 percent in 2025.

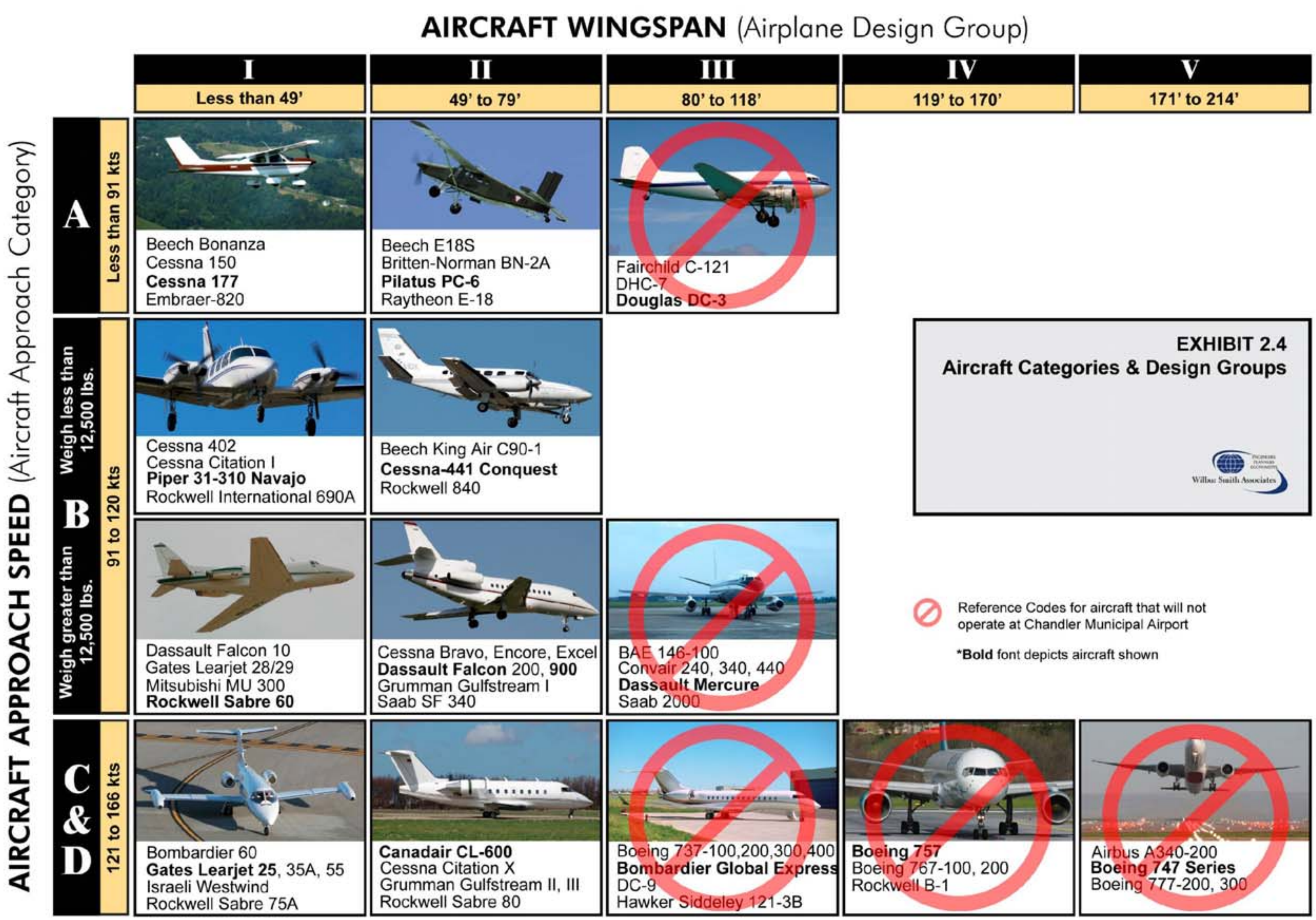

AIRCRAFT WINGSPAN (Airplane Design Group)
I Less than 49'
II 49' to 79'
III 80' to 118'
IV 119' to 170'
V 171' to 214'
AIRCRAFT APPROACH SPEED (Aircraft Approach Category)
A Less than 91 kts
B 91 to 120 kts
Weigh less than 12,500 lbs.
Weigh greater than 12,500 lbs.
C & D 121 to 166 kts
Beech Bonanza
Cessna 150
Cessna 177
Embraer-820
Beech E18S
Britten-Norman BN-2A
Pilatus PC-6
Raytheon E-18
Fairchild C-121
DHC-7
Douglas DC-3
Cessna 402
Cessna Citation I
Piper 31-310 Navajo
Rockwell International 690A
Beech King Air C90-1
Cessna-441 Conquest
Rockwell 840
EXHIBIT 2.4
Aircraft Categories & Design Groups
Wilbur Smith Associates
Dassault Falcon 10
Gates Learjet 28/29
Mitsubishi MU 300
Rockwell Sabre 60
Cessna Bravo, Encore, Excel
Dassault Falcon 200, 900
Grumman Gulfstream I
Saab SF 340
BAE 146-100
Convair 240, 340, 440
Dassault Mercure
Saab 2000
Reference Codes for aircraft that will not operate at Chandler Municipal Airport
*Bold font depicts aircraft shown
Bombardier 60
Gates Learjet 25, 35A, 55
Israeli Westwind
Rockwell Sabre 75A
Canadair CL-600
Cessna Citation X
Grumman Gulfstream II, III
Rockwell Sabre 80
Boeing 737-100,200,300,400
Bombardier Global Express
DC-9
Hawker Siddeley 121-3B
Boeing 757
Boeing 767-100, 200
Rockwell B-1
Airbus A340-200
Boeing 747 Series
Boeing 777-200, 300

Table 2.24
INSTRUMENT OPERATIONS FORECAST

	Year	Instrument Operations	Total Operations	Instrument Ops Percentage
Historical	1996	386	156,212	0.25%
	1997	622	184,139	0.34%
	1998	926	196,511	0.47%
	1999	1,117	221,018	0.51%
	2000	1,430	249,811	0.57%
	2001	1,842	232,449	0.79%
	2002	1,467	230,538	0.64%
	2003	1,222	219,671	0.56%
	2004	1,595	233,079	0.68%
	2005	1,774	235,111	0.75%
Projected	2010	2,149	268,600	0.80%
	2015	2,609	306,900	0.85%
	2020	3,155	350,600	0.90%
	2025	4,006	400,600	1.00%

SOURCE: 1996 – 2005 FAA Air Traffic Activity System and Wilbur Smith Associates
PREPARED: March 2006

SUMMARY

Based on the data presented in this chapter, it is anticipated that the Chandler Municipal Airport will experience continued strong growth in activity indicators throughout the 20-year planning period. Market area demographic trends indicate that the Airport is likely to meet or exceed projected growth in general aviation nationally. Based aircraft are expected to increase from approximately 457 aircraft to 740 aircraft by 2025. The Airport will also see a substantial increase in aircraft operations. By the end of the planning period, more than 400,600 operations could be expected. It is important to note that this is an unconstrained projection. Following sections of the Master Plan will explore the facility implications of accommodating the projected demand. **Table 2.25** summarizes the preferred forecasts selected in this chapter.

Table 2.25
SUMMARY OF PROJECTIONS

	Year	Based Aircraft	Itinerant Operations	Local Operations	Total Operations	Instrument Approaches
Historic	2005	457	65,606	169,505	235,111	1,774
Projected	2010	515	74,939	193,661	268,600	2,149
	2015	581	85,625	221,275	306,900	2,609
	2020	656	97,817	252,783	350,600	3,155
	2025	740	111,767	288,833	400,600	4,006

SOURCE: FAA Air Traffic Activity System, February 2006, Airport records, and Wilbur Smith Associates
PREPARED: March 2006

The next chapters will focus on existing capacity and future demands that may impact the operations of the Airport and facilities that will be required to meet the demands of the future.

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 4,870 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

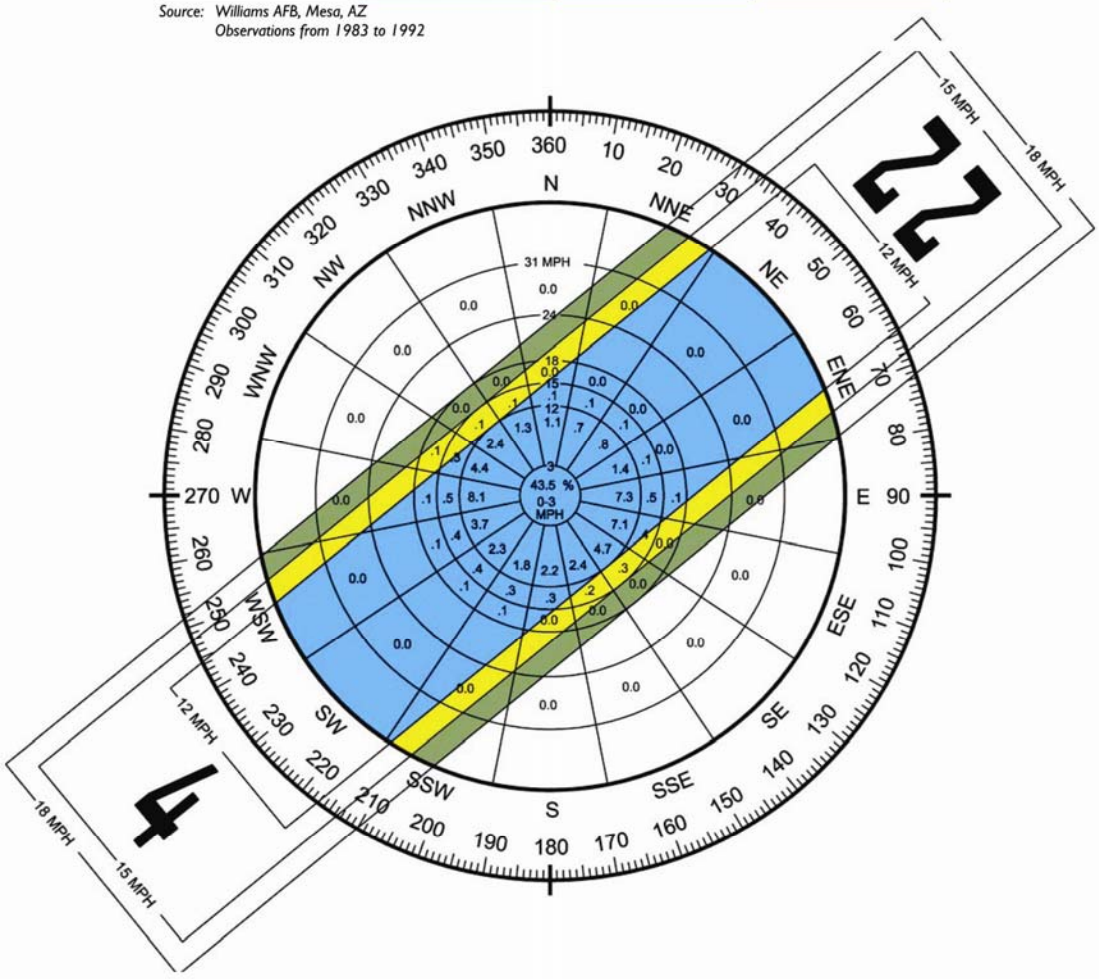


EXHIBIT 3.1
Chandler Municipal Wind Coverage

ENGINEERS PLANNERS ECONOMISTS
Wilbur Smith Associates

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

	Runway 4R /22L (ARC C-II)		Runway 4L/22R (ARC B-II)	
Criteria	**Requirements***	**Existing**	**Requirements***	**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

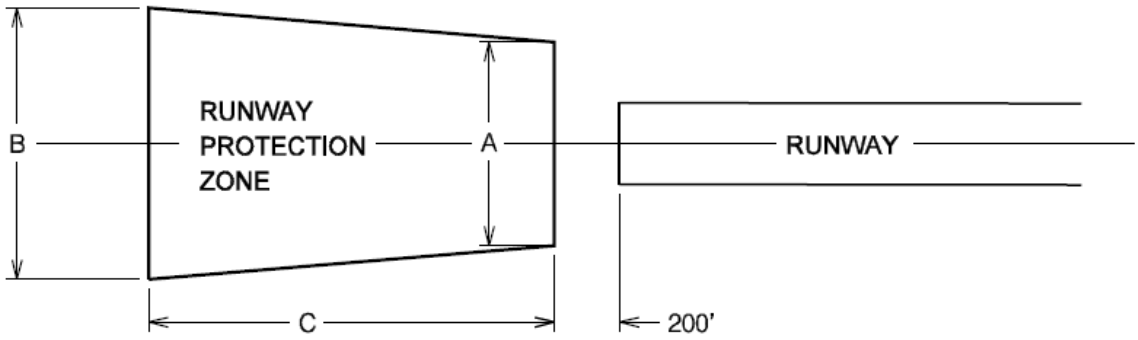
Runway	Type of Approach	Inner Width	Outer Width	Length	Approach Slope
4R	Non-Precision (1-Mile)	500’	700’	1,000’	34:1
22L	Visual	500’	700’	1,000’	20:1
4L	Visual	500’	700’	1,000’	20:1
22R	Visual	500’	700’	1,000’	20:1

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.

CHAPTER FOUR: DEVELOPMENT ALTERNATIVES

INTRODUCTION

The objective of this chapter is to identify feasible development options that meet the projected levels of aviation demand as well as maintain a safe aviation environment in and around Chandler Municipal Airport over the 20-year planning period. In this chapter, a series of airport development scenarios are identified and considered. The ultimate goal is to develop the underlying rationale that supports the final Master Plan recommendations. Through this process, an evaluation of the highest and best uses of Airport property is made while considering local goals, physical constraints, and appropriate federal airport design standards, where appropriate.

The number of potential alternatives that can be considered are endless. Therefore, some judgment must be applied to identify alternatives that have the potential to be implemented. In order to achieve this objective, the following five sections help determine a recommended approach to future development at Chandler Municipal Airport:

- Summary of Airport Requirements
- Ability of Existing Facilities to Accommodate Improvements
- Identification of Development Alternatives
- Evaluation of Alternatives
- Conclusions

SUMMARY OF AIRPORT REQUIREMENTS

Chandler Municipal Airport will continue in its role as a Federal Aviation Administration (FAA)-designated general aviation reliever airport, supporting the region's general and business aviation activities including flight training, and providing service to light and corporate class aircraft. The preceding capacity analysis and facility requirements chapter projected that overall airfield capacity at Chandler Municipal Airport will be sufficient to accommodate demand throughout the 20-year planning period. However, the Airport is projected to be increasingly utilized by larger corporate class aircraft. Based on a continuation of the Airport's existing role and using industry and FAA planning standards, the facility requirements analysis identified the following needs for Chandler Municipal Airport within the 20-year planning period:

- Runway extension and widening
- Extension of parallel Taxiway B
- Installation of Approach Lighting System
- Construction of additional hangar facilities
- Construction of additional apron
- Reconfiguration and construction of additional auto parking
- Reconfiguration and construction of north side airport access roadways

- Construction of south side airport access roadways

ABILITY OF EXISTING FACILITIES TO ACCOMMODATE IMPROVEMENTS

This section evaluates the ability of Chandler Municipal Airport to accommodate the necessary facility improvements identified to meet current and projected demand.

Airfield

Runways

As identified in the preceding chapter, the forecasted demand for future aviation activity is projected to reach the capacity of the existing runway and taxiway system toward the end of the forecast period. Additionally, the analysis completed in previous chapters indicates that Chandler Municipal Airport will be increasingly utilized by larger corporate class aircraft. The analysis indicated that the current runway size is sufficient for the smaller aircraft that use the Airport, but falls short of the requirements necessary for larger aircraft to use the Airport on a year-round basis. As identified in Table 3.4, a runway length of 7,000 feet would provide service to 100 percent of corporate general aviation aircraft at 60 percent useful load. The Airport is constrained by Germann Road to the northeast and Queen Creek Road to the southwest. The alternatives section below discusses the runway extension options available at Chandler Municipal Airport, assuming that the roads and surrounding development are fixed constraints and that this runway length cannot be accommodated. Additionally, because of the location of taxiways, hangars and apron in relation to Runway 4L-22R, it was determined that extension of this runway was not practical. Due to the increased usage of the Airport by corporate class aircraft, it is recommended that the Airport be upgraded to meet ARC C-II design standards. If Runway 4L-22R were upgraded to meet these standards, the taxiway, apron, and the majority of hangars would require relocation. Thus, the runway extension alternatives evaluate the extension of Runway 4R-22L.

Another option that was investigated to meet the identified runway length requirements was the use of declared distances. Runways are normally fully usable in both directions. Furthermore, they normally have clear approaches to each runway end. The use of declared distances can be effective on runways where providing a conventional configuration is impractical for cost or other reasons. Declared distances allow portions of the runway to be counted for certain aircraft operational requirements, typically take-off but not included for others, typically landing. The use of declared distances is effective because the majority of aircraft, particularly larger corporate class aircraft, require more runway length for take-off operations than landing operations. It was determined that using declared distances could provide a longer runway for take-off, however, the FAA strongly discourages the use of declared distances when other options are available. Typically, declared distances are used to address operational limitations in cases where other options are not available. In the case of Chandler Municipal Airport, it was determined that relocation of the roadways limiting expansion is

physically possible, but because of current City policy it is not feasible or desirable. Therefore, the use of declared distances was not utilized in determining runway length alternatives.

Taxiways

Taxiways are primarily constructed to facilitate aircraft movements to and from the runway system. The availability of entrance and exit taxiways can affect the overall airfield efficiency. The current system of full and partial parallel taxiways provides adequate access to each of the Airport's parallel runways. However, as activity at the Airport continues to grow, operation of the Airport in the most efficient manner possible will become critical in avoiding costly delays to users of the Airport. Construction of additional taxiways will assist in operating the airfield as efficiently as possible. The taxiway alternatives allow for two-way taxiing of aircraft on the airfield and in the terminal apron area. An additional taxiway alternative involves an end-around taxiway that would enhance the safety and capacity of the airport by allowing unrestricted taxi around runway 4L-22R.

At the majority of airports with a parallel runway configuration, departing aircraft typically use the inboard runways while arriving aircraft use the outboard runways. This can result in delays or risks of runway incursion when outboard runway traffic has to cross active inboard runways to make its way to the terminal area. To improve efficiency and provide a safe means of movement around a runway, an end-around taxiway may be constructed to allow transition around the departure end of a runway. At Chandler Municipal, the primary benefit of the proposed end-around taxiway would be the allowance of aircraft arriving on runway 4R to taxi around the northeast end of departure runway 4L. End-around taxiways must remain outside of the standard runway safety area, which extends 1,000 feet from the departure end of the runway. Due to these design considerations, Chandler Municipal's end-around taxiway can be visualized as an extension of Taxiway P to the northwest, intersected by an extension of Taxiway A to the northeast.

In order to avoid potential issues where pilots departing from runway 4L might mistake an aircraft taxiing on the end-around taxiway for one actually crossing near the departure end of the runway, a visual screen type device would be required. Through a partial or complete masking effect, the visual screen will enable pilots to better discern when an aircraft is crossing the active runway versus operating on the end-around taxiway. This will eliminate any false perceptions of runway incursions, which could lead to unnecessary aborted takeoffs.

NAVAIDs

The current instrument approach procedures at Chandler Municipal Airport provide opportunities for instrument training operations and access during inclement weather conditions with cloud ceilings as low as 400 feet above ground level and visibility as low

as one mile. In order for Chandler Municipal to implement a precision approach with lower weather minimums, an approach lighting system is required. This system would allow for the installation of a precision instrument approach which would likely be global positioning system (GPS)-based. This system would provide additional training opportunities for pilots practicing to fly using instruments, and would also provide access to the Airport in more inclement weather conditions than are possible today. A precision approach could also potentially help to eliminate approach and traffic pattern conflicts with Memorial Airfield and Stellar Airpark.

A significant amount of flexibility exists in the design of new GPS-based precision approach procedures, which can be created to avoid areas of conflict in the air and on the ground. Because of the relative lack of inclement weather in the Phoenix area, access to the Airport would not be significantly improved by installation of a precision approach, however, improved airspace utilization and additional instrument training opportunities could provide a significant benefit to the Airport.

Landside

Similar to airfield facilities development, landside development opportunities also look to existing structures to accommodate improvements.

Hangars

The Airport currently has conventional hangars, t-hangars and shade hangars on the north side of the airfield to protect aircraft from sun and weather exposure. As identified in Chapter One, the Airport currently has 238 hangar units. The required development of hangars would be in addition to the existing facilities currently provided. The use of the existing hangar units is accounted for in the calculation of required hangar units. The current number of hangar units does not meet current or projected demand for hangar storage. Limited developable land exists for additional hangar development on the north side of the airfield. The southeast side of the airfield has sufficient area available to accommodate the projected need for additional hangar units, but will require additional infrastructure to support this development, including apron, taxi lanes, and access roadways.

Apron

Chandler Municipal Airport has a limited amount of apron pavement located along the northwest side of the airfield. The Airport's existing aircraft apron has adequate pavement to accommodate some additional hangar development, but is insufficient to meet the current and projected need for transient apron, tie-downs and hangar facilities. Additional apron space is needed to support increases in transient and locally based aircraft operations, as well as the construction of additional tie-downs and additional hangar facilities. The amount of developable land on the north side of the airfield is insufficient to construct the amount of apron identified to meet projected demand.

Sufficient developable land exists on the southeast side of the airfield to construct the necessary apron area to meet projected demand, but needs to be coordinated with other development in that vicinity.

Auto Parking

Overall, the Airport has sufficient auto parking to meet the projected demand. However, some individual areas on the Airport have insufficient parking according to future demand projections. Additionally, some areas on the Airport currently used for auto parking are planned to be converted to other uses, thus additional auto parking will be considered along with other facility development alternatives.

Alternatives for developing the airfield and landside facilities mentioned above are addressed in the next section, *Identification of Development Alternatives*. These alternatives make use of existing facilities where they provide benefit, cost savings or minimize the impacts to other areas. In some instances, however, the ability to use existing facilities does not present itself or constitute the most logical approach to development. In these circumstances, a given facility may require the replacement or removal of an existing facility to make way for new opportunities.

IDENTIFICATION OF DEVELOPMENT ALTERNATIVES

Each of the airport requirements listed above present several development alternatives. Because Chandler Municipal Airport, like so many general aviation airports, has experienced times of strong growth as well as times of decreased activity levels, this study aims to provide the flexibility to respond to aviation demand beyond the current expectations. Development alternatives were formulated for each facility requirement discussed above grouped according to airside and landside segments. Because the scope, demand and location of the required facilities differ from one another, they can be developed and evaluated independently. Some required facilities may have more alternatives than others due to the amount of developable land, realistic placement, and ability to meet FAA standards. Before specific airside and landside alternatives are reviewed, a discussion on the “No Action” Alternative and the possible transfer of aviation services are presented.

No Action Alternative

The no action or do nothing alternative maintains the Airport in its present condition and provides no improvement of any type to the existing facilities. With this alternative, Chandler Municipal Airport’s two parallel runways, which are currently 4,401 and 4,870 feet long, and other airside and landside facilities would be retained as they are today. The Beech King Air turbo-prop aircraft would remain the design aircraft with the runways designed to meet ARC B-II criteria. This length is sufficient to accommodate 100 percent of all small aircraft. Under almost all conditions this length is adequate for use by single-engine and twin-engine piston aircraft. While other facilities, such as

aircraft storage, are able to accommodate today's users, a no action alternative would not accommodate future users or expanded aircraft sizes or capabilities. The overlaying result of this alternative would be its inability to satisfy aircraft performance demands on a year-round basis in future years.

Considering that the region has experienced strong growth in all socioeconomic categories over the past several years and the aviation forecast presented earlier in this document predicts continued growth at Chandler Municipal Airport, enhancements are essential to keep pace with demand. Without the facilities identified in the previous section, regular users of the Airport will be constrained from taking advantage of the Airport's air transportation capabilities and the Airport may be unable to attract potential new users.

The consequences of the no action alternative extend beyond Chandler Municipal Airport and the Chandler/Gilbert area. Other airports within Maricopa County rely on Chandler Municipal Airport to help accommodate the demand for general aviation services in the region, one of the reasons the Airport is designated by the FAA as a reliever airport. Without facilities designed to meet the needs of aviation in the region, airports such as Williams Gateway, Falcon Field, and large commercial service airports like Phoenix Sky Harbor International Airport would be at or exceeding capacity due to the increased level of general aviation activity that would utilize those airports. General aviation facilities like Chandler Municipal Airport not only provide convenience to general aviation users in their immediate environs, they also assist in avoiding major congestion at other general aviation and commercial service airports.

The no action alternative will also adversely affect the economic climate in the Chandler community. Businesses and industries seeking locations with adequate and convenient aviation facilities are attracted to airports that maintain and expand their services and facilities to keep up with the ever-changing and growing demands of general aviation. Chandler Municipal Airport has much to offer businesses in terms of airside and landside facilities. Without adequate maintenance and additional and on-going improvements, existing users and potential businesses for Chandler Municipal Airport and the City of Chandler could be lost. Because of the impact the no action alternative may have on the viability of the Airport as well as the opportunities that lay ahead, the no action alternative is not considered prudent.

Transfer of Aviation Services

The relocation of services to another airport is always a potential alternative. It would be difficult to duplicate the services and convenience that Chandler Municipal Airport provides, whether at an existing facility or a new site. There are only two public-use general aviation airports within 20 miles that could potentially service the needs of Chandler Municipal Airport users: Falcon Field and Williams Gateway Airport. Falcon Field in Mesa has nearly 1,000 based aircraft and a lengthy waiting list for other aircraft owners searching for places to base their aircraft. Its longest runway is 5,100 feet long

and would require an extension and/or new runway to meet future demand identified for Chandler Municipal if aircraft and services were transferred from Chandler Municipal Airport. Due to the number of based aircraft and operations at Chandler Municipal Airport, and the lack of existing facilities at Falcon Field to meet the existing or long-range demand for based aircraft and operations projected for Chandler Municipal, shifting services would not be possible without major development costs to Falcon Field.

Williams Gateway Airport is being developed to serve the needs of large commercial jet aircraft as a reliever to Phoenix Sky Harbor and is not intended to serve as a primary general aviation facility. Williams Gateway is working closely with the City of Phoenix to attract additional airlines to serve the growing East Valley's commercial service needs.

As part of the Maricopa Association of Government's previous Regional Aviation System Plan (RASP), development of new airport sites has been recommended to accommodate the projected increases in demand for general aviation activity throughout the Phoenix metropolitan region. While new sites have been recommended, no additional analysis has been undertaken in the region as there are no identified sponsors for new airports due to the economic and environmental costs of new site development. The economic and environmental costs of developing a new airport site are far greater than the cost of developing an existing site. An option exists to encourage the relocation of some services or activity to another facility, should it become necessary. For example, training activity can be encouraged to go elsewhere. It is also possible to encourage the basing of aircraft at other regional airports. There are limited means available to encourage relocation due to regulations imposed by the FAA regarding providing the Airport being open to provide service to any and all users. Providing access to the nation's air transportation system provides many economic benefits to the City of Chandler and the surrounding region. Failure to provide the necessary airport facilities and services diminishes the many social and economic benefits the Airport provides. Therefore, the master planning process attempts to provide the Airport with the needed facilities which have been identified in the previous chapter, at the levels forecasted throughout the 20-year planning period.

Airside Alternative

Runway Alternative – Runway 4R-22L extension to 5,700 feet

Under this scenario, Runway 4R-22L would be extended to 5,700 feet. This would be accomplished by extending the runway 590 feet to the northeast, and 240 feet to the southwest and is depicted in **Exhibit 4.1**. This alternative provides enhanced accommodation of small to medium-sized corporate class aircraft by providing the maximum runway length possible within the confines of existing Airport property. Public roads located beyond each end of the runway limit the amount of runway extension possible and this alternative assumes that the roads are fixed constraints. In this alternative, the runway is designed to accommodate ARC C-II aircraft. In order to accommodate this class of aircraft, the Runway Safety Area (RSA) and Runway Object Free Area (ROFA) requirements and required Runway Protection Zones (RPZ) become

larger than what currently exists. ARC C-II standards require the RSA to be expanded to 500 feet wide and 1,000 feet beyond the end of each runway end. The ROFA is required to be 800 feet wide and extends 1,000 feet beyond each runway end. The RPZ for ARC C-II runways with instrument approach visibility of not less than one mile is 500 feet (inner width) by 1,700 feet (length) by 1,010 (outer width). This alternative maintains the RSA and the ROFA on existing Airport property, and requires the purchase or acquisition of easements of approximately 22.3 acres to achieve control of the expanded RPZ.

The intent of this alternative is to accommodate corporate class aircraft to the greatest extent possible without realignment of roadways at either runway end, while also maintaining the future RSA and ROFA on existing Airport property. A shorter runway extension alternative would accommodate fewer aircraft and the cost differential associated with this alternative versus other, shorter extensions, is marginal. While this length would better accommodate small to medium-sized corporate class aircraft, it would preclude most of these aircraft from operating at their full capacity in terms of carrying maximum loads of fuel, cargo or passengers during warmer weather. A pavement strength of 75,000 pounds for dual wheel aircraft would be appropriate for this length.

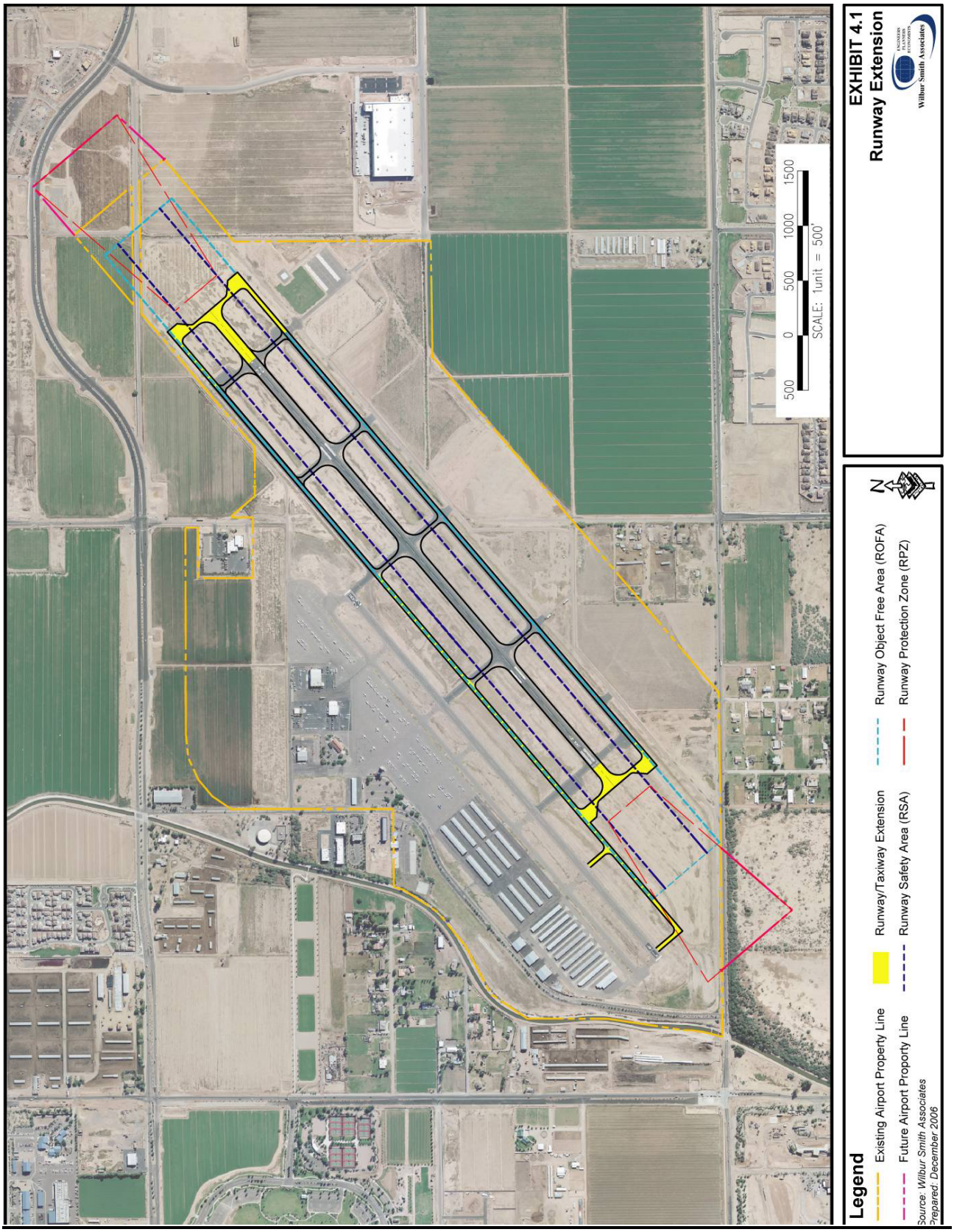


EXHIBIT 4.1
Runway Extension
Wilbur Smith Associates
500 0 500 1000 1500
SCALE: 1unit = 500'
N
Legend
Existing Airport Property Line
Future Airport Property Line
Runway/Taxiway Extension
Runway Safety Area (RSA)
Runway Object Free Area (ROFA)
Runway Protection Zone (RPZ)
Source: Wilbur Smith Associates
Prepared: December 2006

Taxiways

Runway 4R-22L has a full parallel taxiway on the southeast side of the runway (Taxiway C), and a partial parallel taxiway on the northwest side of the runway (Taxiway B). The first taxiway alternative calls for an extension of Taxiway B to the southwest to the approach end of Runway 4L. This would be accomplished by extending Taxiway B to the southwest approximately 4,359 feet and to the northeast 600 feet to the proposed future end of Runway 4R-22L. If Runway 4R-22L is extended, Taxiway C would also be extended to the new runway ends. The proposed taxiway extensions are depicted on **Exhibit 4.2**. This alternative would provide full-length parallel taxiways on each side of both runways, providing two-way taxi circulation for both runways. Taxiway B could be used for operations on both runways and could reduce the need for aircraft to make mid-field runway crossings while transitioning to and from Runway 4R-22L and the north apron area.

Another alternative calls for an extension of Taxiway B and C to the proposed ends of Runway 4R-22L. The extension of Taxiway B and C would provide dual parallel taxiways on Runway 4R-22L and a partial parallel taxiway on Runway 4L-22R which would supplement the full parallel taxiway on the north side of Runway 4L-22R. This would allow two-way taxi circulation to Runway 4R-22L and partial two-way access to the northeast portion of Runway 4L-22R. This alternative is depicted in **Exhibit 4.3**.

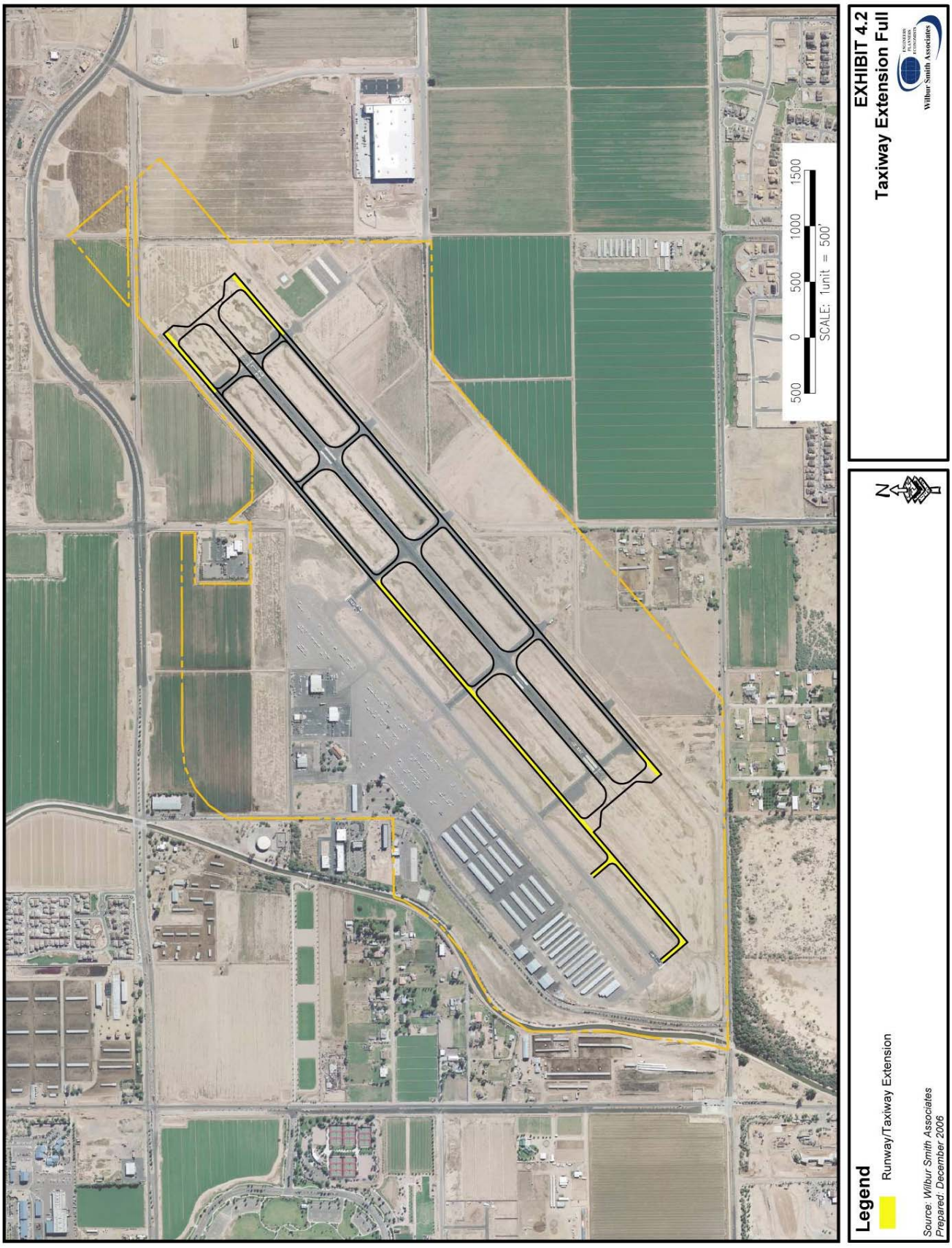


EXHIBIT 4.2
Taxiway Extension Full
Wilbur Smith Associates
SCALE: 1unit = 500'
500 0 500 1000 1500
N
Legend
Runway/Taxiway Extension
Source: Wilbur Smith Associates
Prepared: December 2006

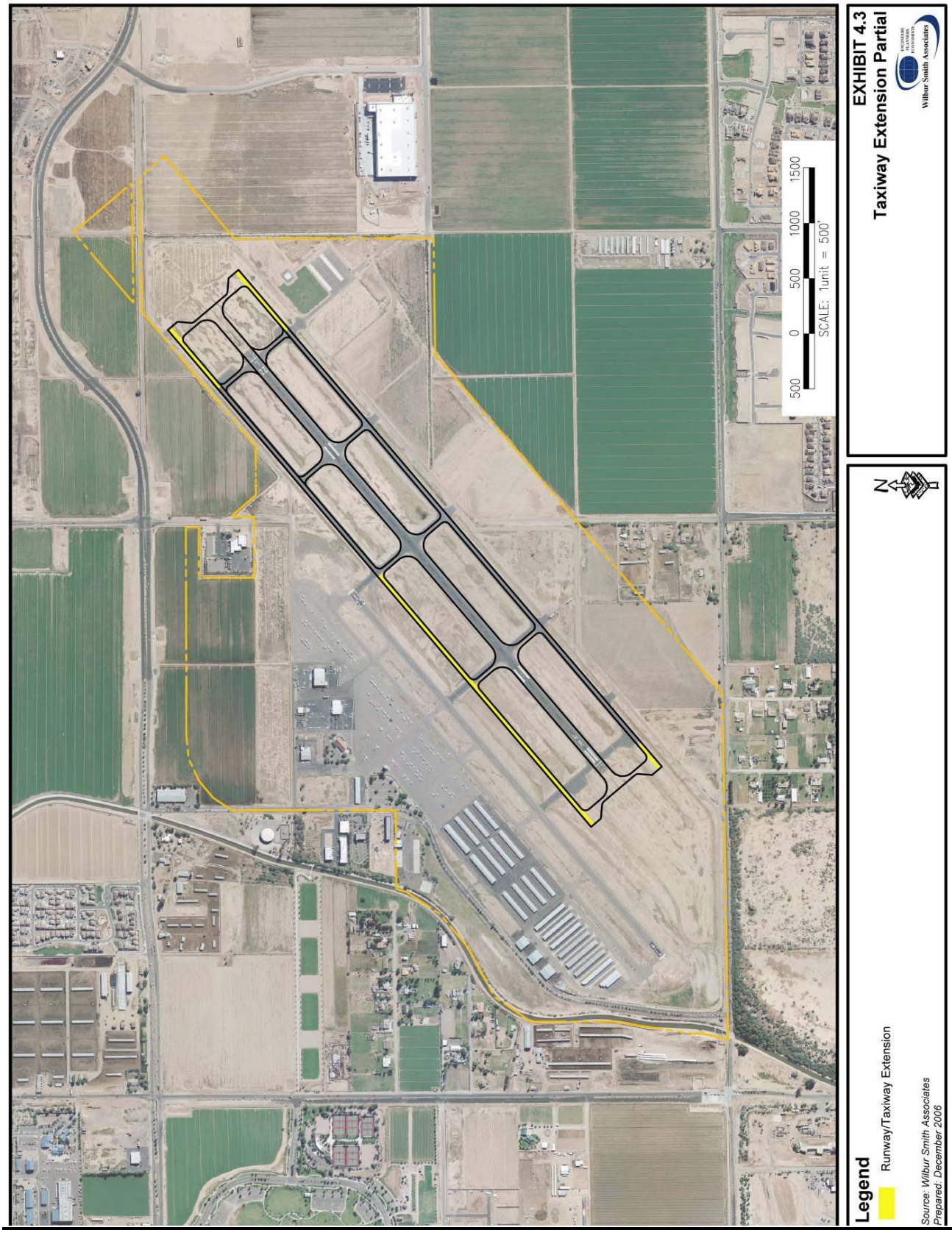


EXHIBIT 4.3
Taxiway Extension Partial
Wilbur Smith Associates
SCALE: 1unit = 500'
500 0 500 1000 1500
N
Legend
Runway/Taxiway Extension
Source: Wilbur Smith Associates
Prepared: December 2006

NAVAIDs

An approach light system is required on Runway 4R in order implement a precision approach procedure (ILS or GPS) and achieve lower instrument approach minima. Discussed below are options for an approach light system which include a Medium Intensity Approach Lighting System Runway Alignment Indicator Lights (MALSR) as well as an option that implements a precision approach with no approach lighting system.

A MALSR allows for precision approach minima as low as 200 feet and ½ mile visibility. The MALS portion of the system extends 1,400 feet from the runway threshold on the extended runway centerline, while the Runway Alignment Indicator Lights (RAILS) portion of the system extends an additional 1,000 feet. Based on the location of the current runway threshold, installation of a MALSR on Runway 4R would require approximately 1,000 feet of the system to extend beyond the current Airport property boundaries and across Queen Creek Road. The location of this approach light system is depicted in **Exhibit 4.4**.

A second option is to install a precision approach system with the existing 1-mile visibility minima in place. While this alternative would not reduce approach visibility minima, it would not require the installation of an approach lighting system, thus avoiding any possible encroachment on nearby properties. This system would provide adequate precision approach instrumentation necessary for pilot training.

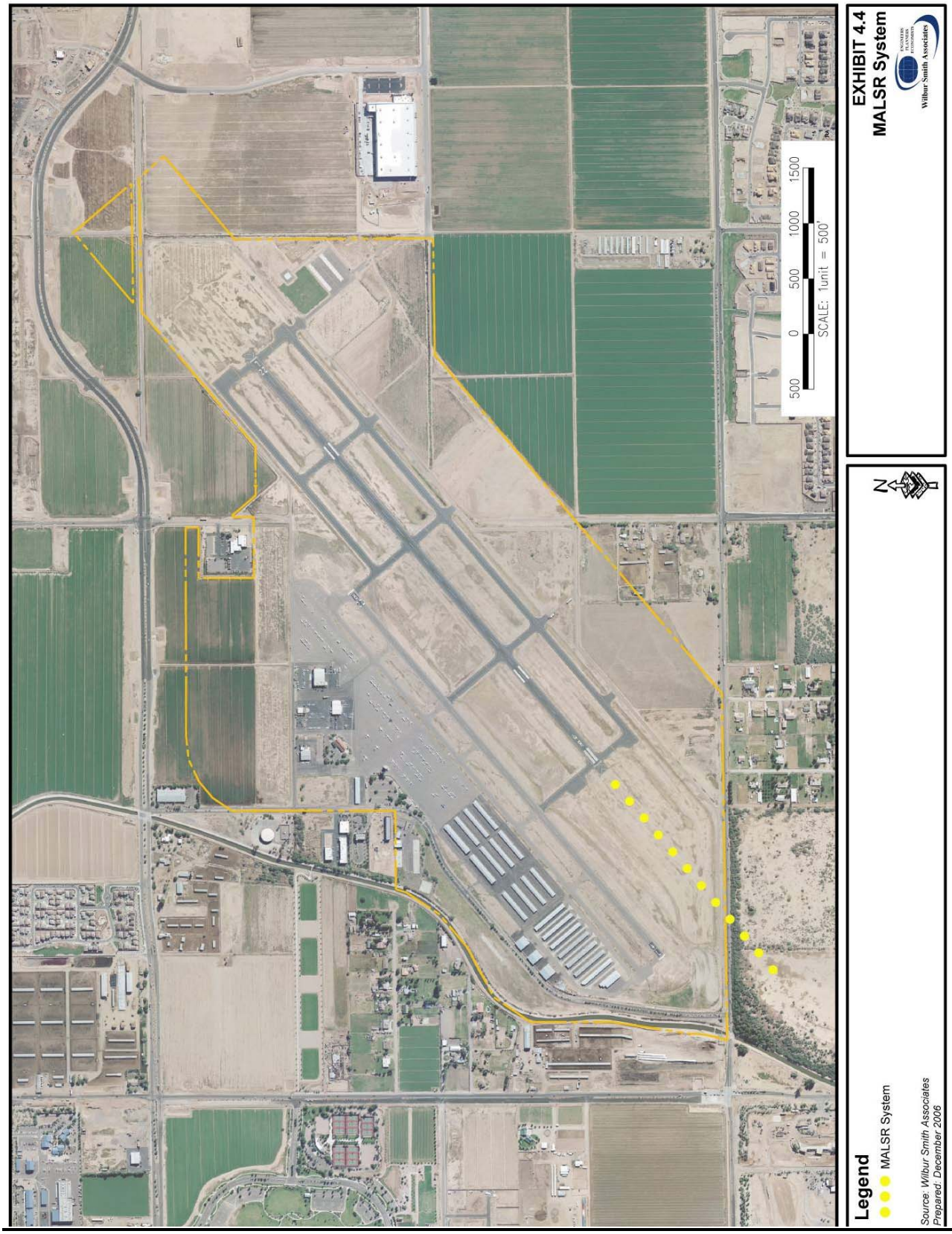


EXHIBIT 4.4
MALSR System
Wilbur Smith Associates
SCALE: 1unit = 500'
500 0 500 1000 1500
N
Legend
MALSR System
Source: Wilbur Smith Associates
Prepared: December 2006

Apron Expansion

Developable land for apron expansion at Chandler Municipal Airport exists north of the FBO and terminal area and along the entire southeast side of the airfield.

The first alternative depicted in **Exhibit 4.5** calls for apron development on the north side of the airfield surrounded by the existing and possible future FBO as well as corporate hangars. Along the southeast side of the airfield, this alternative also shows apron area located between a future FBO and hangar facilities which would maintain access to off-airport parcels adjacent to the Airport, allowing a possible "through-the-fence" operation. A "through-the-fence" operation allows for aviation development located off airport property while providing access to the taxiway and runway system as well as other airport facilities. Business and industrial parks are common "through-the-fence" facilities because they provide additional land development opportunities while maintaining access to the airport. Aeronautical related companies and businesses having expedited travel and shipping needs find these types of facilities convenient and more economical than facilities located directly on airport property. Airports also benefit from this type of arrangement by extending the reach of the airport and improving revenue streams.

The FAA discourages the development and operation of "through-the-fence" activities. Chandler Municipal has worked to address the FAA's concerns related to these activities including being able to preclude access, charging for access to the facilities, and limiting the activities in the areas to non-aviation.

The second alternative to apron development depicted in **Exhibit 4.6** illustrates the same development in the north side of the Airport as in the first alternative. On the southeast side of the Airport, however, the apron area providing access for a "through-the-fence" operation discussed above in the first alternative would be substituted for additional t-hangar development.

Since the north and southeast area represented in these alternatives are separate and exclusive from one another they can be evaluated and implemented independently. Proposed development on the north side of the Airport can be accompanied by either development alternative in the southeast side. The evaluation of alternatives discussed in the next section reviews these areas independently.

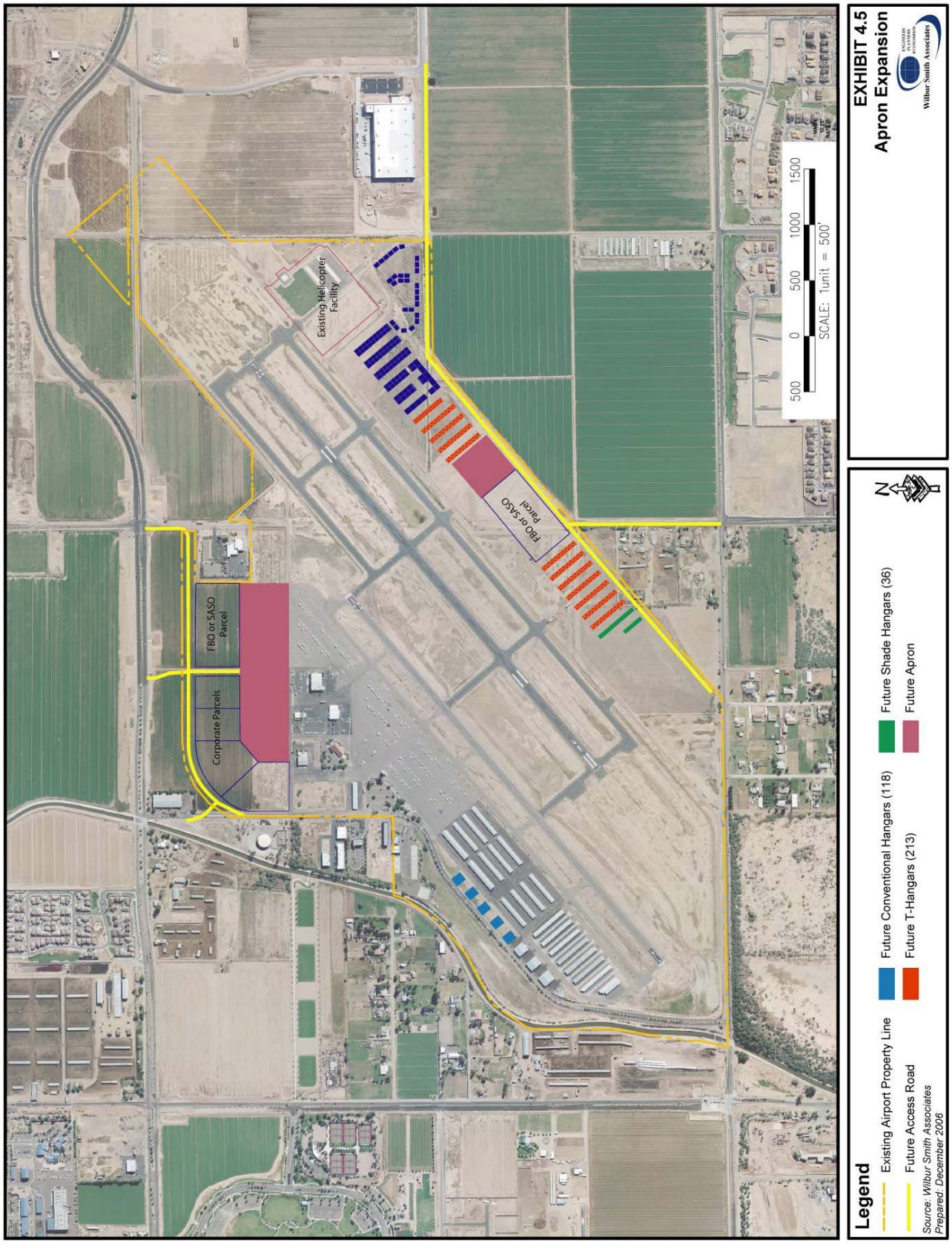


EXHIBIT 4.5
Apron Expansion
Wilbur Smith Associates
Existing Helicopter Facility
FBO or SASO Parcel
Corporate Parcels
FBO or SASO parcel
SCALE: 1unit = 500'
500 0 500 1000 1500
N
Legend
Existing Airport Property Line
Future Access Road
Future Conventional Hangars (118)
Future T-Hangars (213)
Future Shade Hangars (36)
Future Apron
Source: Wilbur Smith Associates
Prepared: December 2006

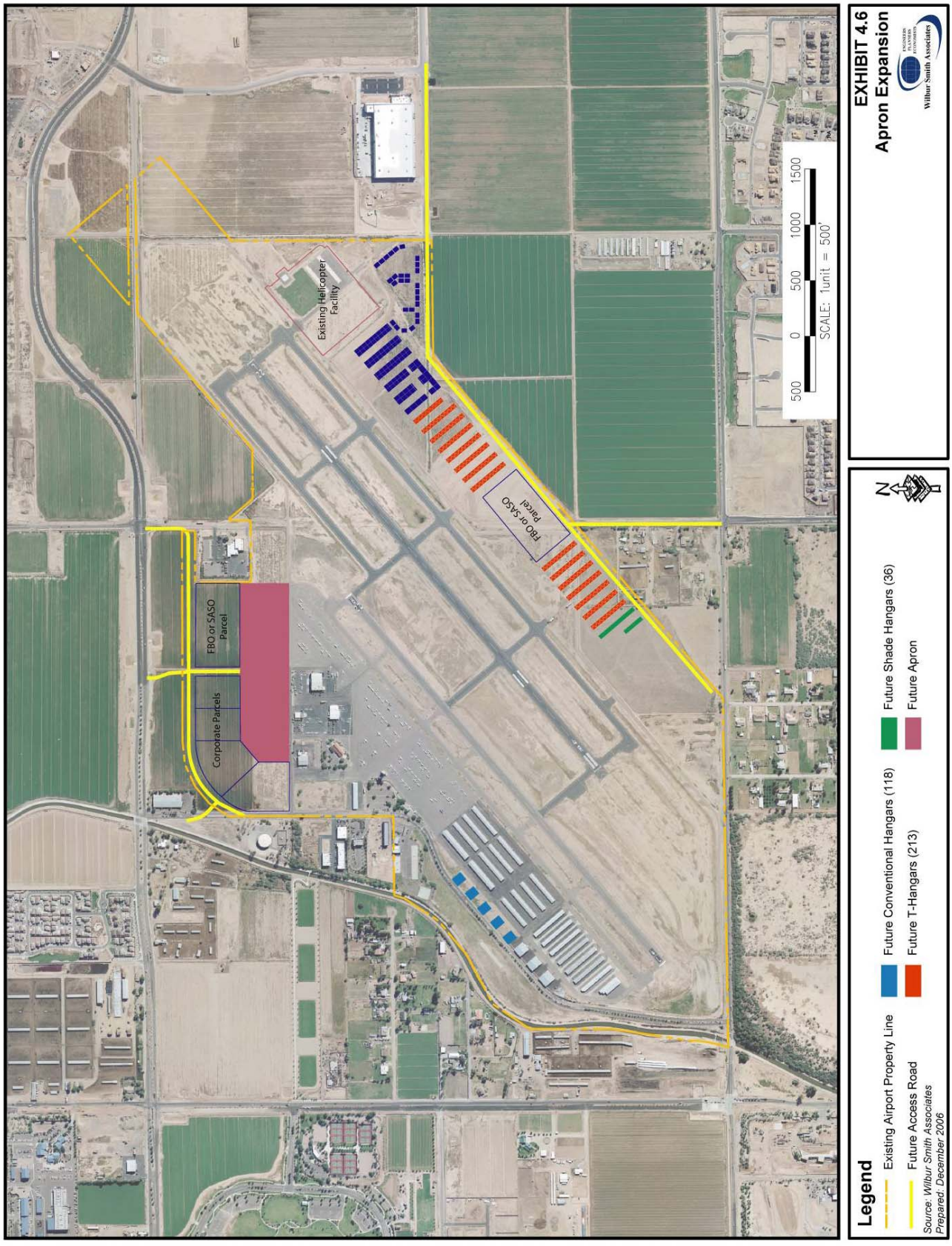


EXHIBIT 4.6
Apron Expansion
Wilbur Smith Associates
SCALE: 1unit = 500'
500 0 500 1000 1500
Existing Helicopter Facility
FBO or SASO Parcel
FBO or SASO Parcel
Corporate Parcels
N
Legend
Existing Airport Property Line
Future Access Road
Future Conventional Hangars (118)
Future T-Hangars (213)
Future Shade Hangars (36)
Future Apron
Source: Wilbur Smith Associates
Prepared: December 2006

Construct Additional Hangars

Construction of future hangars at Chandler Municipal Airport will be comprised of primarily individual conventional and t-hangar structures. Additional shade hangar structures could also be developed, however demand for this type of facility is projected to be minimal. The number and types of hangars developed at the Airport will primarily be determined by market demand for hangar facilities at the Airport. Hangar developers, who lease Airport land from the City, will develop facilities that are the most marketable at the Chandler Municipal Airport. As the Airport gains additional corporate class aircraft tenants, the demand for larger conventional hangars will be greater. Alternatively, if the Airport remains in the present configuration, demand for smaller t-hangars will be greater. Hangar development layouts to accommodate both of these needs are illustrated in Exhibits 4.5 and 4.6 discussed in the previous section.

EVALUATION OF ALTERNATIVES

Because each facility requirement discussed above can be developed independently, without impacting other future facility requirements, they can also be evaluated independently. Each development alternative identified in the preceding section has been reviewed based on the following criteria:

- Safety and efficiency of aviation operations
- Ability to accommodate expected general aviation demand
- Acceptability to users, ADOT, FAA, and the community at large
- Land availability and ownership
- Environmental factors
- Airspace/obstruction requirements
- Consistency with area wide plans
- Political, jurisdictional and implementation factors
- Economic feasibility
- Accessibility

Each alternative impacts the criteria listed above differently and to varying degrees. The evaluation summarized below demonstrates the critical impacts and issues of each alternative as they relate to the above criteria.

Runways

As stated earlier, the selection of an appropriate runway length (and hence the Airport's classification) depends on the family of aircraft forecast to use the runway on a regular basis. Since the existing runway is adequate for 100 percent of all small aircraft, the need for a runway extension is based upon whether future demand by larger aircraft is likely. It is important to note, however, that corporate class aircraft are already using the Airport today, but with limited capacity in terms of fuel, cargo and passengers, especially during the summer months. An estimate of future demand by the corporate

segment of general aviation was completed based on existing usage of the Airport by larger aircraft as well as an analysis of economic activities and national aviation trends.

The City of Chandler has experienced strong economic growth in the past and is projected to see that growth continue in the future. Nationally, activity from the business segment of general aviation has recently also experienced strong growth, which is projected to continue in the future. Given the nature and extent of development expected in the Chandler area, and the projected growth in corporate general aviation activity nationally, it is reasonable to assume that a significant increase in demand by the corporate segment of general aviation will accompany the anticipated arrival of corporate headquarters, increased employment and population to the City of Chandler and surrounding areas. Based on these factors, and the activity that is occurring at other similar airports in the Phoenix region, it very likely that demand for services at Chandler Municipal Airport by larger general aviation aircraft will remain strong.

With this expected growth comes the need for additional runway length. As discussed in the preceding chapter, 7,000 feet of runway length is necessary to fully accommodate aircraft expected to use Chandler Municipal Airport. The runway alternative presented above proposes an 830-foot extension to Runway 4R-22L resulting in a length 5,700 feet. Although this length is dramatically shorter than the 7,000 feet identified in the facility requirements, it is the maximum allowable length within the confines of the Airport property.

As part of the evaluation process, it should be noted that an existing City ordinance No. 2978, § 3, 5-27-99 states that,

> *To guarantee to the citizens of the City of Chandler the continued quiet enjoyment in and to the homes, schools, churches and work places, the Chandler Municipal Airport shall not be permitted to accommodate, in any fashion, aircraft which requires for landing a runway longer than six thousand eight hundred (6,800) feet. Extension of the runway shall require voter approved bonds, which specify that the bond monies are for the purpose of extending the runway.*

While a 5,700-foot long runway is significantly shorter than the 6,800-foot long runway previously examined and included in the City ordinance, the City of Chandler has committed to conducting a bond election should a runway extension project be approved by the City Council. In order to achieve an adequate runway length to accommodate corporate class activity and have a measurable impact on the ability of the Airport to serve these types of aircraft, a runway extension is necessary.

The action alternative (extending Runway 4R-22L to 5,700 feet) accommodates a wide range of aircraft while enhancing the level of operational safety at the Airport. It is believed that this alternative will garner greater acceptance from Airport users, ADOT and the FAA because the runway will be able to accommodate the greatest number of

Airport users possible with an enhanced level of safety. The extension and associated RSA and ROFA dimensions fall within the Airport property, limiting the impact of the proposed extension to the immediate Airport environs.

The FAA does not necessarily require the fee simple acquisition of the RPZ area, but highly recommends that the airport have positive control over development within the RPZ. It is preferred that the Airport own the property through fee simple acquisition, however, avigational easements (providing positive control with the RPZ) can be pursued if fee simple purchase is not possible. It should be noted that avigation easements can often cost as much as 80 percent of the land value and may not fully prohibit incompatible land uses from the RPZ. Because the City has defined that the runway length extension perimeters remain within the Airport boundary, there will be no impacts to surrounding roadways or property acquisitions as a result of actual runway pavement additions. The only properties that may be required are those that fall within the RPZ, in which case fee simple or avigation easements may be necessary.

Aircraft sound emissions are often the most noticeable environmental effect an airport will produce on the surrounding community. If the sound is sufficiently loud or frequent in occurrence it may interfere with various activities or otherwise be considered objectionable. To determine the noise related impacts the runway extension could have on the environment surrounding Chandler Municipal Airport, noise exposure patterns were analyzed for projected operational levels over the long range period. Noise contours developed by the Integrated Noise Model (INM) Version 6.2 and accepted by the FAA and the Environmental Protection Agency (EPA) were developed for the runway extension alternative and compared with current noise contours. Discussions with the Airport and Air Traffic Control Tower (ATCT) staff were conducted in developing aircraft fleet mix using the flight tracking information, runway utilization and hours of aircraft operation. Also, the forecasts of future aviation activity developed earlier in this report were used as an input in the noise model.

Noise contours for Chandler Municipal Airport were developed based on operational activity in the existing year (2005) and the forecast year (2025) with the assumption that Runway 4R-22L is extended to 5,700 feet.

The INM works by defining a network of grid points at ground level around the site. It then selects the shortest distance from each grid point to each flight track and computes the noise exposure generated by each aircraft operation by aircraft type and engine thrust level, and by time of day/night along each flight track. Corrections are applied for atmospheric acoustical attenuation, acoustical shielding of the aircraft engines by the aircraft itself, and aircraft speed variations. The noise exposure levels for each aircraft are then summed at each grid location to provide a day-night level (DNL), which is the 24-hour average sound level expressed in decibels, including an additional 10-decibel penalty for night-time operations (those occurring between the hours of 10 p.m. and 7 a.m.). The cumulative noise exposure levels at all grid points are then used to plot noise exposure contours for selected values (e.g., 65, 70, and 75 DNL).

The decibel scale from zero to 120 includes most of the range of typical daily sound levels, and is shown in **Table 4.1**.

DNL noise levels are indicated by a series of modeled contour lines superimposed on a diagram of the Airport and surrounding area. These levels are calculated for designated points on the ground based on the noise impacts of all aircraft operations. Some operations are far enough away from a location that their effect is minimal, while other operations may dominate noise exposure levels at that location. For example, a location just east of the airport may be affected by an aircraft departure to the east but unaffected by an arrival from the west.

Table 4.1
COMMON SOUND LEVELS

Decibels	Common Aircraft Sound Level	Common Daily Sound Level
110	B-747 takeoff at 2 miles	Rock Band
100	DC-10 takeoff at 2 miles	Gas Lawn Mower at 3 feet
90	B-727 takeoff at 2 miles	Garbage Disposal at 3 feet
80	Learjet 25 takeoff at 2 miles	Shouting at 3 feet
70		Normal Speech at 3 feet
60		Large business office
50	Piper Twin Comanche takeoff at 2 miles	Dishwasher in next room

SOURCE: Federal Aviation Administration
PREPARED: October 2006

The following is a summary of the 2005 and 2025 operational data used in the noise modeling analysis.

Aircraft Operations – The annual operations for 2005 were 235,111, approximately 644 operations per day, and the annual operations for the forecast year are estimated to be 400,600, approximately 1,098 operations per day.

Runway Utilization – The runway utilization at Chandler Municipal Airport is influenced primarily by prevailing wind conditions and secondarily by aircraft departure or arrival into the terminal airspace. Airport management and air traffic controllers provided estimates of runway utilization, as shown in **Table 4.2**. These utilizations rates are not expected to change throughout the forecast period. Chandler Municipal Airport also operates a single helipad located to the east of the runways. The location of this facility is also considered in this analysis.

Table 4.2
RUNWAY UTILIZATIONS

Runway End	Day	Night
Runway 4L	24.6%	0.4%
Runway 4R	24.6%	0.4%
Runway 22L	24.6%	0.4%
Runway 22R	24.6%	0.4%

SOURCE: Chandler Municipal Airport officials
PREPARED: October 2006

Approach and Departure Profiles – Approach and departure profiles illustrate an aircraft's altitude along its flight path. INM's vast database includes information regarding standard approach and departure profiles for the aircraft in this analysis.

Flight Tracks – Flight tracks project an aircraft's flight path as if shown on the surface. Due to meteorological conditions, aircraft type, stage length, air traffic control instructions, and pilot judgment, flight tracks are unique to each operation. Generalized flight tracks were developed for Chandler Municipal Airport based on operations and fleet mix data, as well as discussions with airport management and air traffic controllers. These flight tracks took into account local traffic patterns, instrument approach procedures, and noise abatement procedures used by both fixed-wing and helicopter aircraft.

Noise Exposure Impacts – FAA Order 5050.4B requires that the 65, 70, and 75 DNL noise contours be developed for existing and future airport conditions. According to FAA criteria noise levels greater than 65 DNL are generally considered unacceptable for noise-sensitive land uses, such as residences, hospitals, and schools. However the City of Chandler has opted to use the 55 DNL noise contour as the limiting point were noise sensitive land uses are considered to be unacceptable. The existing and forecast year 55, 60, 65, 70, and 75 DNL noise contours modeled for this analysis are displayed on **Exhibit 4.7 and 4.8**, respectively, on the following pages.

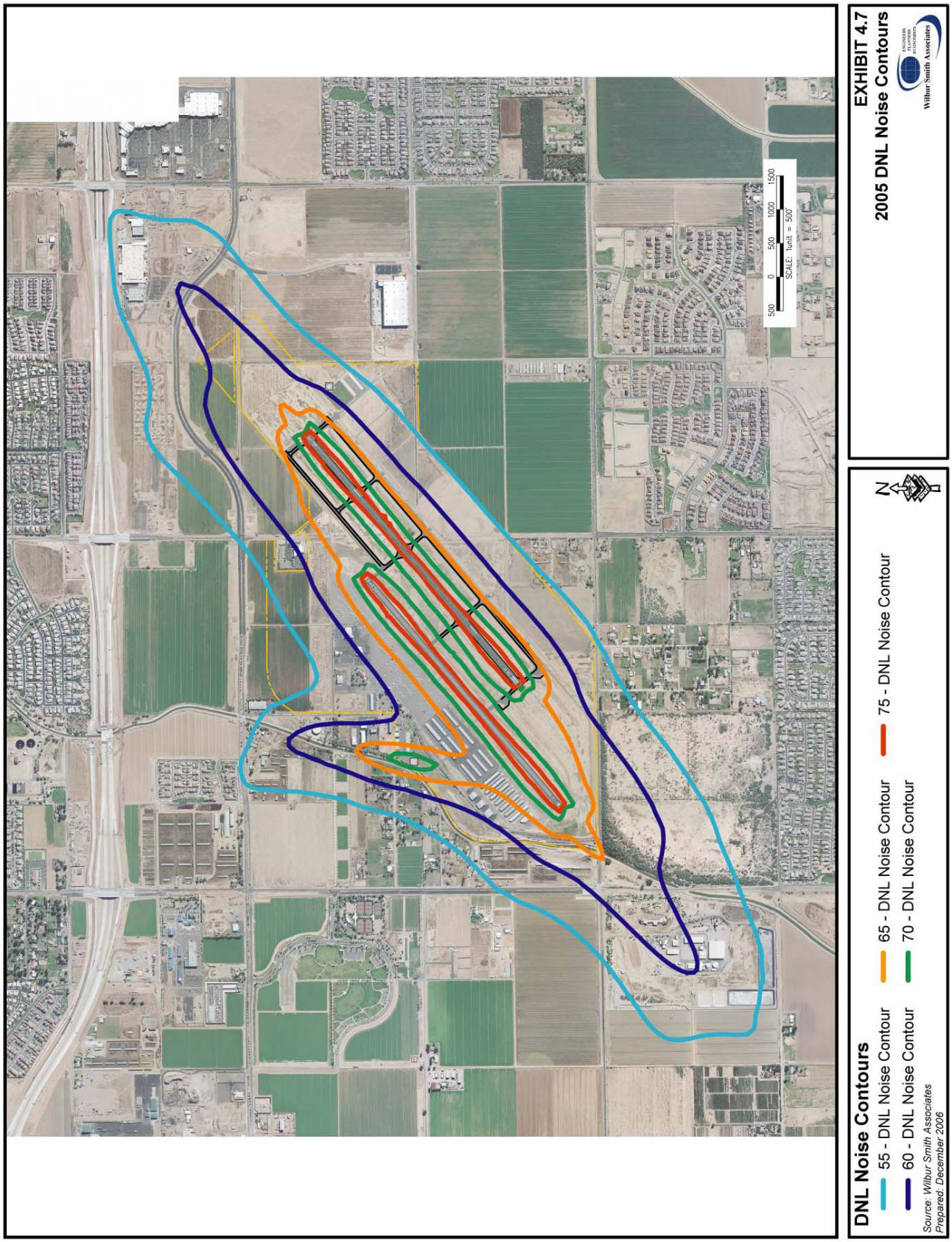


EXHIBIT 4.7
2005 DNL Noise Contours
Wilbur Smith Associates
DNL Noise Contours
55 - DNL Noise Contour
60 - DNL Noise Contour
65 - DNL Noise Contour
70 - DNL Noise Contour
75 - DNL Noise Contour
N
SCALE: 1unit = 500'
500 0 500 1000 1500
Source: Wilbur Smith Associates
Prepared: December 2006

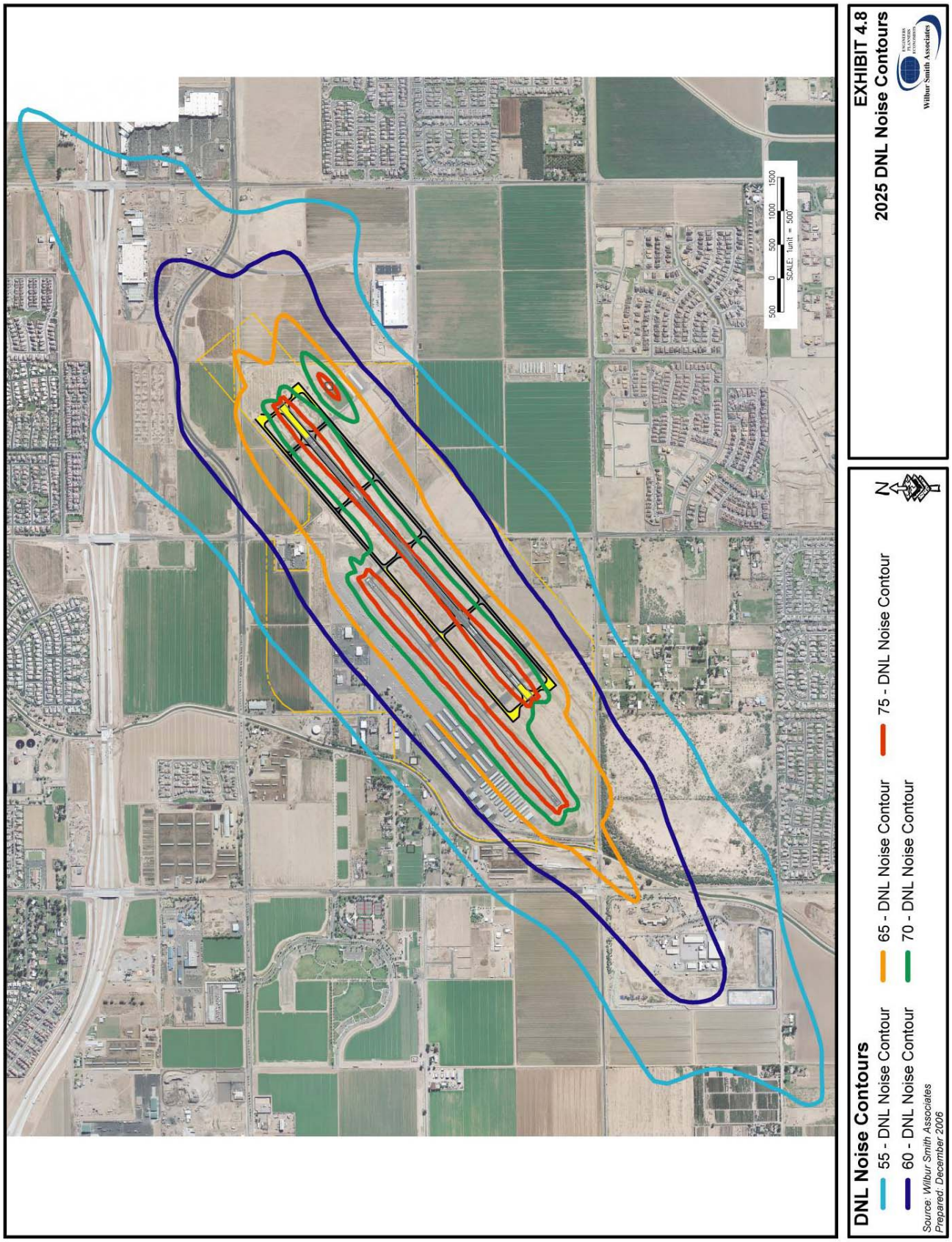


EXHIBIT 4.8
2025 DNL Noise Contours
Wilbur Smith Associates
SCALE: 1unit = 500'
500 0 500 1000 1500
N
DNL Noise Contours
55 - DNL Noise Contour
60 - DNL Noise Contour
65 - DNL Noise Contour
70 - DNL Noise Contour
75 - DNL Noise Contour
Source: Wilbur Smith Associates
Prepared: December 2006

Throughout the forecast period, the 75 DNL area encompasses approximately 57 acres; the 70 DNL area covers approximately 165 acres; and, the 65 DNL covers approximately 349 acres. Relocating the helipad from the western edge of the airport helps to keep more of the noise contours within the airport property line, but a small amount of noise does fall outside the boundary. Based on this analysis the proposed extension of Runway 4R-22L will not result in significant noise impacts to the surrounding community.

Considering the review of evaluation criteria highlighted above, it is recommended that the Airport proceed with extending Runway 4R-22L to 5,700 feet. While this ultimate runway length is short of the FAA-identified runway length requirement in the facility requirements section, this alternative provides the greatest runway length within the Airport property boundary and the physical limitations of development around the Airport. This alternative maintains safe aircraft operational areas, accommodates the greatest number of corporate class aircraft expected to use the Airport and has minimal impact to the surrounding community.

Taxiways

There were two alternatives presented earlier that address taxiway circulation around the Airport. The first alternative called for an extension of Taxiway B to the southwest to the approach end of Runway 4L, extension of Taxiway B to the northeast to the ultimate end of Runway 22L and the extension of Taxiway C to the new extended ends of Runway 4R-22L. The second alternative called for an extension of Taxiway B only to the proposed ends of Runway 4R-22L and an extension to Taxiway C to the new extended ends of Runway 4R-22L.

The only evaluation criteria where these two alternatives differ is in the efficiency of aircraft movement and cost associated with each alternative. Both alternatives recognize the value and importance of extending Taxiway B to the ends of runways 4R and 22L. With hangar development proposed on the southeast side of the Airport, a growing number of aircraft will utilize Taxiway C within the forecast period. The southeast side of the Airport will accommodate over 300 various hangar types, an FBO and potential “through-the-fence” operation such as an aviation industrial park. With this type of potential development, aircraft on the southeast side of the Airport will benefit from direct access to the ends of Runway 4R-22L through the extension of Taxiway C. The cost associated with extending Taxiway C is worth the benefit a significant number of aircraft will receive from the efficient, safe and standardized taxiway configuration this alternative provides. Additionally, the full extension of taxiway B will provide two-way taxiway circulation to both runways. Therefore, the first alternative of extending both Taxiway B and C to the ends of each runway is recommended.

NAVAIDs

In the previous section two alternatives for implementation of a precision approach were discussed. One included the installation of a MALSR which would allow for a precision approach with minima as low as ½ mile and 200 feet. The other alternative discussed was the installation of a precision approach without an approach lighting system.

The advantages of installing a MALSR include the ability to provide an instrument approach with lower minima while providing an additional level of safety by making the Airport and runway threshold easier for pilots to identify during night time operations in all weather conditions. Disadvantages include the need to acquire additional property to accommodate the last 1,000 feet of the approach light system and potential issues with light emissions disturbing the surrounding community.

The alternative of not installing an approach light system would maintain the Airport's approach minima at 1 mile and 400 feet. The advantages of this option include elimination of the need to acquire additional property for the approach light system and reduced light emissions on the surrounding community. Disadvantages include higher approach minima and potentially a lower margin of safety due to the runway environment being more difficult to identify during night operations.

Because of the relative lack of instrument meteorological conditions (IMC) in the Phoenix area, the primary benefits of a precision approach at Chandler Municipal Airport would be the enhancement of instrument training opportunities at Chandler Municipal Airport and the ability to help to eliminate approach and traffic pattern conflicts with Memorial Airfield and Stellar Airpark. Currently, the majority of precision approach training occurs at Williams Gateway Airport or at Casa Grande Airport. Providing a precision approach would offer additional instrument training opportunities at Chandler Municipal Airport. Because the precision approach would primarily be used for training purposes, the cost of installing an approach lighting system is greater than the benefit of slightly lower approach minima the system would provide.

Based on the most recent draft of new Part 77 guidance, the precision approach with the expected aircraft types at Chandler Municipal Airport would call for a 34:1 approach slope, not a 50:1 as previously required. Using existing survey and obstruction data as a guide, the 34:1 approach slope would not be obstructed. Additional development planned to take place off the end of Runway 4R should undergo an obstruction evaluation prior to design or construction to avoid the approach surface.

Apron Expansion

There is one apron expansion alternative for the north side of the Airport and two for the southeast side of the Airport. The northern expansion alternative can be implemented with either southeastern alternative which can be compared to each other in order to provide an overall apron expansion recommendation.

On the north side of the Airport, the proposed apron expansion alternative avoids the relocation of existing facilities. The resulting apron configuration encircles the FBO, terminal building and other facilities located on the north side of the airfield. The apron would be developed to accommodate additional corporate hangars and a second FBO in the area. This alternative provides an area of apron space with room for additional tie-downs and improves the layout and efficiency of the northern Airport area. Based on the factors stated above, it is recommended that the Airport develop the expanded apron area in the north side of the Airport to accommodate growth of based aircraft and expanded Airport services.

The southeast side of the Airport has two development alternatives that can be evaluated. The only difference between these two alternatives is that the first provides enough undeveloped area to allow construction of a taxilane to access off-airport properties in the event the Airport wishes to pursue and allow "through-the-fence" opportunities. The second alternative proposes to develop t-hangars along the entire south side of the airport boundary, which could limit access to private land adjacent to the Airport. Considering that the Airport has ample opportunities for hangar development throughout the southeast side of the property and the possible benefits that the "through-the-fence" may bring, it is recommended that the first alternative for apron expansion on the southeast side of the Airport be pursued. Additionally, a large apron stretching along the southeast side of the Airport between Taxiway C and the proposed hangars (see next section – Additional Hangars) is recommended to provide adequate access to all landside facilities proposed on the southeast side of the Airport.

Additional Hangars

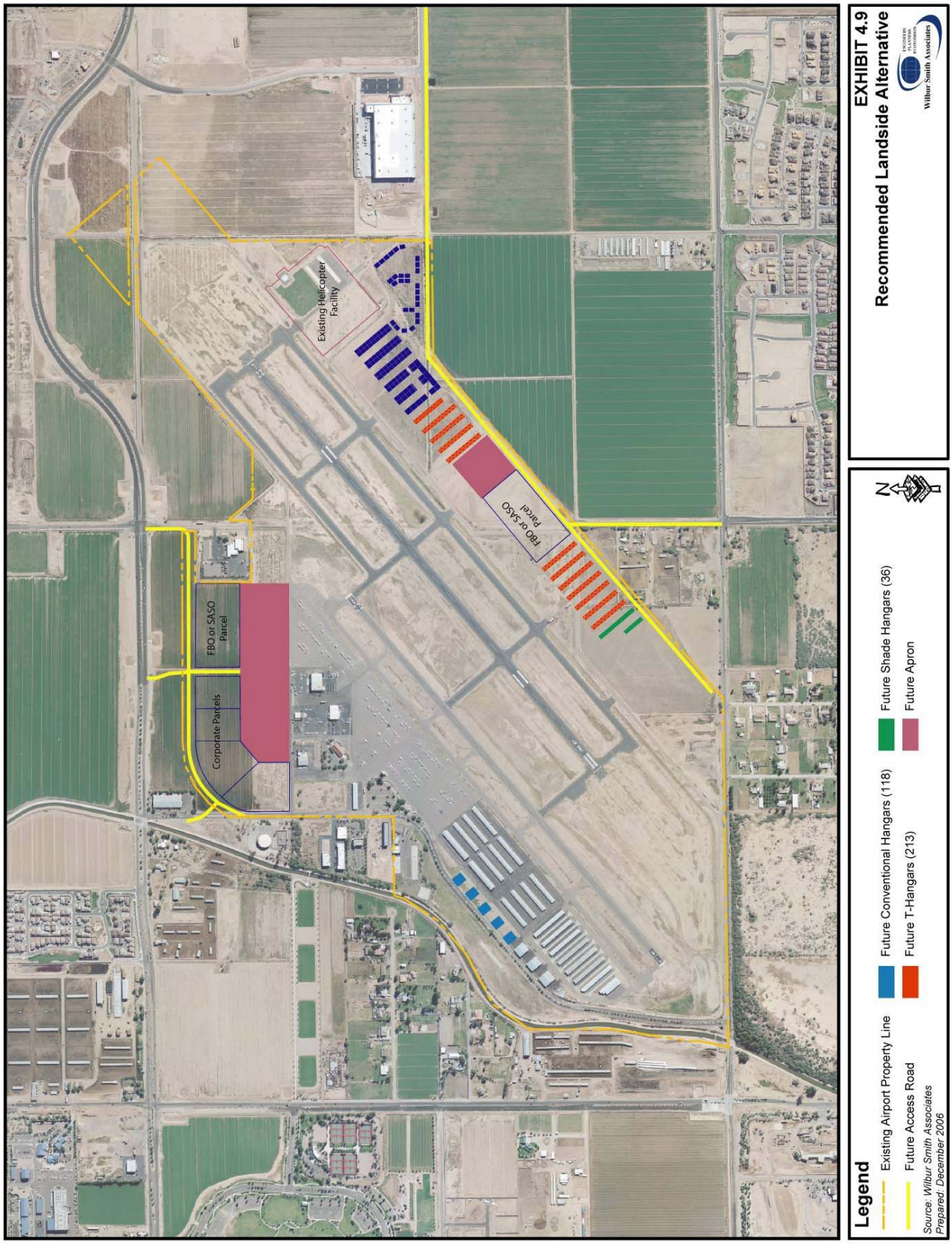
Although there are a considerable number of additional hangar facilities recommended as part of this Master Plan, there are no alternatives related to proposed hangar development at Chandler Municipal Airport. Instead, hangar developers who lease land from the Airport will develop hangars based on market conditions and the needs of Airport users. This Master Plan illustrates recommended hangar development to make the most use out of existing facilities and take advantage of available Airport land while considering the increase of based aircraft types identified in the forecast chapter of this report. Similar hangar facility types are developed in clusters in order to maximize land development opportunities and co-locate categories of airport users with one another.

As shown on the apron expansion alternative Exhibits 4.5 and 4.6, t-hangars and shade hangars are proposed along the southeast side of the Airport along with smaller conventional hangars. Since there is such a strong demand for these types of facilities, this section of the Airport, with its large amount of available land with convenient access to the airfield, is ideal for a large-scale small hangar complex. Consistent with the existing Airport layout, larger conventional hangars and corporate facilities are proposed for the north side of the Airport.

SUMMARY

The recommended landside development alternatives are presented in **Exhibit 4.9** and recommended airside development alternatives are presented in **Exhibit 4.10.** The process utilized in assessing the airside and landside development alternatives involved a detailed analysis of short and long term requirements as well as future growth potential. Current and future airport and aircraft design standards were considered at every stage of development. Safety both in the air and on the ground was given a high priority in the development and analysis of alternatives. Important considerations of local political influences and surrounding community interests were also applied to the development and analysis of alternatives.

After review and input from the Planning Advisory Committee, City officials, public and other Airport stakeholders, an Airport development plan concept will be developed. The resultant plan will represent airside and landside facilities that fulfill safety design standards while addressing future demands to the greatest extent possible. The development plan for Chandler Municipal Airport must represent a means by which the Airport can evolve in a balanced manner with the rest of the community and accommodate the forecasted demand. In addition, the plan must provide for flexibility to meet activity growth beyond the long range planning horizon.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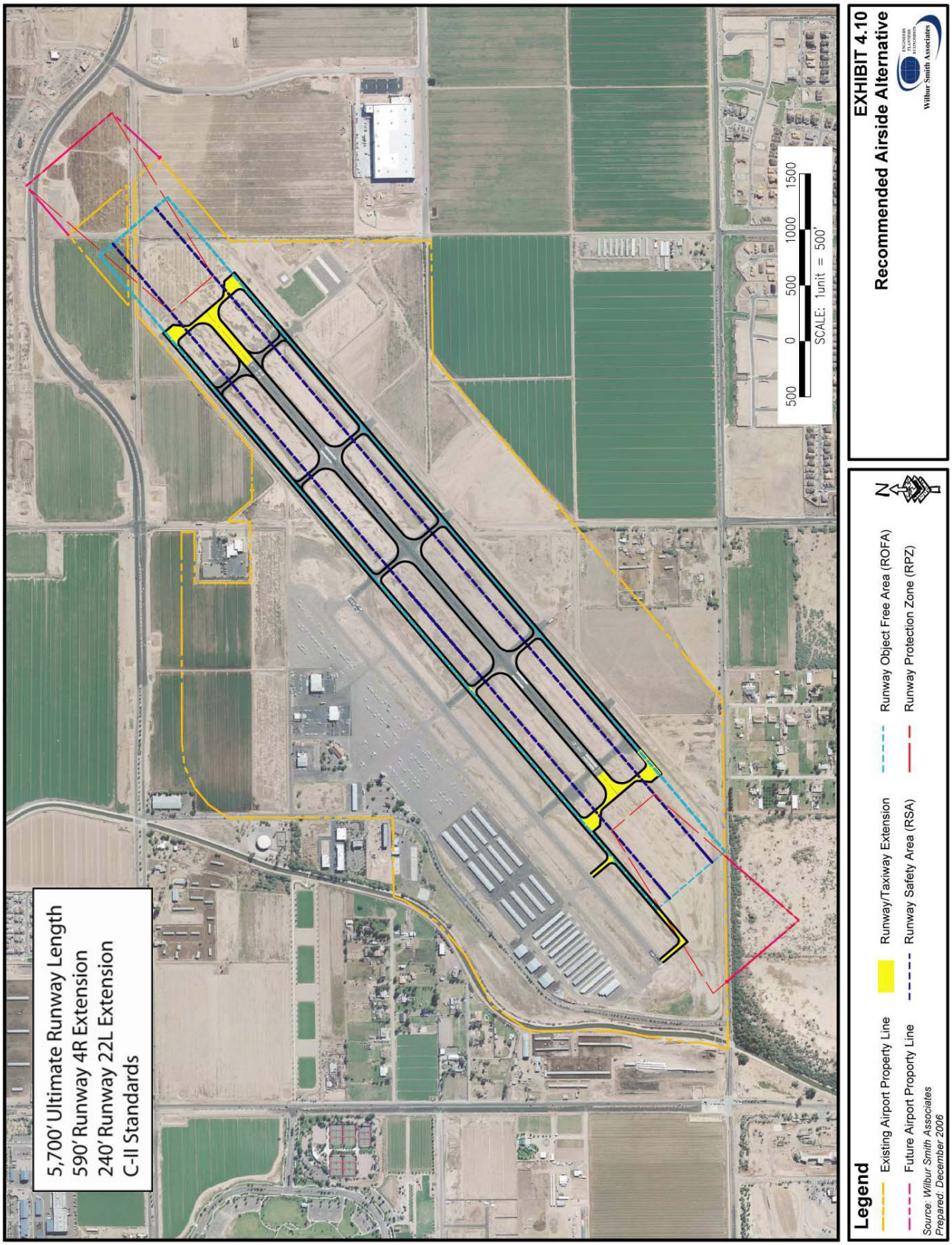
Source: Wilbur Smith Associates
Prepared: December 2006
EXHIBIT 4.9
Recommended Landside Alternative
Wilbur Smith Associates


5,700' Ultimate Runway Length
590' Runway 4R Extension
240' Runway 22L Extension
C-II Standards
500 0 500 1000 1500
SCALE: 1unit = 500'
EXHIBIT 4.10
Recommended Airside Alternative
Wilbur Smith Associates
Legend
Existing Airport Property Line
Future Airport Property Line
Runway/Taxiway Extension
Runway Safety Area (RSA)
Runway Object Free Area (ROFA)
Runway Protection Zone (RPZ)
N
Source: Wilbur Smith Associates
Prepared: December 2006

CHAPTER FIVE: ENVIRONMENTAL OVERVIEW

INTRODUCTION

The primary goal of any airport master plan is to map out a long-term development program for an airport through the identification of projects that are technically, financially and environmentally viable. With regards to potential environmental considerations, the Council on Environmental Quality (CEQ) 1501.2 states that, "Agencies shall integrate the NEPA *(National Environmental Policy Act)* process with other planning at the earliest possible time to insure that planning and decisions reflect environmental values, to avoid delays later in the process, and to head off potential conflicts." Additionally, Federal Aviation Administration (FAA) Order 5050.4B, *Airport Environmental Handbook*, notes the following:

> *NEPA requires each Federal agency to disclose to the interested public a clear, accurate description of potential environmental impacts that proposed Federal actions and reasonable alternatives to those actions would cause. . . . . In approving the Federal actions necessary to support an airport development proposal, the approving FAA official must consider environmental effects as fully and as fairly as it does technical, economic, and other non-environmental considerations.*

As such, identifying the potential environmental impacts that could result from the implementation of an airport development program has become an integral part of the master planning process.

This Environmental Overview chapter has been prepared to identify the potential environmental impacts associated with the proposed airside and landside development projects for Chandler Municipal Airport, as described in Chapter 4, *Development Alternatives*. Additionally, this overview will discuss, where appropriate, the potential mitigation measures that could be considered to help minimize these impacts, as well as identifying those impacts that may require further analysis beyond this master plan. The proposed Airport development projects for Chandler that have the most potential to result in environmental impacts generally include the following:

Airfield

- Extension of Taxiway B to Taxiway H
- Extension of Runway 4R-22L
- Extension of Taxiways B and C to the future ends of Runway 4R-22L
- Extension of Taxiway B to Runway 4L

Landside

- Construction of additional hangar structures
- Expansion of aprons
- Improvements to airport access roads

This Environmental Overview chapter was developed in accordance with FAA Order 5050.4B, *Airport Environmental Handbook*, which requires the analysis of 21 environmental impact categories with respect to the proposed development projects. Those environmental impact categories include the following:

- Noise
- Compatible Land Use
- Social Impacts / Induced Socioeconomic Impacts
- Air Quality
- Water Quality
- Department of Transportation Act, Section 4(f) Lands (recodified as 49 USC, Subtitle I, Section 303 (c))
- Historic, Architectural, Archaeological, and Cultural Resources
- Biotic Communities
- Endangered and Threatened Species of Flora and Fauna
- Wetlands
- Floodplains
- Coastal Zone Management Program
- Coastal Barriers
- Wild and Scenic Rivers
- Farmlands
- Energy Supply and Natural Resources
- Light Emissions
- Solid Waste Impacts
- Construction Impacts
- Potential Cumulative Impacts
- Environmental Justice

The *Airport Environmental Handbook* also outlines the types of potential environmental impacts and the thresholds that determine if a given impact is to be considered significant. In general, projects fall into one of the following three categories:

Categorical Exclusions – Projects that are categorically excluded include those actions that have been found, under normal circumstances, to have no potential for significant environmental impact.

Actions Normally Requiring an Environmental Assessment (EA) – Projects that normally require an Environmental Assessment are actions that have been found to sometimes have significant environmental impacts.

Actions Normally Requiring an Environmental Impact Statement (EIS) – If a project is found to have significant impacts during the preparation of an Environmental Assessment, the FAA can determine that an Environmental Impact Statement is required to investigate in greater detail a project's potential environmental impacts.

It is important to note that this Environmental Overview chapter constitutes neither a formal Environmental Assessment nor an Environmental Impact Statement. It has been included to provide a limited degree of analysis for those proposed Airport development projects that have the potential to be considered "categorically excluded" from further environmental review. Those projects that are subsequently determined to be not "categorically excluded" will require additional environmental analyses that will likely be in the form of an EA or an EIS.

The following sections discuss the preliminary evaluation of the recommended Airport development projects for each of the environmental impact categories included in the *Airport Environmental Handbook.*

NOISE

Noise is generally defined as "unwanted sound," which is a definition that encompasses both its psychological and physical natures. While the physical nature of sound is measurable and quantifiable, its psychological component, or the part that generally encompasses the unwanted sound or annoyance factors, makes the determination of acceptable levels of sound for people a subjective one. The standard practice established by the FAA for evaluating noise impacts at airports involves the use of the FAA's Integrated Noise Model (INM), a program specially developed to model current and future noise levels at and around airports. Specifically, INM version 6.2 was utilized for this analysis to develop noise contours for Chandler Municipal Airport based on aircraft operational activity for the existing year (2005) and the forecast year (2025). The details and results of this analysis were presented previously in Chapter 4, *Development Alternative*s.

Noise Exposure Impacts

Noise Exposure Impacts are measured using a metric known as Day-Night Level (DNL) averages. The DNL (also sometimes referred to as Ldn) represents the 24-hour average sound level expressed in decibels, including an additional 10-decibel penalty

for night-time operations (defined as those operations occurring between the hours of 10 p.m. and 7 a.m.). As indicated in the previous chapter, FAA Order 5050.4B requires that the 65, 70, and 75 DNL noise contours be developed for existing and future airport conditions. Noise levels greater than 65 DNL are generally considered unacceptable for noise-sensitive land uses such as residences, hospitals, and schools. Additionally, the City of Chandler itself has established an Airport Impact Overlay District which uses a more restrictive 55 DNL contour to determine if incompatible uses in the vicinity of the Airport are acceptable. **Exhibit 5.1** reflects the location of the above-described DNL noise contours for the year 2025 based on the projected level of aircraft operations presented in Chapter 2, *Projections of Aviation Demand*.

As shown in Exhibit 5.1, two of the noise contours required by FAA (75 DNL and 70 DNL) remain entirely on Airport property, while the third required contour (65 DNL) exceeds the property boundary slightly to the north of Runway 22L and to the south of Runway 4L. Specifically, the areas that lie off-Airport but within the 65 DNL to the north are comprised entirely of unpopulated areas that include farmland and commercial development, while the area that lies to the south crosses both Queen Creek Road and McQueen Road, but overlies a heavy industry site. It is important to note that none of the areas that lie within the 65 DNL contour, contain residences or other noise sensitive land uses.

In terms of the total acreages that these contours will encompass throughout the forecast period (2025), the 75 DNL area is approximately 57 acres in size, the 70 DNL area is approximately 165 acres, and the 65 DNL covers a total of approximately 349 acres. (Note that as shown in the figure above, the 75 DNL and the 70 DNL contours are wholly contained within the 65 DNL contour, and therefore their corresponding acreages should not be considered to be additive.) While a relatively small amount of the 65 DNL contour does lie outside of the Airport bounds, these areas are not currently considered to be noise-sensitive land use areas. Additionally, from a long-term development perspective and as reflected in the Chandler General Plan (adopted March 2002), these areas all lie within either the City's *Employment* or *Open Space* land use designations, neither of which is noise sensitive but are, in fact, considered to be appropriate as "buffers" to noise sensitive residential areas. Therefore, they are viewed as airport-compatible land uses.

As noted previously, the City of Chandler has an Airport Impact Overlay District (Ord. No. 3063, § 3, 11-18-99) in place for Chandler Municipal Airport. This overlay district establishes specific land uses, additional building code requirements, and other restrictions for the explicit purpose of promoting airport noise attenuation. The overlay district utilizes airport zones that correspond to the FAA-required 70 DNL and 65 DNL noise contours, as well as establishes a zone based on a City-required 55 DNL noise contour. Exhibit 5.1 shows that the Airport's 55 DNL noise contour extends north of Germann Road and south of Queen Creek Road along the extended runway centerline, overlying approximately nine existing residences located south of the Airport.

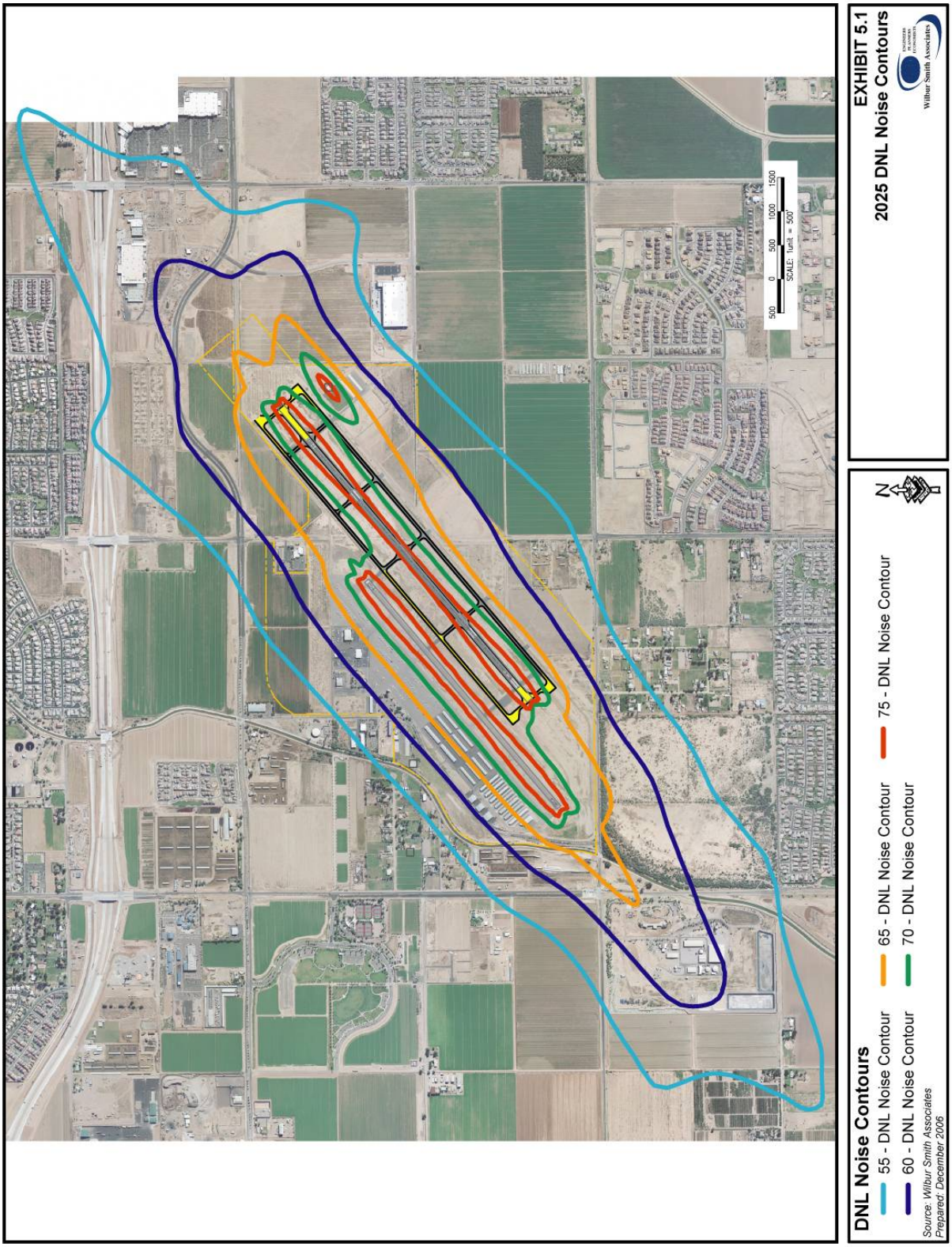


EXHIBIT 5.1
2025 DNL Noise Contours
Wilbur Smith Associates
SCALE: 1inch = 500'
0 500 1000 1500
500
N
DNL Noise Contours
55 - DNL Noise Contour
60 - DNL Noise Contour
65 - DNL Noise Contour
70 - DNL Noise Contour
75 - DNL Noise Contour
Source: Wilbur Smith Associates
Prepared: December 2006

Additionally, the 55 DNL noise contour extends along sides of the runways, encompassing approximately three residences to the north of the Airport. In total, there are approximately 12 existing residences within the City-required 55 DNL contour.

The land uses within the boundary of the 55 DNL contour also include *Employment, Open Space, Rural Residential,* and *Low Density Residential*. While the first two uses are not considered to be noise sensitive, new construction in the latter two within the 55 DNL may have some implications. Specifically, any new facility or residence should incorporate noise attenuation into its design and construction in order to achieve a maximum interior noise level of 45 decibels. It should also be noted that based on Exhibit 5.1, as well as the City's current land use plan, any additional restrictions and/or requirements for the 65 DNL and 70 DNL noise contours as related to the Airport Impact Overlay District should not come be an issue for Chandler Municipal Airport.

COMPATIBLE LAND USE

FAA Order 5050.4B states that the compatibility of existing and planned land uses in the vicinity of an airport is usually associated with the extent of noise impacts related to that airport. If the noise analysis concludes that there is no significant impact, a similar conclusion usually can be made with regard to compatible land use. However, other issues such as relocation of residences or businesses and alteration of floodplains, wetlands or critical habitat may also influence property surrounding the airport. For example, land use impacts also can occur if the proposed projects exceed the threshold of significance of other impact areas that have land use ramifications, including disruption of communities, relocation, and induced socioeconomic impacts (FAA's *Airport Environmental Handbook*, Chapter 5). For these reasons, the FAA requires that airports and airport sponsors seek compatible uses for the land surrounding that airport through appropriate zoning and municipal planning efforts.

The 2005 and 2025 noise contours were analyzed to evaluate the impact of aircraft noise on sensitive land uses within the Airport area. Sensitive land uses typically include residential areas, parks, hospitals, churches, amphitheaters, and libraries. FAA Advisory Circular 150/5020-1, *Noise Control and Compatibility Planning for Airports,* has identified land use compatibility guidelines that relate types of land uses to airport noise levels. Based on these guidelines, FAA has determined that all land uses with yearly day-night sound levels below 65 DNL based on airport activities are considered to be compatible with the airport environment.

As such, at Chandler Municipal Airport, the 65 DNL noise contour has been shown to overlie compatible land uses throughout the planning period. There are currently no residences or other noise sensitive uses within this contour, and, based on the City's current land use plan, no future residential or other noise sensitive development should occur within the 65 DNL contour. Additionally, none of the projects proposed within this Master Plan would result in any direct significant land use impacts.

SOCIAL IMPACTS

The purpose of a social impact analysis is to determine the effect airport development could have on the human environment. The types of social impacts typically evaluated are as follows:

- Relocation of residences and/or businesses,
- Alterations in traffic patterns that may permanently or temporarily restrict traditional community access,
- Division or disruption of established communities,
- Disruption of orderly, planned development, and
- Creation of appreciable change in employment.

Each of these considerations is directly addressed below with respect to the proposed Airport development projects at Chandler Municipal Airport.

Relocation of residences and/or businesses: The proposed Airport development projects will not result in the relocation of any residences and/or businesses.

Alterations in traffic patterns that may permanently or temporarily restrict traditional community access: There may be temporary restrictions in access during the construction of the access roadways on the south side of the Airport; however, these restrictions will be short-term in nature and will be mitigated with the implementation of traffic detours. It should also be noted the selection of the preferred Airport development alternative, which keeps development primarily within the boundaries of the Airport, was in large part made to help minimize any potential off-Airport or community disruptions. Airport access is planned to be altered, providing more direct access from Cooper Road, which has an exit ramp from the recently completed Loop 202.

Division or disruption of established communities: There will not be any division or disruption of established communities or neighborhoods adjacent to the Airport as a direct result of the proposed projects.

Creation of appreciable change in employment: The construction of the proposed Airport development projects will not result in any appreciable negative change in employment for the community. However, the proposed development program could result in an appreciable positive change in employment directly through an increase in short-term construction employment, as well as increased long-term employment that would result both directly and indirectly from the construction of business-class airport facilities. Specifically, it is projected that the Airport development projects would result in a direct net increase of 44 employees at the Airport, as well as a number of other unquantifiable jobs that would indirectly result from the economic growth that the additional Airport activity would generate. This increased employment would also

results in increased employment as well as economic spending that will be quantified as part of follow-on analyses.

Based on this analysis, no social impacts would be anticipated within the planning period resulting from the construction of the proposed Airport development program.

INDUCED SOCIOECONOMIC IMPACTS/CUMULATIVE IMPACTS

For major airport development projects, there is a possibility of induced or secondary impacts on surrounding communities. Such impacts include shifts in patterns of population movement and growth, public service demands, and changes in business and economic activity based on airport development. These induced impacts will normally not be significant, except when there are also significant impacts in other categories, especially noise, land use or direct social impacts. Cumulative impacts occur if the proposed airport development projects, combined with other local development projects, such as road improvements or economic development projects, create significant socioeconomic impacts for the surrounding area.

At Chandler Municipal Airport, the socioeconomic impacts of the proposed Airport development projects are expected to be positive in nature and would include direct, indirect, and induced economic benefits to the local area. Improved facilities are expected to enhance safety for the existing types of corporate and business aircraft utilizing the Airport. These Airport improvements are expected to attract additional users, which will, in turn, encourage business development, tourism, industry and trade to enhance the future growth and expansion of the community's economic base. As such, no induced socioeconomic or cumulative impacts are anticipated within the planning period that would require further analysis.

ENVIRONMENTAL JUSTICE IMPACTS

On April 15, 1997, the Department of Transportation (DOT) released DOT Order 5680.1 to comply with the Executive Order (EO) 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations*. This Order requires the DOT to identify and address any disproportionately high and adverse human health or environmental effects resulting from their policies or programs on minorities or low-income populations. Environmental Justice must be considered in all phases of planning, since it is essential that any potential impacts to minority and low-income populations be identified early in the planning process so that they can be considered during the evaluation of project alternatives.

At Chandler Municipal Airport, the proposed Airport development projects will not result in any disproportionate adverse impacts to minority and low-income populations since there will be no significant impacts to any areas that are located off Airport and adjacent to any residential areas.

AIR QUALITY

As described in the findings of the Air Pollution Prevention and Control Act, "growth in the amount and complexity of air pollution…has resulted in mounting dangers to the public health and welfare." As such, air pollution prevention and control is of critical importance, and must be considered as it relates to airport improvement projects. The primary laws that apply to air quality include the National Environmental Policy Act of 1969 (NEPA); the Clean Air Act (CAA), as amended; and Title 49 U.S.C. 47106 (c) (1) (B), as amended (formerly sections 509 (B) (5) and (B) (7) of the Airport and Airway Improvement Act of 1982, as amended, PL 97-248). Specifically, for major federal actions, including those of FAA, that have the potential to affect the quality of the environment, including air quality, NEPA requires that federal agencies prepare an environmental document, such as an EA or an EIS to analyze those potential impacts.
Additionally, the EPA has adopted air quality standards that specify the maximum permissible short-term and long-term concentrations of various air contaminants. The Clean Air Act (CAA) established the National Ambient Air Quality Standards (NAAQS) consisting of primary and secondary standards for six pollutants, termed "criteria pollutants," that include the following:

- Carbon monoxide (CO)
- Lead (Pb)
- Nitrogen dioxide (NO2)
- Ozone (O3)
- Particulates (PM10 and PM2.5)
- Sulfur dioxide (SO2)

For the practical implementation of the NAAQS, the CAA requires that each state adopt a plan (e.g. State Implementation Plan or SIP) to achieve the NAAQS for each pollutant within the timeframes established under CAA. In addition to NEPA, the CAA 1990 Amendments required that the EPA issue rules that would ensure Federal actions conform to the appropriate SIP. Under the CAA, the federal government requires that a general conformity determination to the SIP be made for all federally approved/funded projects which occur in a "non-attainment" area, defined as an area where air pollution levels persistently exceed the national ambient air quality standards for a particular pollutant.

Specifically, the General Conformity rule establishes the procedures and criteria for determining whether certain federal actions conform to State or EPA (federal) air quality implementation plans. To determine whether conformity requirements apply to a proposed federal action, the following must be considered:

- Non-attainment or maintenance status of the area
- Type(s) of pollutant(s) or emission(s)
- Exemptions from conformity and presumptions to conform
- Project's emission levels

- Regional significance of the project's emissions

It should be noted that FAA actions are subject to the General Conformity Rule, but that the General Conformity Rule only applies in areas that EPA has designated non-attainment or maintenance. This is important in that Chandler Municipal Airport is located in Maricopa County, Arizona, currently designated as a non-attainment area for Ozone and Particulate Matter-10 (PM10) pollutants, meaning that the proposed Airport improvement projects are subject to the requirements of the General Conformity rule (see http://www.epa.gov/air/oaqps/greenbk/).

Additionally, FAA air quality analysis guidelines indicate that, if a proposed federal action is in a state that does not have applicable Indirect Source Review (ISR) requirements, then the projected airport activity levels should be examined to determine if a detailed air quality analysis is required. The State of Arizona does not have ISR requirements; therefore, the determination of whether or not a detailed air quality analysis is required for a proposed project is based on annual aircraft operations. According to FAA guidelines, an air quality analysis is required for general aviation airports with more than 180,000 projected annual operations. Since Chandler Municipal Airport is located in a non-attainment area, and because the current and projected operations at the Airport are significantly greater than 180,000 annual general aviation operations over the 20-year planning period, a detailed air quality analysis may be required as part of the NEPA documentation for the implementation of the proposed Airport improvement projects.

WATER QUALITY

Potential water quality impacts associated with airport development typically result from the disturbance of large areas of soil during construction, significant alternation of site grading and drainage, creation of large areas of impervious surface, altered storm water runoff volumes and directions of flow, sewage disposal, and the storage and handling of fuels and other solvents. As such, there are several regulatory requirements which must be reviewed and considered with regards to water quality. Of primary importance is the Federal Water Pollution Control Act, as amended (commonly referred to as the Clean Water Act), which provides the authority to establish water quality standards, control discharges, develop waste treatment management plans and practices, prevent or minimize the loss of wetlands, establish location with regard to an aquifer or sensitive ecological area such as a wetlands area, and regulate other issues concerning water quality including all proposed federal actions.

Further requirements could apply, such as the triggering of the Fish and Wildlife Coordination Act, if a proposed federal action would impound, divert, drain, control, or otherwise modify the waters of any stream or other body of water, unless that project is for the impoundment of water covering an area of less than 10 acres. The Fish and Wildlife Coordination Act requires the responsible federal agency to consult with the Fish and Wildlife Service (FWS) and the applicable state agency to identify means to

prevent loss or damage to wildlife resources resulting from the proposal. Additionally, if a proposed federal project has the potential to result in contamination of an aquifer designated by the EPA as a sole-source or principal drinking water resource for an area, the project needs to be coordinated with the EPA, as required by Section 1424 (e) of the Safe Drinking Water Act, as amended.

A National Pollution Discharge Elimination System (NPDES) permit would be required if more than five acres of existing vegetated land are disturbed as a result of the proposed federal action, with "disturbance" being defined as activities such as clearing, grading, and excavating that leave soil exposed. The general NPDES Construction Permit requires the submittal of a Notice of Intent and an Erosion and Sediment Control Plan to the county conservation district. If less than five acres is disturbed, only an Erosion and Sediment Control Plan would be required. This Erosion and Sediment Control Plan would include procedures for the development, implementation, and maintenance of best management practices to be used during the construction phase to minimize non-point source pollution. Additionally, measures identified in FAA Advisory Circular 150/5370-10A, *Standards for Specifying Construction of Airports, Item P-156, Temporary Air and Water Pollution, Soil Erosion, and Siltation Control,* should also be incorporated into the design and construction of the proposed Airport development projects to minimize adverse water quality effects, including control of water pollution during construction.

At Chandler Municipal Airport, the proposed Airport improvement projects would not impound, divert, drain, control, or otherwise modify the waters of any stream or other body of water. Therefore, the Fish and Wildlife Coordination Act does not apply to these projects. In addition, Chandler Municipal Airport is not within an area of a Sole Source Aquifer; therefore, Section 1424(e) of the Safe Drinking Water Act, as amended, does not apply. With regard to proposed construction activities, the Airport and all applicable contractors will need to comply with the requirements and procedures of the construction related NPDES General Permit, including the preparation of a *Notice of Intent* and a *Stormwater Pollution Prevention Plan*, prior to the initiation of product construction activities.

DEPARTMENT OF TRANSPORTATION ACT, SECTION 4(f)

The Department of Transportation Act of 1966, Section 4(f), recodified at 49 USC, Subtitle I, Section 303, provides that no project shall be approved if it requires the use of land from a publicly owned park, recreational area, wildlife refuge or historic site, unless there is "no feasible and prudent alternative." Additionally, Section 6(f) of the Land and Water Conservation Act prohibits the taking of lands purchased with land and water conservation funds.

At Chandler Municipal Airport, because the proposed Airport development projects will occur within Airport property and the areas of potential impact, including the areas

within the 65 DNL contour, do not include any Section 303 (c) lands, there will be no direct or indirect impacts to Section 303 (c) or Section 6(f) lands.

HISTORIC, ARCHITECTURAL, ARCHAEOLOGICAL, AND CULTURAL RESOURCES

The National Historic Preservation Act of 1966 (NHPA), as amended, provides for the preservation of historic and archaeological resources including districts, sites, buildings, structures, objects, and landscapes included in or eligible for inclusion in the state and National Register of Historic Places (NRHP), or areas designated as historically or archaeologically sensitive. In addition, Section 106 of the NHPA directs the heads of federal agencies and departments, or independent agencies that have direct or indirect jurisdiction over a federal or federally assisted action to "take into account the effect of the undertaking on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register."

The Archaeological and Historic Preservation Act of 1974 provides for the survey, recovery, and preservation of significant scientific, prehistoric, archaeological, or paleontological data when such data may be destroyed or irreparably lost due to a federal, federally licensed, or federally funded project.

At Chandler Municipal Airport, data from the State Historic Preservation Office (SHPO) including locations of Official Historical Markers and National Register of Historic Places properties indicates that there are no historical sites located on Airport property or within areas associated with the proposed Airport development program. However, prior to construction of the proposed projects, further coordination with the Arizona State Historic Preservation Office should be undertaken to confirm the action's adherence to NHPA requirements.

BIOTIC COMMUNITIES/THREATENED AND ENDANGERED SPECIES

Section 7 of the Endangered Species Act (ESA), as amended, applies to federal agency actions and requires each agency, generally the lead agency, to ensure that any action the agency authorizes, funds, or carries out is not likely to jeopardize the continued existence of any federally listed endangered or threatened species or result in the destruction or adverse modification of critical habitat. In addition, the Fish and Wildlife Coordination Act requires that agencies consult with the state wildlife agencies and Department of the Interior (FWS) concerning the conservation of wildlife resources where the water of any stream or other water body is proposed to be controlled or modified by a federal agency or any public or private agency operating under a federal permit.

Chandler Municipal Airport is located within a highly urbanized area. As part of the environmental studies that would be performed for the environmental documentation in conjunction with the proposed Airport projects, an on-site biological survey would be

performed to ensure that no threatened and endangered wildlife or plant species occur within the project area.

WETLANDS

EO 11990, "Protection of Wetlands," DOT Order 5660.1A, the Rivers and Harbors Act of 1899, and the Clean Water Act, Section 404, address activities in wetlands. Specifically, E.O. 11990 requires federal agencies to ensure that their actions minimize the destruction, loss, or degradation of wetlands. It also ensures the protection, preservation, and enhancement of the nation's wetlands to the fullest extent practicable during the planning, construction, funding, and operation of transportation facilities and projects (7CFR Part 650.26, August 6, 1982). DOT Order 5660.1A establishes DOT policy that transportation facilities should be planned, constructed, and operated to ensure protection and enhancement of wetlands.

At Chandler Municipal Airport, there are no wetlands located within or adjacent to the Airport. Therefore, there will be no impacts to wetlands resulting from the proposed Airport development projects.

FLOODPLAINS

Floodplains are land areas adjacent to a river or stream or other body of flowing water which is, on the average, likely to be covered with flood waters resulting from a 100-year frequency storm. Maintaining floodplains are critical in that they provide important flood water storage functions, and projects that propose building or filling a floodplain must provide compensation for any waters that might be displaced during a flood event. Development in a floodplain must also be managed so as to prevent any potential release of hazardous materials or wastes during a flood.

EO 11988 directs federal agencies to take action to reduce the risk of flood loss, minimize the impact of floods on human safety, health, and welfare, and restore and preserve the natural and beneficial values served by floodplains. Agencies are required to make a finding that there is no practicable alternative before taking action that would encroach on a base floodplain based on a 100-year flood (7 CFR Section 650.250).

According to the Flood Insurance Rate Map (FIRM) for Maricopa County, Arizona dated September 30, 2005 (Panel 2665 of 4350), a 100-year floodplain (Flood Zone AH) exists along the eastern side of the levee on the western and northwestern borders of the Airport, including the existing approach end of Runway 4L, the existing southwest end of Taxiway A, and a portion of the aircraft parking apron on the north side of the airfield. It should also be noted that Flood Zone AH is the flood insurance rate zone that corresponds to the areas of 1-percent annual chance shallow flooding with a constant water-surface elevation (usually areas of ponding) where average depths are between 1 and 3 feet. Mandatory flood insurance purchase requirements apply.

Based on review of FEMA maps, the southwestern-most portion of the proposed extension of Taxiway B to the end of Runway 4L would extend into this Zone AH floodplain boundary. This designation indicates that this portion of the study area is within the boundaries of the 100-year floodplain and that base flood elevations and flood hazard factors have been determined. Federal regulations allow development encroachment into the floodplain if the encroachment does not increase the base flood elevation by more than one foot. During construction of the proposed Airport improvement projects, local regulations must be complied with and precautions taken to minimize potential impact to the existing floodplain and floodway areas.

COASTAL ZONE MANAGEMENT PROGRAM AND COASTAL BARRIERS

The Coastal Barriers Resources Act (CBRA) and the Coastal Zone Management Act (CZMA) govern federal activities involving or affecting coastal resources. Since neither Chandler Municipal Airport nor its host community lie within the vicinity of a coastal zone or barrier, these requirements do not apply to the proposed Airport improvements.

WILD AND SCENIC RIVERS

The Wild and Scenic Rivers Act (P.L. 90-542, as amended) protects rivers that are listed on the National Inventory of Wild and Scenic Rivers. However, there are no rivers in the vicinity of the Chandler Municipal Airport listed in the U.S. Department of Interior's Inventory of National Wild and Scenic Rivers (see http://www.nps.gov/rivers/wildriverslist.html#az). Therefore, there can no impacts to designated wild and scenic rivers as a result of the implementation of the Airport projects included in the Master Plan Update.

PRIME AND UNIQUE FARMLANDS

The Farmland Protection Policy Act (FPPA) requires that federal actions consider the impact to prime or unique farmland, and that such actions must be compatible with state, local, and private programs intended to protect farmland. The requirements of FPPA are not applicable to farmland already committed to urban development by designation as commercial, industrial and residential use in a state or local zoning ordinance or land use plan.

At Chandler Municipal Airport, the proposed Airport development projects will occur on Airport property which is dedicated to Airport use. There will be no impacts to farmlands as a result of the proposed projects.

ENERGY SUPPLY AND NATURAL RESOURCES

FAA Order 1053.1, *Policies and Procedures for Energy Planning and Conservation,* provides for assessing energy demands related to airport improvement projects. The effects of the airport development on energy supply typically relate to the amount of energy required for the following:

- Stationary facilities (such as terminal building heating and cooling and airfield lighting)
- Movement of air and ground materials

At Chandler Municipal Airport, the effects of Airport development on natural resources typically relate to the transportation and installation of basic construction materials, such as gravel, fill dirt, etc. From an airfield and facilities operations and maintenance perspective, it is anticipated that the local power company will have no difficulty in meeting the future energy demands of the proposed hangar facilities. Additionally, it should be noted that total aviation activity at the Airport is projected to increase approximately 2.7 percent compounded annually. At these levels of total growth, energy consumption by aircraft and vehicles will not be expected to appreciably increase as a result of implementing the proposed Airport development program.

LIGHT EMISSIONS

Airport-related light emissions and the resulting glare from lighted and flashing airport lighting facilities have the potential to create an annoyance to surrounding residential communities. In general, however, light emissions created by general aviation airports are considered to be minimal. As indicated in FAA Order 5050.4B, light emissions generally do not result in impacts to adjacent residential communities unless there are unusual circumstances, such as high intensity strobe lighting aimed directly at an individual house.

The proposed development projects at Chandler Municipal Airport include the extension of Runway 4R-22L, the extension of parallel taxiways to the end of Runway 4L and both ends of Runway 4R-22L which would include the installation of additional taxiway and runway lighting. They will not include the installation of approach lighting systems, which are most often the source of light emissions concerns. It is not expected that the installation of standard runway and taxiway lights would result in an increase to any existing light emission impacts currently being realized by nearby residences. In fact, it should also be noted that there have never been any complaints regarding the existing taxiway and runway lights on the Airport.

SOLID WASTE IMPACTS

Two of the most important statutes in the construction and operation of airport facilities and navigational aids are the Resource Conservation and Recovery Act (RCRA), as amended by the Federal Facilities Compliance Act of 1992, and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended (also known as Superfund). RCRA governs the generation, treatment, storage, and disposal of hazardous wastes and CERCLA provides for the cleanup of any releases of a hazardous substance (excluding petroleum) into the environment. FAA actions to fund, approve, or conduct an activity require consideration of hazardous material and solid waste impacts.

In an effort to identify any presence of known hazardous waste sites within the areas that could be impacted by the construction of the proposed Airport improvement projects, the EPA databases of hazardous waste information was reviewed. These databases include information on hazardous waste generators, as well as hazardous waste sites (see http://www.epa.gov/enviro/html/rcris/). Based on this review, two RCRA-listed sites were identified in the vicinity of Chandler Municipal Airport. One is Estergard Aviation Inc, located at 2330 S. Airport Boulevard, and the other is Varga Enterprises located at 2350 S. Airport Boulevard. Estergard Aviation is not located on Airport property.

In addition to these two sites, there are no aged crop duster areas on the Airport as well as underground storage tanks that have been remediated through the Arizona Department of Environmental Quality (ADEQ). These remediation sites will be evaluated in subsequent environmental analyses to determine their impact as a result of the proposed Airport development plan.

Prior to further Airport development, the project areas will be the subject of further investigations so as to identify and remediate any other areas of potential hazardous waste contamination in accordance with state and federal regulations.

In addition to hazardous waste sites, solid waste impacts must be evaluated in conjunction with airport development. These impacts include the following:

- Impacts on solid waste generation
- Location of existing solid waste disposal facilities in the vicinity of proposed runways

At Chandler Municipal Airport, no significant increases in solid waste generation are anticipated as a result of the proposed Airport improvements, with the only additional waste expected to be that which will be associated with the construction of the aviation facilities. Existing waste collection and disposal facilities will be adequate to handle the waste associated with the construction of these Airport facilities.

FAA Order 5200.5, *FAA Guidance Concerning Sanitary Landfills On or Near Airports,* states that "sanitary landfills will be considered as an incompatible use" if located within 1,500 meters (approximately 4,921 feet) of all runways planned to be used by piston type aircraft and within 3,000 meters (approximately 9,843 feet) of all runways planned to be used by turbo aircraft. Airports located closer than these distances to sanitary landfills have an increased risk of bird hazards. There are no active sanitary landfills within five miles of Chandler Municipal Airport; therefore, there would be no potential bird hazards as a result of the proposed runway improvements.

CONSTRUCTION IMPACTS

Specific impacts that can occur as a result of construction activities include noise of construction equipment on the site, noise and dust from delivery of materials through local streets, disposal of soil, air pollution from construction equipment exhaust and dust, and water pollution from erosion. To the extent necessary, mitigation of construction impacts would be accomplished by incorporating in the project specifications from the provisions of FAA Advisory Circular 150/5370-10, *Standards for Specifying Construction of Airports,* and FAA Advisory Circular 150/5370-10A, *Standards for Specifying Construction of Airports, Item P-156, Temporary Air and Water Pollution, Soil Erosion, and Siltation Control.* Potential construction-related water quality impacts would be minimized through the implementation of a sediment and erosion control plan.

Note that construction activities would require workers and machinery to be present in and about the operations areas of the Airport. In some cases, runway or taxiway closures may be required for short periods of time. Guidelines as cited in FAA Advisory Circular 150/5370/2C, *Operation Safety on Airports, During Construction,* would be enforced where applicable. Runway or taxiway closure conditions will be kept to a minimum in an effort to minimize inconvenience to Airport users.

SUMMARY

There are no major environmental issues on or around Chandler Municipal Airport that would preclude or impede the implementation of the proposed Airport development projects. As part of the NEPA documentation process, additional coordination with resource agencies will be required prior to project construction, but no significant impacts are apparent.

CHAPTER SIX: AIRPORT DEVELOPMENT SCHEDULE AND FINANCIAL ANALYSIS

INTRODUCTION

This chapter details the various projects required for the continued improvement and operation of Chandler Municipal Airport throughout the Master Plan Update's 20-year planning period. These projects, by phase (time period), include estimates of probable project costs in constant 2006 dollars. The estimates are intended to be used for planning purposes only and should not be construed as construction cost estimates, which can only be compiled following the preparation of detailed design documentation.

The 20-year Capital Improvement Program (CIP) is broken down into the following three development phases:

- Phase I: Short–Term (first five years)
- Phase II: Intermediate-Term (second five years)
- Phase III: Long-Term (last 10 years)

This chapter also presents a financial evaluation of Chandler Municipal Airport and examines various facets of the financial operating condition of the Airport. In addition, this chapter examines historic operating revenues and expenses at the Airport and develops projections of future operating results. Financial projections of revenues and expenses at the Airport focus on the short- and mid-term planning period and are used to identify the ability of the Airport to contribute to the local share of anticipated project costs, as necessary.

PHASING OF PROPOSED DEVELOPMENT

A list of capital improvement projects has been assembled based on the preferred development alternative established in Chapter 4, *Development Alternatives*, of this Master Plan Update. This project list has been coordinated with the Airport Layout Plan (ALP) drawing set and the CIP that is continuously updated by Airport management and the Federal Aviation Administration (FAA). The CIP itself has three primary purposes: it identifies improvement projects that will be required at an airport over a specific period of time; it estimates the order of implementation of the projects included in the plan; and it estimates the total costs and funding sources of the projects. It is important to note that as the CIP progresses from projects planned in the current year to projects planned in future years, the plan becomes less detailed and more flexible. Additionally, the CIP is typically modified on an annual basis as new projects are identified or as projects or funding change.

Phase I: Short-Term Development (0-5 Years)

A. FAR Part 150 Noise Compatibility Study Update
Since the Airport's Part 150 Noise Compatibility Study was last updated in 1998, aircraft activity has significantly exceeded that which was projected. As such, per FAA and ADOT requirements, the Part 150 Study should be updated based on the current operational levels, as well as those forecasted in this Master Plan Update.

B. Airport Pavement Preservation – Runway 4L/22R and Apron
The Airport airfield pavement surfaces, including runways, taxiways and apron areas, require periodic maintenance to extend their useful lives. This project is comprised of two phases: maintenance of Runway 4L/22R and maintenance of the aircraft parking apron.

C. Airport Storm Drain
This project is Phase II of the Airport Terminal Area Storm Drainage System improvement program that will allow apron area runoff from storm water events to drain and be retained properly on Airport property. This will help prevent deterioration of the affected apron pavement subgrade and extend the pavement life. Phase I was completed in 1996.

D. North Airport Apron Construction
An aircraft parking apron on the north side of the Airport is needed to provide additional aircraft tiedown areas. This project will develop apron areas on the north side of the Airport in two phases. Phase I will encompass the design and construction of the "Armory Apron," located directly north of the existing Santan Apron, while Phase II (referred to as the Northwest Apron) will include the design and construction of a new apron area located north of Ryan Road and west of Curtis Road.

E. Airport Boulevard & Terminal Parking
Airport Boulevard must be relocated to provide access from Cooper Road to the Airport areas immediately north of Ryan Road. This is critical since Cooper Road will become the primary means of entry to the Airport with the completion of the Santan Freeway (Loop 202). Additionally, new automobile parking areas are needed to meet a current deficiency in parking spaces, as well as increasing demand for parking spurred by continued development in the north terminal area.

F. Perimeter Road
This project includes the construction of a paved airport perimeter road to eliminate mid-field crossing by fuel trucks serving future development on the south side of the Airport.

G. South Airport Apron Construction
Additional apron and development areas will be required to accommodate the demand by additional aircraft as well as the need for an additional fixed-base operator (FBO) and other specialized aviation services as reflected previously in this Master Plan. The south side of the Airport offers prime parcels for this type of development. As such, this project will begin development of this side of the Airport with the construction of an apron area along the southeast side of the runway/taxiway system.

H. Airport Light Vault Reconstruction
The existing Airport lighting control vault was installed in the early 1990s, and its components are outdated, deteriorating, and require special orders/servicing. A renovation of the existing lighting vault will update the facility, install climate controls to extend the life of the facility and provide more reliable circuitry to the Airport lighting system.

I. Upgrade Tower Voice Switch Gear/Transmitter
The FAA-contractor for air traffic control tower (ATCT) services will add additional control personnel in the tower as the number of operations at the Airport continues to grow. As such, additional equipment, including a voice switch gear and transmitter/receiver, will be required to separate ground, flight, and weather operational duties.

J. Airport Guidance Sign Replacement
This project involves two phases for replacing the existing or installing new mandatory Airport guidance signs for the runway/taxiway. This first phase will address signage changes requested by the FAA Runway Incursion Action Team (RIAT) as well as changes resulting from updated FAA signage standards. The second phase is needed to replace the remaining existing signs, originally installed from 1990 to 1993.

K. Aircraft Storage Facilities
This project will consist of two primary construction phases. Phase I will include the construction of two canopy or shade hangars that will each house 25 aircraft. Phase II will include the construction of three T-hangar buildings, each having 11 hangar units.

L. Airport Erosion Control
This project will establish a shoulder along all movement area pavements. This will prevent erosion of these edges and any resulting RSA safety concerns.

M. Existing Airport Terminal Apron Improvement
This project includes improvements to the existing terminal aircraft parking apron that will upgrade the taxilane and tiedowns that serve the aircraft tiedown area directly in front of the terminal building. The aircraft parking pavement in this

area will be upgraded to sustain the same weight bearing capacity as the runways and taxiways.

N. Taxiway B Construction
This project will extend Taxiway B to the southeast between Taxiways N and H. This project is necessary in order to allow the ATCT to more efficiently handle aircraft from both runways and help relieve aircraft congestion from Taxiway A.

O. Taxiway A Run-Up Area Construction
This project will provide a new aircraft run-up area near the east end of Taxiway A to provide a large area off the taxiway where aircraft can perform engine preflight tests prior to takeoff.

P. Runway 4R-22L Extension/Associated Taxiways
The extension of Runway 4R-22L has been discussed at length in Chapter 4, *Development Alternatives.* It is anticipated that this project will encompass several phases: the relocation of the Runway 4R threshold, and associated taxiways, 250 feet to the southwest; the relocation of the Runway 22L threshold, and associated taxiways, 600 feet to the northeast; and the overall rehabilitation of the existing pavement to the full extent.

Phase II: Mid-Term Development (5-10 Years)

Q. Other Taxiway/Runway Modifications/Standards
This project establishes a new taxiway or taxiway extension around the end of Runway 22R. Such a runway will greatly increase the efficiency and factor of safety of the airfield by definitely helping to minimize the number of runway crossings and the resultant possibility of incursions. Other taxiway improvements will be needed to meet standards and provide a full taxiway to both runways.

R. South Airport Apron Access Improvements
As development progresses around the south Airport apron area, it is anticipated that upgrades to the surface road infrastructure and an increase in automobile parking will be required.

S. Update Airport Master Plan
The FAA typically recommends that airport master plans be update every five to seven years, depending on the changes that have occurred since the completion of the previous master plan. A master plan update will be needed in the mid-term period.

Phase III: Long-Term Development (10-20 Years)

T. Aircraft Storage Facilities
This project will consist of the construction of four T-hangar buildings, each having 11 hangar units.

U. Update FAR Part 150 Noise Compatibility Study
With a planned update in 2007, a subsequent update should be conducted in the long-term planning horizon. The Part 150 Study should be updated based on the operational levels at the time of conduct, as well as those forecasted in the updated Master Plan.

COST ESTIMATES

Table 6.1 presents a summary of the proposed capital improvements over the 20-year planning period, broken down by phase, with estimates of the eligibility for all projects by funding source.

Table 6.1
SUMMARY TABLE

Phase	FAA Share	State Share[1]	Local Share	Total Cost
Phase I	$22,678,540	$14,660,482	$5,423,181	$42,762,203
Phase II	$13,724,175	$621,263	$390,063	$14,735,501
Phase III	$308,750	$633,125	$1,883,125	$2,825,000
TOTAL	**$36,711,465**	**$15,914,870**	**$7,696,369**	**$60,322,704**

[1] Includes ADOT Airport Loan Program
SOURCE: Wilbur Smith Associates
PREPARED: December 2006

Tables 6.2 through **6.4** list each proposed improvement and show a total cost estimate for the planning, design, and construction of each project. The estimates contained in these tables were derived from analyzing similar projects, but should be re-evaluated at the time of project initiation. Tables 6.2 through 6.4 respectively depict anticipated costs for the Short-Term (Phase I), Intermediate-Term (Phase II), and Long-Term (Phase III) developments included in the Airport's CIP. Phase I (shown in Table 6.2) contains approximately $42.76 million in capital projects including the north Airport apron projects, south Airport apron projects, airfield improvements including taxiway construction, runway extension, T-hangar/shade hangar development and other miscellaneous projects. It is estimated that the sponsor share of Phase I capital costs will be approximately $5.42 million and the state share will be approximately $14.66 million with the balance ($22.68 million) being eligible for funding from the FAA.

Table 6.2
PHASE I (0 – 5 Years)

Project	FAA Eligible	State Share	Local Share	Total Cost
A. FAR Part 150 Noise Compatibility Study Update	$315,400	$8,300	$8,300	$332,000
B. Airport Pavement Preservation – Runway 4L/22R and Apron	$0	$985,050	$109,450	$1,094,500
C. Airport Storm Drain	$935,750	$24,625	$24,625	$985,500
D. North Airport Apron Construction	$6,159,800	$348,850	$182,850	$6,691,500
E. Airport Boulevard & Terminal Parking	$527,440	$2,672,030	$40,730	$3,240,200
F. Perimeter Road	$427,500	$11,250	$11,250	$450,000
G. South Airport Apron Construction	$8,379,000	$864,900	$307,600	$9,551,500
H. Airport Light Vault Reconstruction	$0	$489,150	$54,350	$543,500
I. Upgrade Tower Voice Switch Gear/Transmitter	$33,725	$888	$888	$35,500
J. Airport Guidance Sign Replacement	$1,072,550	$90,325	$35,125	$1,198,000
K. Aircraft Storage Facilities	$0	$812,500[1]	$4,419,500	$5,232,000
L. Airport Erosion Control	$785,175	$20,663	$20,663	$826,500
M. Existing Airport Terminal Apron Improvement	$0	$570,150	$63,350	$633,500
N. Taxiway B Construction	$1,820,200	$188,300	$63,500	$2,072,000
O. Taxiway A Run-Up Area Construction	$0	$202,500	$22,500	$225,000
P. Runway 4R-22L Extension	$2,222,000	$58,500	$58,500	$2,339,000
TOTAL	**$22,678,540**	**$14,660,482**	**$5,423,181**	**$42,762,203**

[1] ADOT Airport Loan Program
SOURCE: Chandler Municipal Airport
PREPARED: December 2006

Table 6.3
PHASE II (6 – 10 Years)

Project	FAA Eligible	State Share	Local Share	Total Cost
G. South Airport Apron Construction	$7,066,575	$446,063	$214,863	$7,727,500
Q. Other Taxiway/Runway Modifications/Standards	$3,040,000	$80,000	$80,000	$3,200,000
R. South Airport Apron Access Improvements	$3,332,600	$87,700	$87,700	$3,508,000
S. Update Airport Master Plan	$285,000	$7,500	$7,500	$300,000
TOTAL	**$13,724,175**	**$621,263**	**$390,063**	**$14,735,501**

SOURCE: Chandler Municipal Airport
PREPARED: December 2006

Table 6.4
PHASE III (11 – 20 Years)

Project	FAA Eligible	State Share	Local Share	Total Cost
T. Aircraft Storage Facilities	$0	$625,000	$1,875,000	$2,500,000
U. Update FAR Part 150 Noise Compatibility Study	$308,750	$8,125	$8,125	$325,000
TOTAL	**$308,750**	**$6 33,125**	**$1,883,125**	**$2,825,000**

SOURCE: Chandler Municipal Airport and Wilbur Smith Associates
PREPARED: December 2006

Phase II contains approximately $14.74 million in total capital projects, as shown in Table 6.3. These projects include the completion of the south Airport apron development area, runway and taxiway modifications and standards, additional apron access improvements, and updating the Airport Master Plan. The sponsor share of the proposed development plan in Phase II is approximately $390,063 while the state share is estimated at $621,263. Table 6.4 lists the Phase III development that includes additional storage facilities and an update of the FAR Part 150 Study. Phase III capital costs are currently estimated at $2.83 million.

When combined, the 20-year CIP for the Airport represents over $60 million in development projects. Approximately 61 percent of the total is eligible for federal participation, 26 percent is eligible for state grants and loans, and 13 percent will need to be funded locally.

CAPITAL FUNDING SOURCES

This section describes the various funding sources that are potentially available for Airport development initiatives and their respective eligibility criteria.

FAA Funding

From the inception of flight to the advent of the first airparks, the United States Government has been an active advocate for the establishment, maintenance, and growth of aviation throughout the country. Recognizing aviation's value as a resource for national defense, as well as its value in promoting interstate commerce, the Federal Government established a grant-In-aid funding program to units of State and local government following World War II. That early program, the Federal Aid Airport Program (FAAP), was authorized by the Federal Treasury Act of 1946 and provided its funding to airports directly from the U.S. Treasury.

However, it was not until the Airport and Airway Revenue Act of 1970 that a comprehensive aviation development program was formally established. This Act created the Airport and Airway Trust Fund (also known as the Aviation Trust Fund), which was funded exclusively through taxes on airline tickets, air freight, and aviation fuel. The purpose of the Aviation Trust Fund was to establish a source of funding collected only from the users of the nation's airport system that could be used to finance airport improvements at system airports. Through this trust fund, the Federal Government was able to provide grants for airport planning and for airport development throughout the country.

The current program, known as the Airport Improvement Program (AIP), was established by the Airport and Airway Improvement Act of 1982 (Public Law 97-248). Since then, the AIP has been amended several times, most recently with the passage of the Wendell H. Ford Aviation Investment and Reform Act for 21st Century (AIR-21). Administered by the FAA through its regional and airport district offices, the current AIP

legislation provides for two types of funding (entitlement funds and discretionary funds) that must be spent on FAA eligible projects as defined in FAA Order 5100.38C, *Airport Improvement Program Handbook*. In general, the handbook states the following:

- An airport receiving funding must be in the currently approved National Plan of Integrated Airport Systems (NPIAS)
- AIP provides up to 95 percent federal funding for most eligible public-use airport improvements
- Eligible projects include those that preserve or enhance safety, security, or capacity of the national air transportation system; reduce noise or mitigate noise impacts resulting from aircraft; and, if applicable, furnish opportunities for enhanced competition between or among air carriers
- Eligible projects must be shown on a current Airport Layout Plan
- General aviation terminal buildings, T-hangars, and corporate hangars and other private-use facilities may be eligible for federal funding, but are subject to other funding requirements

Specifically, AIP provides entitlement grants to eligible commercial service airports through a formula based primarily on passenger enplanements, and to eligible general aviation airports through non-primary entitlements and state apportionments. Within the entitlement amount granted, up to 95 percent of eligible project costs are funded, with the remaining 5 percent provided from other non-federal, local airport sources. The FAA also provides discretionary grants (also on a 95/5 basis), over and above entitlement funding, to airports for projects that have a high federal priority, such as for enhancing safety, security, and capacity of the airport, and would be difficult to fund otherwise. The amount that individual grants vary can be significant in comparison to entitlements and are awarded through an evaluation process based on need, the FAA's project priority ranking system, and the FAA's assessment of a project's significance within the national airport and airway system.

Other sources of funding within the FAA's budget appropriations include Facilities and Equipment (F&E) funding for the installation and maintenance of various navigational aids and equipment for the national airspace system, including facilities such as air traffic control towers, approach lighting systems, and some runway instrumentation. This funding is separate from the AIP program and typically requires no local match. It is provided on a discretionary basis by the FAA. Federal noise funds (Part 150 funds) may also be available for noise mitigation with an 80 percent federal and a 20 percent state and/or local share.

State Funding

In support of the state aviation system, the State of Arizona also participates in airport improvement projects through its own grant program. The source for State airport improvement funds is the Arizona Aviation Fund administrated by the Arizona Department of Transportation (ADOT) Aeronautics Division and funded mainly through

flight property taxes, aircraft lieu taxes and aviation fuel taxes. The State Transportation Board establishes the policies for distribution of these State funds across three major categories of airport development assistance:

- Airport Development Grants Program (including AIP, state and local funded projects)
- Airport Preventive Maintenance Services (APMS) (including projects maintaining and protecting aviation pavement surfaces)
- Airport Loan Program (including economic development/revenue generating loans, and grant match loans)

Specifically, the State's Airport Development Grants Program is designed to provide 50 percent of the local share for projects receiving federal AIP funding. Current sponsor obligations on federal projects are 5 percent of a project's total cost, making the state share 2.5 percent. The State's Airport Preventive Maintenance Services also may fund up to 90 percent of a primary airport project and 95 percent of a secondary airport project (primary and secondary are Arizona airport classifications) which is not eligible for AIP funding, such as pavement maintenance.

Additionally, ADOT Aeronautics Division has an Airport Loan Program, established to enhance the utilization of state funds and provide a flexible funding mechanism to assist airports in funding improvement projects. Eligible projects include runways, taxiways, aircraft parking ramps, aircraft storage facilities (hangars), fueling facilities, general aviation terminal buildings or pilot lounges, utility services (power, water, sewer, etc.) to the airport runway or taxiway lighting, approach aids (electronic or visual), ramp lighting, airport fencing, airport drainage, land acquisition, planning studies, and under certain conditions, the preparation of plans and specifications for airport construction projects. Projects not eligible for funding under other programs but are designed to improve an airport's ability to be financially self-sufficiency may also be considered.

There are three types of loans available through the program: Grant Advance, Matching Grant, or Revenue Generating. Grant Advance loan funds are provided when the airport can demonstrate the ability to accelerate the development and construction of a multi-phase project. The project(s) must be compatible with the Airport Master Plan and be included in the ADOT 5-year Airport Development Program. The Matching Grant loan funds are provided to meet the local matching fund requirement for securing federal airport improvement grants or other federal or state grants. These loans cannot be repaid with future airport development grant funds. The Revenue Generating loan funds are provided for airport related development/construction projects, which are not eligible for funding, in whole or part, under other programs and are designed to improve airport financial self-sufficiency.

Sponsor Funding

Airport Operating Revenues and Expenses

Airport revenues are typically generated through user fees charged by the airport for the facilities and services that are provided. These user fees are typically established by the airport based on market conditions in the area and vary airport-to-airport. Airport operating revenues are collected at Chandler Municipal Airport from the following primary sources:

- Fixed Leases (Hangar & Field Fees)
- Tie Down Fees
- Fuel Sales
- Concessions (Fuel Flowage Fee)
- Other Revenues

Landside facility development and levels of aviation activity are typically the primary factors affecting airport operating revenues. As additional development occurs, the number of based aircraft and itinerant aircraft operations increase and leases are updated at the Airport, it is likely that operating revenues will increase in a corresponding fashion. Projections of future Airport operating revenues are developed in a subsequent section.

Airport operating revenues are offset by operating expenses, typically referred to as Operation and Maintenances (O&M) costs. Airport operating expenses are comprised of the day-to-day costs incurred by operating the Airport. They do not include non-cash and capital costs associated with depreciation, debt service, and infrastructure development. Primary components of O&M costs at Chandler Municipal include the following:

- Salaries, Wages and Related
- Professional Services
- Operating Supplies (aviation fuel)
- Repairs and Maintenance
- Other Expenses

Like operating revenues, certain components of Airport operating expenses fluctuate with activity levels. However, there are some significant fixed expenses, such as personnel, that could be maintained at or near current levels while accommodating significant increases in Airport activity.

Historic Airport operating revenues and expenses for Chandler Municipal Airport over the five most recent fiscal years are presented in **Table 6.5**.

Table 6.5
ON-AIRPORT OPERATING REVENUES AND EXPENSES

Project	FY2002	FY2003	FY2004	FY2005	FY2006
Operating Revenues					
Fixed Leases	$118,897	$123,680	$125,688	$141,240	$154,141
Tiedown Fees	$337,108	$335,135	$368,380	$380,041	$400,311
Fuels Sales	$227,574	$293,506	$346,321	$362,203	$405,329
Fuel Flowage Fees	$48,746	$44,682	$38,485	$47,936	$49,448
Other Revenues	$8,429	$34,292	$22,736	$18,067	$24,937
Total Operating Revenues	**$740,754**	**$831,295**	**$901,610**	**$949,487**	**$1,034,166**
Operating Expenses					
Salaries, Wages and Related	$156,997	$217,702	$249,285	$295,100	$402,846
Office / Utilities / Admin / Equip / Misc.	$136,448	$129,557	$101,356	$109,633	$113,721
Repairs and Maintenance	$17,200	$25,414	$29,011	$40,935	$27,962
Revenue Supplies (aviation fuel)	$179,037	$252,717	$301,175	$322,158	$358,927
Total Operating Expenses	**$489,682**	**$625,390**	**$680,827**	**$767,826**	**$903,456**
Net Operating Income	**$251,072**	**$205,905**	**$220,783**	**$181,661**	**$130,710**
Capital Improvements & Annual Debt Service					
Capital Airport Improvements	$2,588,794	$63,058	$120,308	$2,818,202	$1,688,526
Internal Service Transfer (debt service)	$161,039	$137,605	$12,840	$11,833	$4,456
ADOT Debt Service	$68,911	$68,911	$68,911	$68,911	$126,350
Total Improvements / Debt Service	**$2,818,744**	**$269,574**	**$202,059**	**$2,898,946**	**$1,819,332**

SOURCE: Chandler Municipal Airport
PREPARED: November 2006

As shown in Table 6.5, while total operating revenues at the Airport increased between fiscal year (FY) 2002 and FY 2006 at an aggressive rate, operating expenses increased at a higher rate. Operating revenues at Chandler Municipal increased $293,412 from FY 2002 to FY 2006, representing a compound annual growth rate of approximately 8.7 percent. Unfortunately, operating expenses increased $413,774 over that same time period, representing a compound annual growth rate of approximately 16.55 percent. Over the same period, the net operating profit of the Airport, on an annual cash-flow basis, declined from a profit $251,072 in FY 2002 to a profit of $130,710 in FY 2006. Growth in operating revenues at the Airport has primarily been driven by increases in leases, leasing rates and fuel sales. The increase in Airport operating expenses experienced between FY 2002 and FY 2006 was realized primarily in increased aviation fuel costs and increased staff expenditures.

Projected Operating Revenues and Expenses

The continued growth of Chandler Municipal Airport, in terms of activity, tenants, new leases and facility development, will impact the Airport's operating revenues and expenses over the planning period. Actual future financial outcomes will be determined

by a variety of factors, many of which are impossible to identify at the current time. However, the projections developed in this evaluation depict future Airport operating revenues and expenses based on recent financial results, budgeted revenues and expenses for 2007, and activity and tenant growth trends identified in previous chapters.

Projections of future Airport operating revenues and expenses at Chandler Municipal for the period 2007 through 2025 are presented in **Table 6.6**. The following information for operating revenues was established through close consideration of historical trends, as well as of proposed Airport development initiatives and how they might impact those future revenues. In most cases, revenue projections resulted from normal growth factors refined to more closely reflect the unique circumstances of this Airport. On the operating expense side, increases in salaries and wages, as well as overall operational activities are based on normal growth (primarily a 3 percent annual growth), with a slightly higher growth factor for fuel costs in order to account for some of the volatility in that supply market.

Table 6.6
PROJECTED ON-AIRPORT OPERATING REVENUES AND EXPENSES

Project	FY2007 (budget)	FY2010	FY2015	FY2020	FY2025
Operating Revenues					
Fixed Leases	$235,680	$292,200	$364,500	$454,900	$567,300
Tiedown Fees	$412,970	$451,400	$532,700	$629,400	$743,100
Fuels Sales	$421,390	$506,200	$694,600	$952,800	$1,307,000
Fuel Flowage Fees	$54,340	$56,300	$68,700	$82,800	$98,400
Other Revenues	23,610	$26,600	$32,300	$37,100	$40,800
Total Operating Revenues	**$1,147,990**	**$1,332,700**	**$1,692,800**	**$2,157,000**	**$2,756,600**
Operating Expenses					
Salaries, Wages and Related	$444,808	$486,100	$563,500	$653,200	$757,300
Office / Utilities / Admin / Equip / Misc.	$210,515	$230,000	$266,700	$309,100	$358,400
Repairs and Maintenance	$36,960	$40,400	$46,800	$54,300	$62,900
Revenue Supplies (aviation fuel)	$328,750	$394,300	$548,200	$761,900	$1,059,200
Total Operating Expenses	**$1,021,033**	**$1,150,800**	**$1,425,200**	**$1,778,500**	**$2,237,800**
Net Operating Income	**$126,957**	**$181,900**	**$267,600**	**$378,500**	**$518,800**

SOURCE: Chandler Municipal Airport & Wilbur Smith Associates
PREPARED: November 2006

The projected operating revenues presented in Table 6.6 are based on historical year-end financial results for fiscal years 2002-2006 and budgeted revenues for 2007. Additionally, forecasted increases in Airport based and itinerant aircraft activities, as well as Airport tenant populations presented earlier in this Master Plan, have been incorporated in these projections. Note that considerations have also been made regarding increasing tenant lease rates and the general growth in jet fuel services. Based on projected activity growth and assumptions regarding future tenant growth and

development at Chandler Municipal Airport, operating revenues are projected to increase from $1,147,990 in 2007 to approximately $2,756,600 by 2026.
Over the same period, Airport operating expenses are projected to increase from $1,021,033 in 2007 to approximately $2,237,800 in 2025. Based on these projections, the Airport's net operating outcome is projected to improve each year between 2007 and 2025, with the Airport having an operating income potential of approximately $518,800.

Other Funding

Other funding opportunities primarily encompass private development sources and/or public/private development partnerships. These investors may construct needed airport facilities as part of a lease agreement with the airport which would, in turn, provide for an adequate time frame to amortize their investments. For example, leasehold financing refers to a developer or tenant financed improvements which occur under a long-term ground lease. The obvious advantage of such an arrangement is that it relieves the community of all responsibility for raising the capital funds for improvements. This type of funding is particularly suitable for corporate hangar development and other privately owned projects in that these types of projects are not typically eligible for the FAA or state funding described above.

However, the private development of facilities based on a ground lease, particularly on property owned by a municipal agency, produces a unique set of problems. It is more difficult to obtain private financing in that only the improvements and the right to continue the lease can be claimed in the event of a default. Ground leases normally provide for the reversion of improvements to the lessor at the end of the lease term (typically 20 years), which reduces their potential value to a lender taking possession. Also, companies that want to own their property as a matter of financial policy may not locate where land is only available for lease.

Conversely, ground leases offer a substantial financial advantage to a private developer in that there are no up-front property acquisition costs and lease payments are fully deductible for tax purposes and can be depreciated. Additionally, this option could be structured as a straight ground lease or as a joint venture. Under a straight ground lease to a developer, the City would not be involved in the construction, financing, sale, or lease of buildings for tenants. However, there may be circumstances where the City will want to participate in the construction of facilities, either as part of a joint venture or to provide inducements to attract certain tenants. The simplest way to do this is to underwrite the construction and financing of those facilities, keeping them in City ownership and leasing them to tenants.

In a joint venture arrangement, the City would provide funds for construction and permanent financing. A joint venture could be structured so that the various benefits would be available for each partner according to their highest use; for example: tax benefits (such as depreciation) would go to the private developer while cash income

would go to the City. This could be used successfully to fund individual buildings for specific tenants, where lower rents could be charged in exchange for partial ownership, producing income from both rents and interest payments.

These financing techniques offer marketing inducements, as they assume the City can obtain lower-cost funds than are available in the private market. These lower costs can then be passed through to the development process to reduce lower rental rates. To avoid the appearance of unfairly competing with the private sector, it will be important to establish comparable market rental rates.

SUMMARY

The primary goal is for Chandler Municipal Airport is to evolve into a facility that will best serve the air transportation needs of the region while simultaneously developing into a self-sustaining economic generator for the City of Chandler. This Master Plan Update can be best described as being the road map to helping the Airport achieve those goals. But it should be recognized that planning is a continuous process that does not end with completion of the Master Plan in that the fundamental basic issues that have driven this Master Plan will remain valid for many years. Therefore, the ability to continuously monitor the existing and forecast status of Airport activity will be a key ingredient in maintaining the applicability and relevance of this study.

In order to realize those goals through the successful implementation of Airport development projects, sound and measured decisions by the City of Chandler must be made. Two of the most important factors in influencing the decision to move forward with a specific improvement are Airport activity and funding timing. Both factors must be considered in the implementation of this Master Plan in that while Airport activity levels provide the “why” in the establishment of Airport improvements, the timing of funding provides the “how.” Through the course of this Master Plan effort, the “why” has been discussed in detail in previous chapters. This chapter has addressed the “how” by detailing the practical financial realities required to implement this overall Airport development program. However, it can not be understated that although every effort has been made in this effort to conservatively estimate when facility development may be needed, aviation demand will ultimately dictate when facility improvements need to be accelerated or delayed.

APPENDIX A: AIRSPACE CONFLICTS ANALYSIS

INTRODUCTION

As part of the Master Plan Update for Chandler Municipal Airport, a separate, more detailed analysis of the airspace was conducted. This separate airspace analysis provides the City of Chandler with detailed information on the potential for airspace conflicts given the changing conditions in the region. The analysis starts with an overview of the airspace, including definitions of the types of airspace in the region affecting aviation activities at Chandler Municipal Airport. Identification of potential conflicts based on existing and future conditions are then analyzed. The analysis is reported in the following sections:

- General Airspace Overview
- Air Traffic Control
- Current Airspace Issues
- Future Potential Airspace Issues
- Summary

GENERAL AIRSPACE OVERVIEW

The Chandler Municipal Airport is located among several of the busiest airports in the country in terms of aircraft take-offs and landings or operations. According to Airports Council International (ACI) Annual Traffic Data, during calendar year 2005 the Phoenix Sky Harbor International Airport (PHX) accommodated 555,256 aircraft operations while the Phoenix Deer Valley Airport (DVT) had 378,255 annual operations. This level of activity ranked the Phoenix Sky Harbor International Airport and Deer Valley airports as the 8th and 22nd busiest airports in the United States respectively. In addition to these airports, the Phoenix metropolitan area contains several other major general aviation airports, including Chandler Municipal. All combined these airports accounted for well over 2 million annual operations in 2005.

The high concentration of aircraft operations in the Phoenix area has necessitated the development of a complex airspace structure, numerous procedures, and specific equipment designed to separate aircraft from each other. The following information is intended to explain how the FAA air traffic and airspace system functions in relation to the Chandler Municipal Airport. Additionally, information will be presented on existing and future airspace conditions and developments which have the potential to impact operations at the Chandler Municipal Airport.

Aircraft operate under two general sets of operating rules, Visual Flight Rules (VFR) and Instrument Flight Rules (IFR). The airspace and air traffic control (ATC) system is primarily designed to separate aircraft operating under VFR from aircraft operating under IFR.

Under VFR, pilots are responsible to "see and avoid" other aircraft and terrain. In order to accomplish this, specific cloud clearance, terrain and visibility minimums are required by FAA regulations to be maintained. These requirements vary depending on the classification of airspace and day or nighttime operations. VFR aircraft are not required to file a flight plan or contact Air Traffic Control (ATC) unless they are planning to enter an area of restricted or controlled airspace where contact is mandatory. These areas are most commonly the airspace surrounding an airport with an operating air traffic control tower. The FAA publishes recommended procedures and altitudes for VFR flight. However, it should be noted that because contact with ATC is not required, the FAA's ability to monitor or enforce the required or recommend flight altitudes and procedures outside of controlled airspace is limited. VFR flight plans are voluntary and are used by the FAA to assist in locating lost or overdue aircraft, and not for the purpose of controlling or approving VFR flight operations.

Under IFR, aircraft are separated by ATC using radar and direct radio communications. Under IFR, aircraft may operate inside of clouds with little or no outside visibility. IFR operations occur in what is termed "controlled airspace." Controlled airspace includes five different classifications: Class A, Class B, Class C, Class D, and Class E airspace, which are different in each region served by airports. Class B, Class C, and Class D airspace are designated around at least one primary airport. For IFR operations in any class of controlled airspace, a pilot must file an IFR flight plan and receive an appropriate ATC clearance. With few exceptions, scheduled passenger and business jet aircraft operate under IFR in controlled airspace.

The following sections provide additional information and descriptions of each airspace classification.

Controlled Airspace

Controlled airspace is primarily designated to insure separation between VFR and IFR aircraft. Controlled airspace and the requirements to operate within, differ depending on the type and number of aircraft operations occurring in the area. The following sections describe the unique characteristics of each type of controlled airspace in the Phoenix metropolitan area.

Class A Airspace. The Class A airspace includes all the airspace in the Region from 18,000 feet Mean Sea Level (MSL) upward through 60,000 feet MSL. This airspace includes jet routes, area high routes, and additional control areas at or above 18,000 MSL. All flights within the Class A airspace are conducted under IFR, and are under positive control by the Air Route Traffic Control Center (ARTCC) or military controller. The ARTCC for the Phoenix Metropolitan area is located in Albuquerque New Mexico.

Exhibit A.1 shows the Area High Routes that overlay the Region which are contained in Class A airspace.

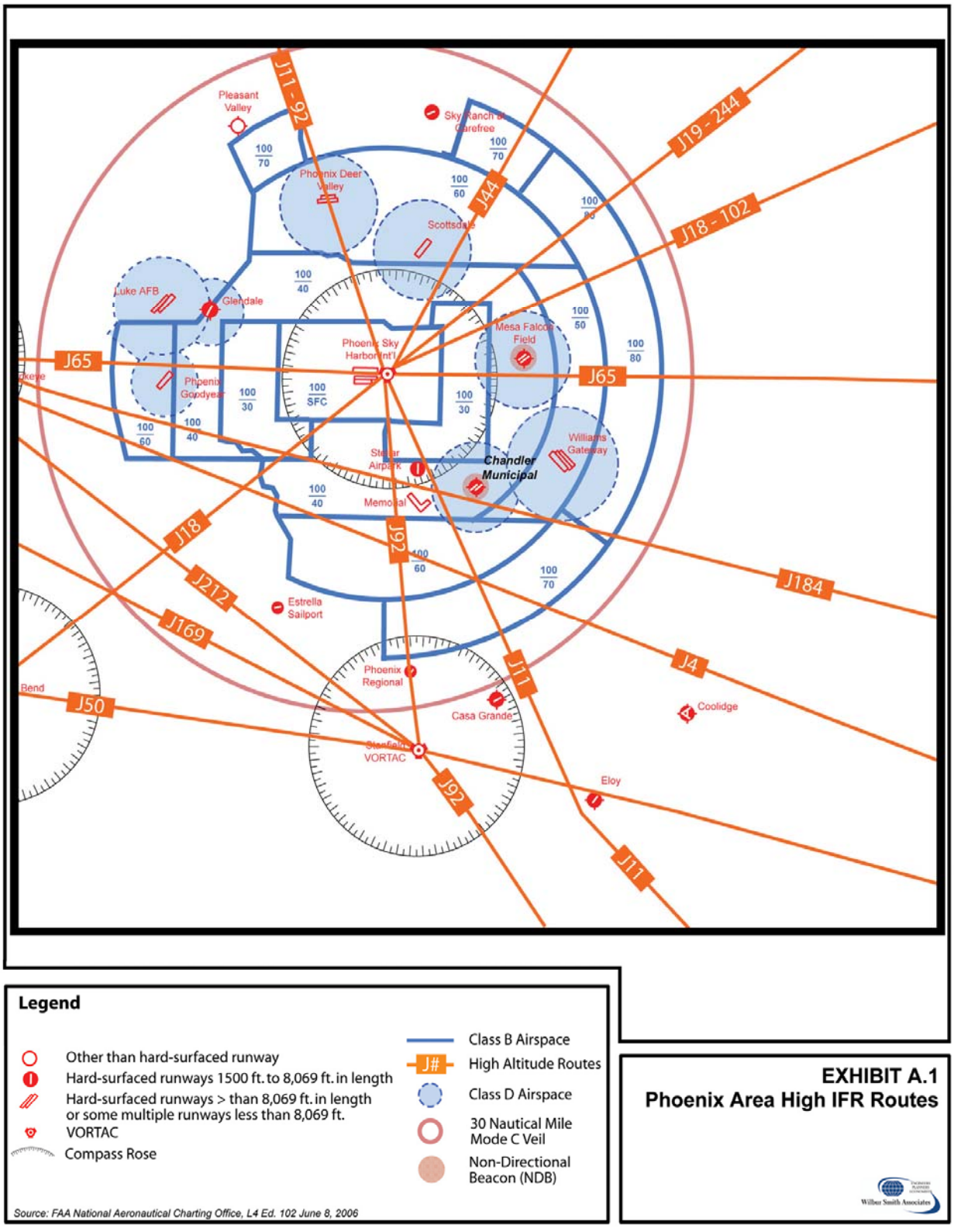


EXHIBIT A.1
Phoenix Area High IFR Routes

Class B Airspace. The Phoenix Class B Airspace is controlled airspace, centered on the Phoenix Sky Harbor International Airport (PHX), extending upward from the surface, or higher altitudes around the periphery, to specified altitudes. The top of the Class B Airspace is 10,000 feet above MSL, and the base extends from the surface at PHX to varying altitudes between 3,000 and 8,000 feet MSL. The boundaries and altitudes of each portion of the Phoenix Class B Airspace are depicted in **Exhibit A.2**. The altitude figures depicted on Class B airspace maps are displayed in hundreds. Thus a Class B airspace boundary labeled $\frac{100}{50}$ would indicate that the top or ceiling of this portion of airspace is 10,000 feet MSL and the floor or bottom of this portion of airspace is 5,000 feet MSL.

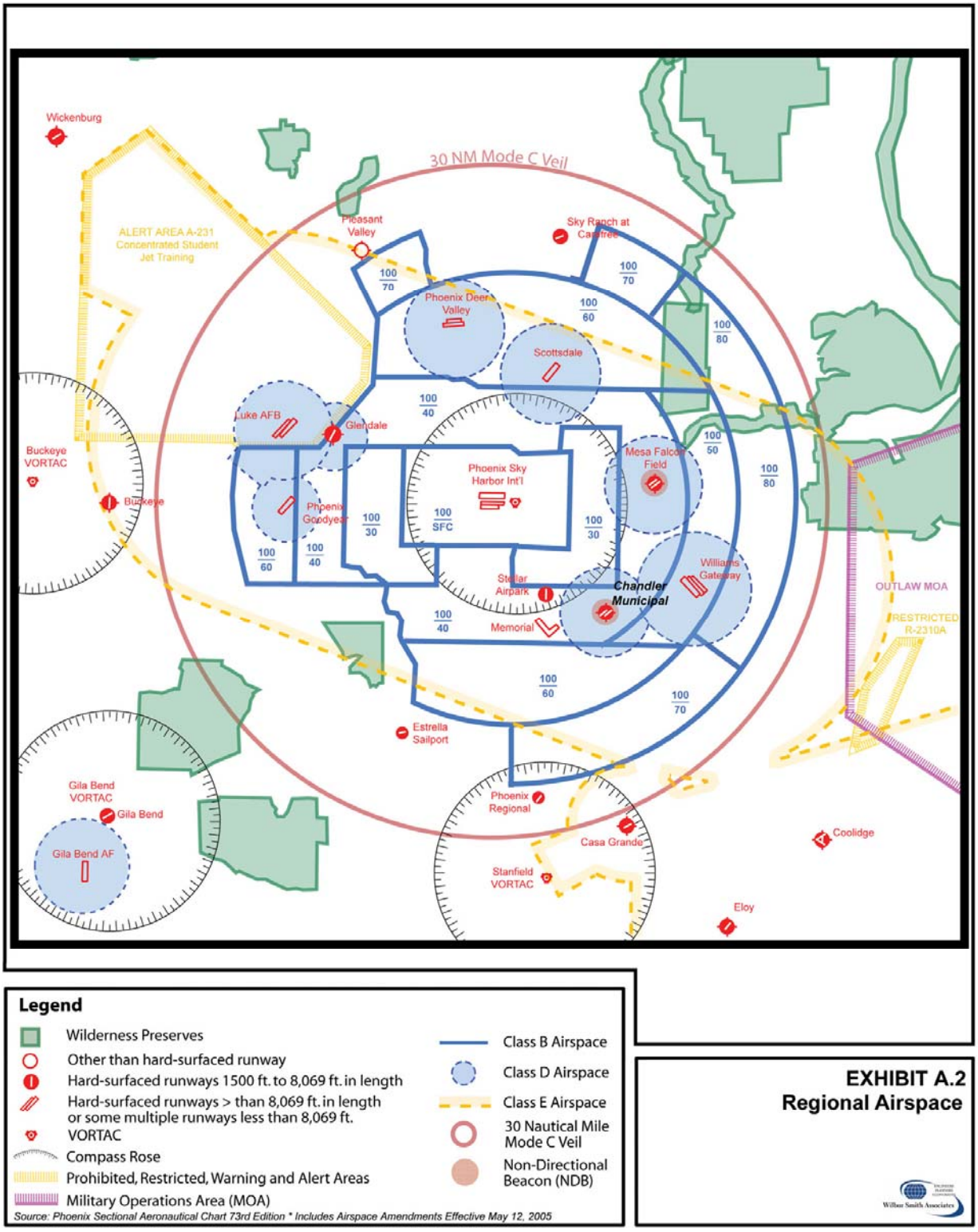
Rules for operating in the Class B Airspace are found in Federal Aviation Regulation (FAR) Part 91. In general, the following are required:

- An ATC clearance is mandatory prior to entering the Class B Airspace.
- The pilot in command of the aircraft must hold a private pilot certificate or higher rating.
- If a student pilot, the requirements of FAR Part 61.95 must be met.
- The aircraft must possess a two-way radio, VOR receiver, and a Mode C transponder.

Class C Airspace. Currently there is no Class C airspace in Phoenix region. Class C airspace generally surrounds airports which have an operating control tower, are serviced by a radar approach control, and have a certain number of IFR operations or passenger enplanements. The airspace surrounding the Tucson International airport is currently designated as Class C airspace.

Class D Airspace. Class D airspace is located at the following airports in the Phoenix region:

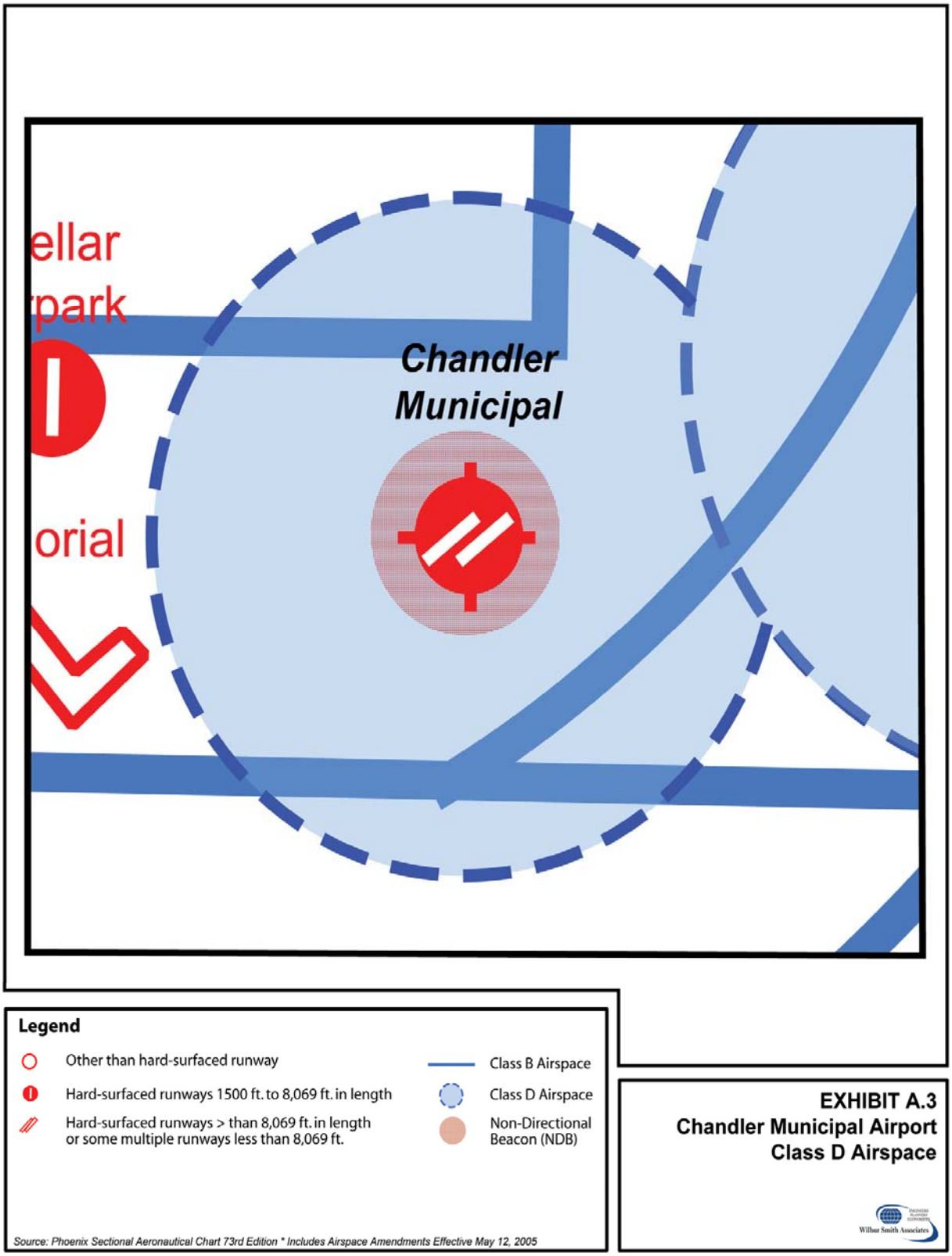
- Chandler Municipal Airport
- Williams Gateway Airport
- Falcon Field
- Scottsdale Airport
- Phoenix Deer Valley Airport
- Luke Air Force Base
- Glendale Municipal Airport
- Phoenix Goodyear Airport


Wickenburg
30 NM Mode C Veil
ALERT AREA A-231
Concentrated Student
Jet Training
Pleasant Valley
Sky Ranch at Carefree
Phoenix Deer Valley
Scottsdale
Luke AFB
Glendale
Buckeye VORTAC
Buckeye
Phoenix Goodyear
Phoenix Sky Harbor Int'l
Mesa Falcon Field
Stellar Airpark
Chandler Municipal
Williams Gateway
Memorial
OUTLAW MOA
RESTRICTED R-2310A
Estrella Sailport
Gila Bend VORTAC
Gila Bend
Gila Bend AF
Phoenix Regional
Casa Grande
Stanfield VORTAC
Coolidge
Eloy
100/70
100/60
100/80
100/40
100/50
100/30
100/SFC
Legend
Wilderness Preserves
Other than hard-surfaced runway
Hard-surfaced runways 1500 ft. to 8,069 ft. in length
Hard-surfaced runways > than 8,069 ft. in length or some multiple runways less than 8,069 ft.
VORTAC
Compass Rose
Prohibited, Restricted, Warning and Alert Areas
Military Operations Area (MOA)
Class B Airspace
Class D Airspace
Class E Airspace
30 Nautical Mile Mode C Veil
Non-Directional Beacon (NDB)
Source: Phoenix Sectional Aeronautical Chart 73rd Edition * Includes Airspace Amendments Effective May 12, 2005
EXHIBIT A.2
Regional Airspace
Wilbur Smith Associates

Class D airspace can be considered, generally, as the traffic pattern airspace serving an airport. It is generally a 5 statute mile circle centered on an airport with an operating control tower, extending upward to 2500 feet Above Ground Level (AGL). All operations within Class D airspace are controlled by an air traffic control tower. **Exhibit A.3** depicts the Class D airspace surrounding the Chandler Municipal Airport. The Class D airspace boundary is identified by the dashed blue circle. The Class D airspace surrounding Chandler Municipal Airport is a 4 statute mile circle centered on the Airport because of the close proximity to Williams Gateway Airport. As shown in Exhibit A.3, the Williams Class D airspace supersedes a portion of the Chandler Municipal Airport Class D airspace.

Class E Airspace. Class E airspace is general controlled airspace. The airspace includes Federal Airways, area low routes and additional control areas specified by the Regulation, all of which are outside (below) Class A airspace. **Exhibit A.4** depicts Federal Area Low Routes located in the Region. Surface areas for airports with instrument approaches are also classified as Class E airspace. The Class E airspace is configured to contain all instrument approach procedures. Class E airspace is also generally extended around Class B, C, and D airspace to provide controlled airspace to contain standard instrument approach procedures without imposing a communications requirement on pilots operating under VFR. VFR aircraft are not required to communicate with or receive clearance from ATC to enter Class E airspace.

VFR aircraft operating in Class E airspace are simply required to maintain the specified cloud clearance and flight visibility requirements in order to “see and avoid” other aircraft, including those operating under IFR. **Exhibit A.5** graphically depicts Class E airspace extended around Class D airspace. This is a typical representation, however, each airspace configuration is slightly different depending on local conditions. Class E airspace provides controlled airspace for transition to or from the enroute or terminal environment where there is a requirement to provide IFR enroute ATC services but the Federal airway system is inadequate. Currently the entire Phoenix Metropolitan area is Class E airspace from 700 AGL to 18,000 MSL, with the airspace below 700 AGL designated as Class G or uncontrolled airspace. Exceptions are the PHX Class B airspace, the areas of Class D airspace listed above, and an area northeast of the Deer Valley Airport, where the Class E airspace begins at the surface.


ellar
park
orial
Chandler
Municipal
Legend
Other than hard-surfaced runway
Hard-surfaced runways 1500 ft. to 8,069 ft. in length
Hard-surfaced runways > than 8,069 ft. in length or some multiple runways less than 8,069 ft.
Class B Airspace
Class D Airspace
Non-Directional Beacon (NDB)
Source: Phoenix Sectional Aeronautical Chart 73rd Edition * Includes Airspace Amendments Effective May 12, 2005
EXHIBIT A.3
Chandler Municipal Airport
Class D Airspace
Wilbur Smith Associates

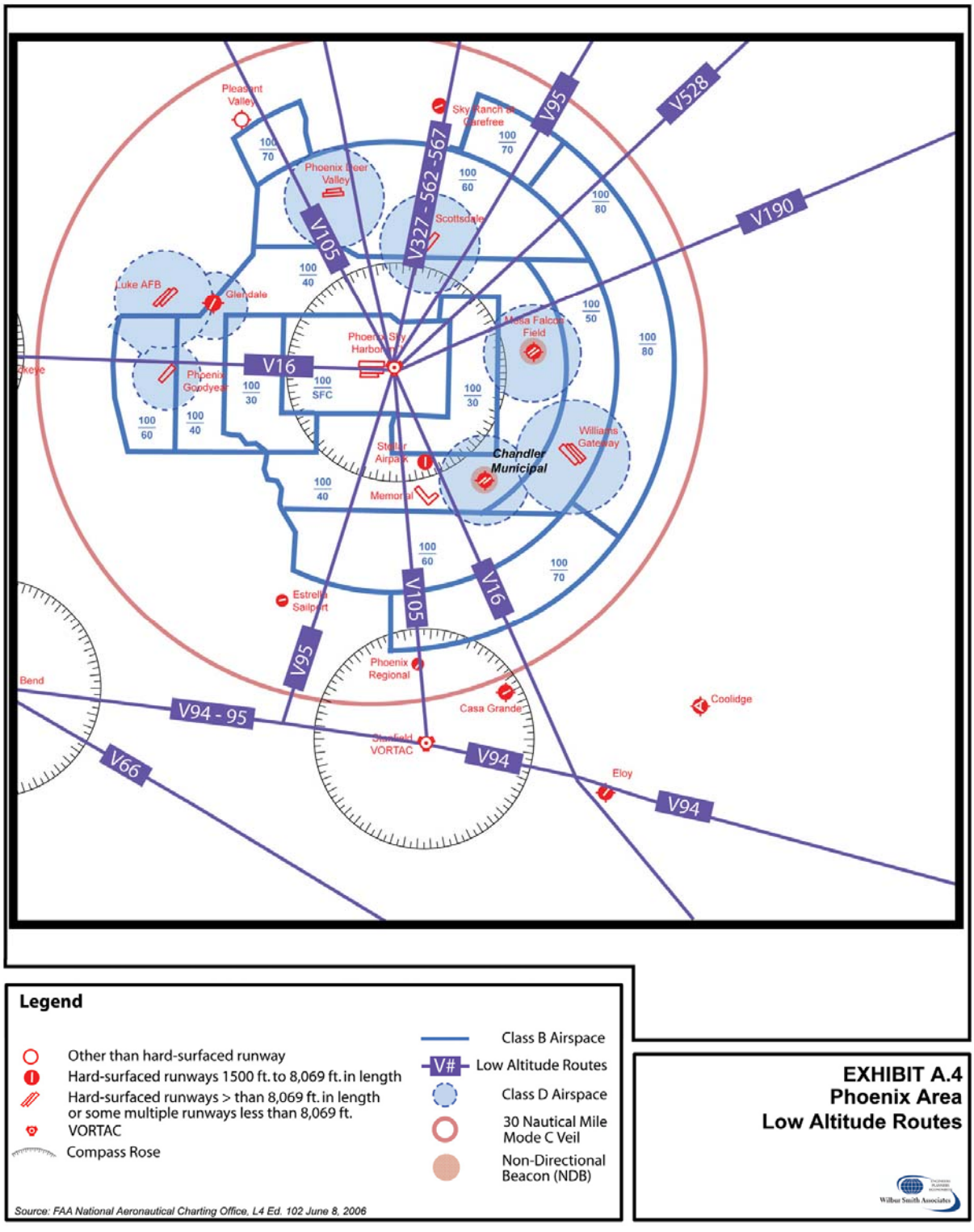
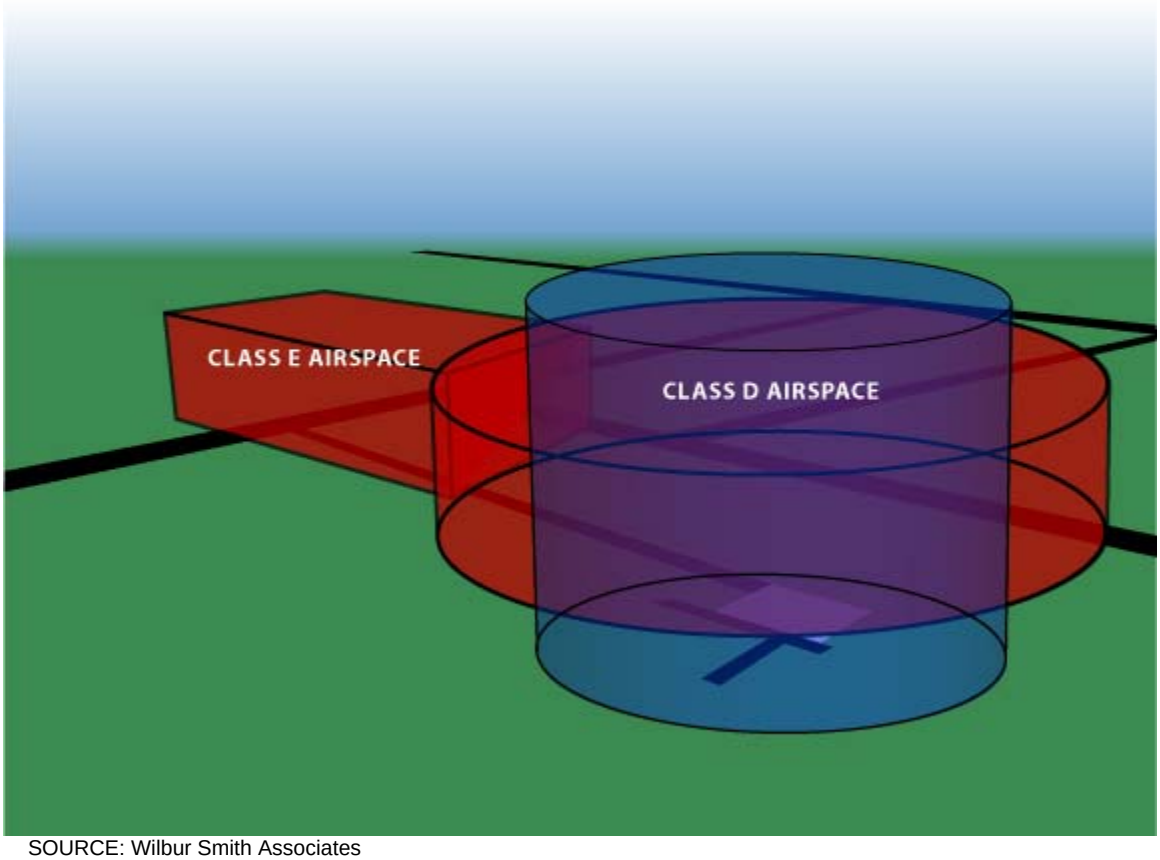

Pleasant Valley
Sky Ranch at Carefree
Phoenix Deer Valley
Scottsdale
Luke AFB
Glendale
Phoenix Sky Harbor Intl
Mesa Falcon Field
Phoenix Goodyear
Williams Gateway
Stellar Airpark
Chandler Municipal
Memorial
Estrella Sailport
Phoenix Regional
Casa Grande
Stanfield VORTAC
Coolidge
Eloy
Bend
V95
V528
V190
V327 - 562 -567
V105
V16
V94 - 95
V66
V94
100/70
100/60
100/80
100/40
100/50
100/30
100/SFC
Legend
Other than hard-surfaced runway
Hard-surfaced runways 1500 ft. to 8,069 ft. in length
Hard-surfaced runways > than 8,069 ft. in length or some multiple runways less than 8,069 ft.
VORTAC
Compass Rose
Class B Airspace
V# Low Altitude Routes
Class D Airspace
30 Nautical Mile Mode C Veil
Non-Directional Beacon (NDB)
Source: FAA National Aeronautical Charting Office, L4 Ed. 102 June 8, 2006
EXHIBIT A.4
Phoenix Area
Low Altitude Routes
Wilbur Smith Associates

Exhibit A.5
CLASS D AND CLASS E AIRSPACE



SOURCE: Wilbur Smith Associates
PREPARED: July 2006

Special Use Airspace

Restricted Areas. There are seven different restricted areas in the region. Restricted areas are established, pursuant to FAR Part 73, to restrict but not prohibit flight, to permit the user (normally the military) large blocks of unimpeded airspace for their operations. These areas with the exception of the A-231 Alert Area are located well outside the Phoenix Class B airspace boundary; North of Florence, and South of Gila Bend. The restricted areas include R-2301E, R-2304, R-2305, R-2310A, R-2310B and R-2310C. A-231 Alert Area is located directly against the northwest boundary of the Phoenix Class B airspace, and provides airspace for training operations associated with Luke Air Force Base.

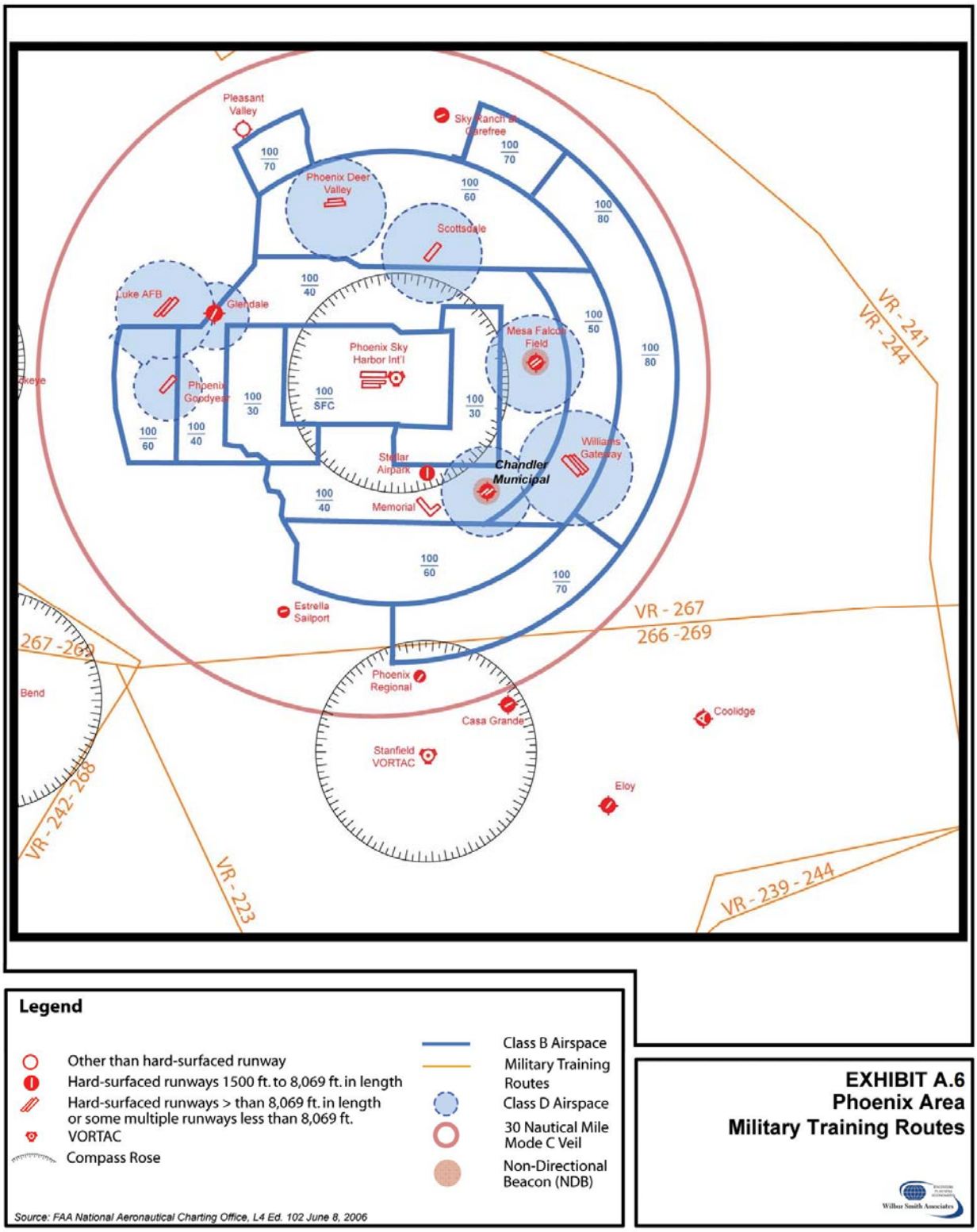
Military Operations Areas. There are two Military Operations Area (MOA) in the region. The Outlaw MOA begins approximately 25 miles east of Chandler Municipal Airport and extends to the east approximately 45 miles to the boundary of the Jackal MOA. The Sells MOA is located 45 nautical miles southwest of Chandler Municipal and extends to the U.S./Mexico border. This airspace is utilized by all military flying organizations in the State of Arizona. MOAs are airspace blocks outside positive control areas assigned to segregate certain military activities from IFR traffic, to identify VFR traffic to the user and to make non-participating aircraft aware of these operations. Scheduling, coordination and flight procedures for MOAs are established by letters of agreement between local military authorities and concerned ATC facilities. MOAs are intermittently used. They are scheduled by the designated military scheduling point and are activated by ATC.

Military Training Routes. There are numerous designated Military Training Routes (MTRs) in the Region. MTRs are air corridors of defined lateral dimensions established for the conduct of military training at speeds in excess of 250 knots. MTRs may be bi-directional or unidirectional. The MTRs in the Phoenix area are located along the outer edges of the Phoenix Class B airspace boundary, and have limited impact on aircraft operating to and from Chandler Municipal Airport. **Exhibit A.6** depicts the MTRs in the Phoenix area.

Skydiving and Parachute Jumping Areas. There are 2 designated skydiving/parachute jumping areas in the Region located near the Buckeye and Coolidge airports. These areas are normally activated by Notices to Airmen (NOTAM) whenever parachute jumping is planned. There are additional areas occasionally used for parachuting activities, and these are identified by NOTAM. Skydiving is an FAA-recognized activity and is conducted in accordance with FAR Part 105.

Available VFR Airspace

When the volume of controlled airspace, special use airspace and restricted airspace is superimposed on a chart of the Region, the minimal amount of airspace available for VFR flying becomes apparent.



Legend

- Other than hard-surfaced runway
- Hard-surfaced runways 1500 ft. to 8,069 ft. in length
- Hard-surfaced runways > than 8,069 ft. in length or some multiple runways less than 8,069 ft.
- VORTAC
- Compass Rose
- Class B Airspace
- Military Training Routes
- Class D Airspace
- 30 Nautical Mile Mode C Veil
- Non-Directional Beacon (NDB)

Source: FAA National Aeronautical Charting Office, L4 Ed. 102 June 8, 2006

EXHIBIT A.6
Phoenix Area
Military Training Routes

Wilbur Smith Associates

AIR TRAFFIC CONTROL

Air Traffic Control Facilities

From the preceding information it is clear that a large portion of the airspace above the Phoenix area is controlled airspace. The FAA, acting through several subordinate agencies, manages the complex task of separating aircraft. Each agency, or sub-agency, has responsibility for a portion of the system. These air traffic control agencies work in harmony with one another and the various users of controlled airspace to ensure a safe and efficient environment for the flying public.

Albuquerque Air Route Traffic Control Center (ARTCC). Airspace control throughout most of the southwestern United States rests with the Albuquerque ARTCC, frequently referred to as "Albuquerque Center", or locally as "Center". The Center controls the airspace between 16,000 feet and FL 600 encompassing most of Arizona, New Mexico, and western portions of Texas. Albuquerque ARTCC is located in Albuquerque, NM and exercises its control through remote radar and radio facilities located throughout its region. The ARTCC maintains letters of agreement with other FAA ATC agencies and users throughout its area of responsibility. These agreements establish procedures for handing off air traffic from one agency to another and define local air control procedures and responsibilities. The Center also maintains a letter of agreement with the other radar-equipped FAA agencies to assume enroute air traffic control responsibilities in the event of an emergency which renders the Center incapable of control.

Phoenix Terminal Radar Approach Control (TRACON). The TRACON is the next level down of air traffic control provided in the Phoenix region. The TRACON exercises radar traffic control in the terminal area from a facility located at the Phoenix Sky Harbor International Airport. The terminal area includes the Phoenix Class B airspace as well as portions of controlled airspace surrounding the Class B airspace used by aircraft arriving and departing the Phoenix area. The TRACON manages all traffic in the in the terminal area which is not under center or tower control. The TRACON coordinates its many and varied responsibilities through letters of agreement with other controlling agencies and some users. The TRACON operates twenty-four hours a day and handles IFR arrivals and departures for most of the airports in the region, including Chandler Municipal Airport.

Luke Radar Approach Control (RAPCON). In conjunction with Phoenix TRACON, Luke RAPCON exercises radar traffic control in the West Valley of Phoenix's terminal area. When Luke Air Force Base is flying, RAPCON provides air traffic service in the portion of the Phoenix Class B airspace overlying Luke. As TRACON, the RAPCON coordinates its many and varied responsibilities through letter of agreement with other agencies. Luke RAPCON operates Monday through Friday from 6:30 am until 10:30 pm, weekends by notices to airmen (NOTAMs) and handles IFR arrival and departures to West Valley airports.

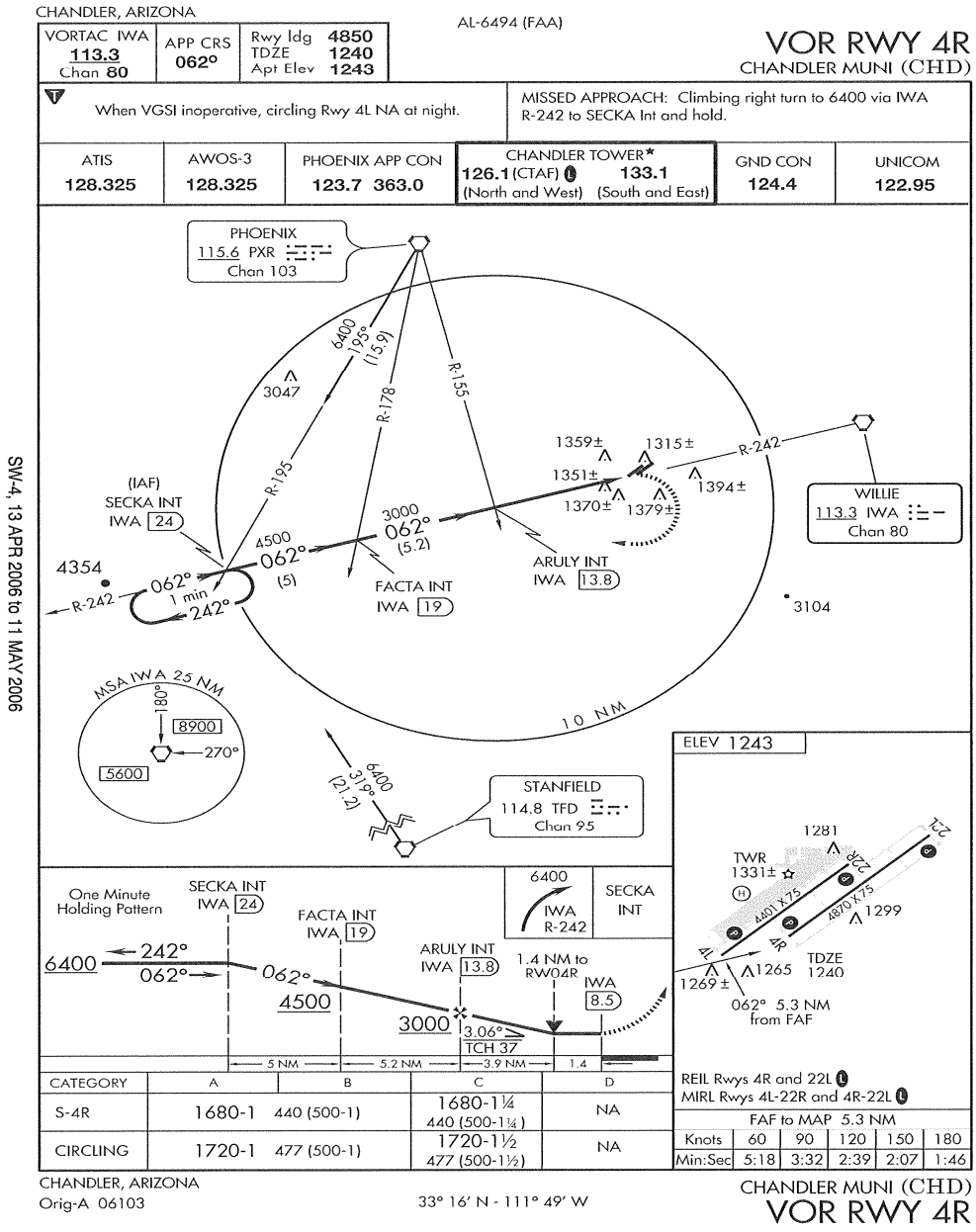
Air Traffic Control Towers. There are nine airports with operating control towers in the Phoenix metropolitan area. With the exception of the tower at the Phoenix Sky Harbor International Airport, each tower controls the Class D airspace associated with the airport as well as ground operations at each airport. Each Class D airspace is contained within or underlies the Phoenix Class B airspace. Many of the tower facilities including the Chandler Municipal ATCT are equipped with a terminal area radar repeater system (D Bright) which gives the tower controllers better awareness of aircraft operating in the vicinity, including all aircraft with an operating transponder. The D Bright presentation is a duplicate of the TRACON primary radar picture, including flight track data. This system improves tower controllers' ability to control airplanes safely under reduced visibility conditions.

Published Instrument Approaches

Under IFR, aircraft transition from the enroute system to a point where a landing can be made at an airport using a series of predetermined maneuvers called an instrument approach. An instrument approach or instrument approach procedure (IAP) is a method that allows pilots to land an aircraft during periods of restricted visibility known as instrument meteorological conditions (IMC). Instrument approaches are classified as either precision or non-precision, depending on the accuracy and capabilities of the navigational aids used. Precision approaches utilize both lateral or course, and vertical or glideslope information. Non-precision approaches provide course information only.

Pilots refer to charts known as terminal procedures or approach plates during an instrument approach. IAP's depict the horizontal and vertical approach path and radio frequencies used in addition to landmarks, airspace, and other relevant data. The majority of IAP's are aligned with the airport runway to allow for a straight-in landing once the airport environment is in sight. However, if wind conditions do not favor a straight-in landing or if the approach procedure does not line up with the runway a "circling approach" is used. During a circling approach, once the airport environment is in sight, the pilot maneuvers the aircraft while maintaining visual reference to the airport, to line the aircraft up with the runway favored by the prevailing wind. **Exhibit A.7** depicts the VOR non-precision IAP for Chandler Municipal Airport. The procedure includes both straight-in and circling minimums, which are the lowest altitudes that an aircraft can descend to before having the runway environment in sight. Within a 15 nautical mile (NM) radius of Chandler Municipal Airport there are four airports that currently have published instrument approaches. **Table A.1** summarizes the instrument approaches for the IFR capable airports within 15 NM of Chandler Municipal Airport. **Exhibit A.8** depicts the typical flight tracks of aircraft utilizing instrument approach procedures in the vicinity of Chandler Municipal Airport.

Exhibit A.7
NON-PRECISION INSTRUMENT APPROACH PROCEDURE
CHANDLER MUNICIPAL AIRPORT



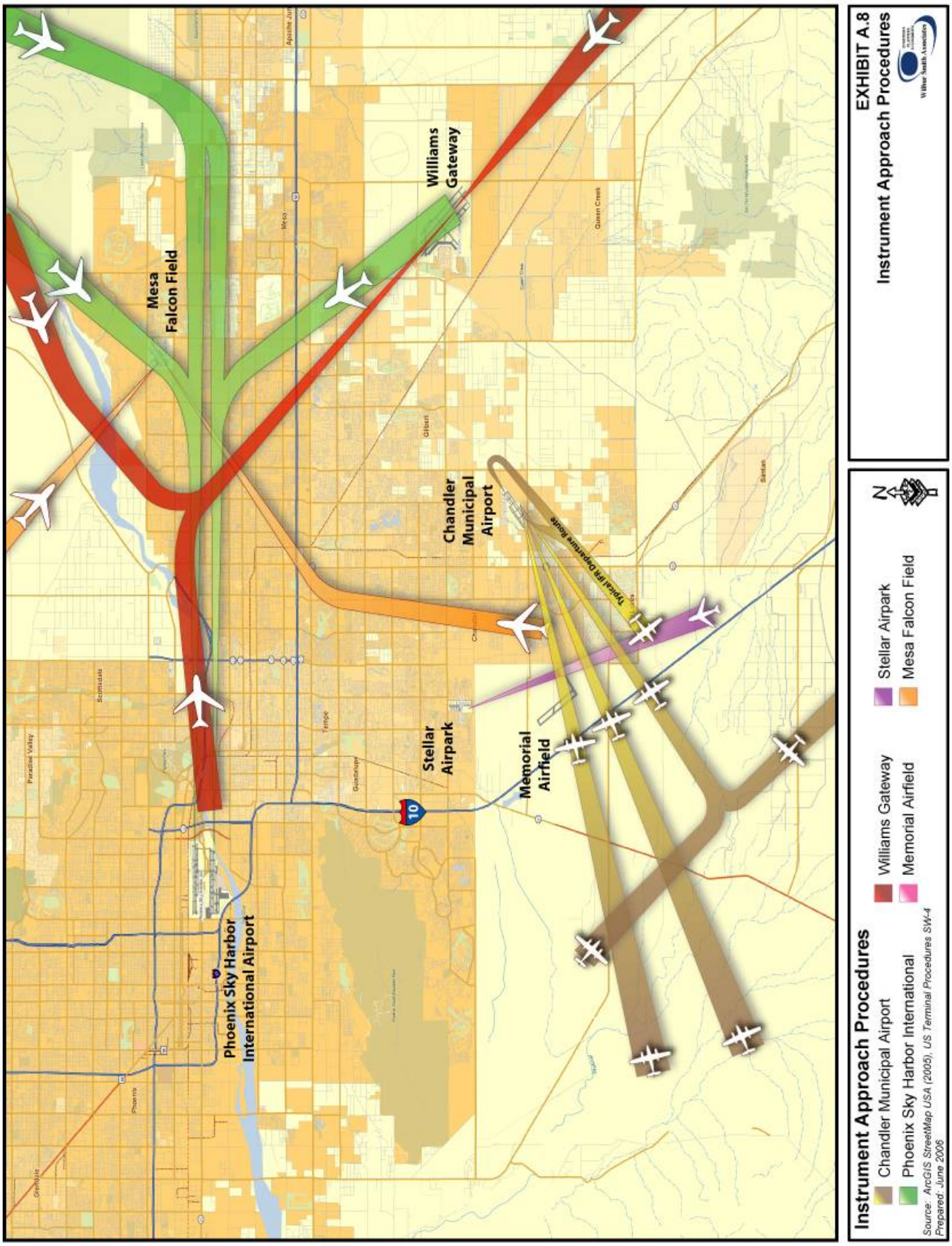
SW-4, 13 APR 2006 to 11 MAY 2006

SW-4, 13 APR 2006 to 11 MAY 2006

Table A.1
INSTRUMENT APPROACH PROCEDURES

Chandler Municipal Airport (CHD)	
2005 Total Operations	235,111
Instrument Approach Procedures	**NDB Runway 4R** **GPS Runway 4R** **VOR Runway 4R**
Stellar Airpark (P19)	
Distance and Location from Chandler Municipal Airport	5.5 NM West-Northwest
2005 Total Operations	45,800
Instrument Approach Procedures	**VOR or GPS-A**
Williams Gateway (IWA)	
Distance and Location from Chandler Municipal Airport	8.2 NM East
2005 Total Operations	261,021
Instrument Approach Procedures	**GPS Runway 30C** **ILS Runway 30C** **GPS Runway 12C** **GPS Runway 12R** **GPS Runway 30L** **VOR or TACAN Runway 30C**
Falcon Field (FFZ)	
Distance and Location from Chandler Municipal Airport	12.2 NM North-Northeast
2005 Total Operations	257,028
Instrument Approach Procedures	**GPS Runway 4R** **NDB or GPS-A**
Phoenix Sky Harbor International (PHX)	
Distance and Location from Chandler Municipal Airport	14.1 NM Northwest
2005 Total Operations	559,887
Instrument Approach Procedures	**ILS Runway 7L** **ILS Runway 7R** **ILS Runway 8** **ILS Runway 25L** **ILS Runway 26** **Localizer Back Course Runway 25R** **GPS Runway 7L** **GPS Runway 7R** **GPS Runway 8** **GPS Runway 25L** **GPS Runway 25R** **GPS Runway 26** **VOR/DME Runway 25R** **VOR/DME – A**

***Colors of the instrument approach procedures correspond to the flight path colors in the following exhibits.**


Mesa Falcon Field
Williams Gateway
Chandler Municipal Airport
Stellar Airpark
Memorial Airfield
Phoenix Sky Harbor International Airport
Typical IFR Departure Route
EXHIBIT A.8
Instrument Approach Procedures
Wilbur Smith Associates
Instrument Approach Procedures
Chandler Municipal Airport
Phoenix Sky Harbor International
Williams Gateway
Memorial Airfield
Stellar Airpark
Mesa Falcon Field
N
Source: ArcGIS StreetMap USA (2005), US Terminal Procedures SW-4
Prepared: June 2006

CURRENT AIRSPACE ISSUES

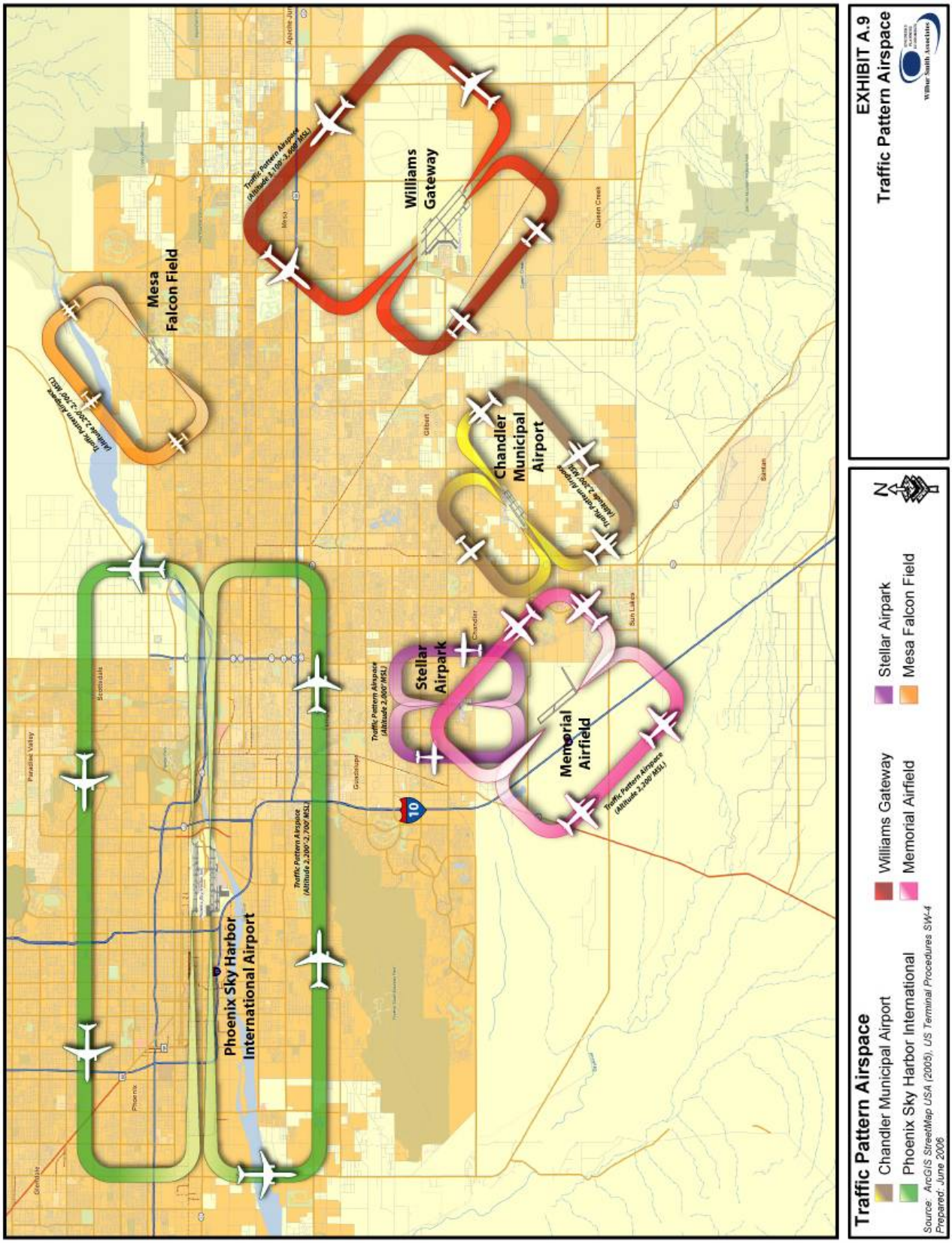
As mentioned, Chandler Municipal Airport is located in close proximity to some of the most active airports in the county. **Exhibit A.9** shows the standard traffic pattern airspace for Chandler Municipal Airport in addition to the typical traffic patterns used at the airports surrounding the City of Chandler. In general the traffic pattern is the prescribed path for an airplane that is preparing to land at an airport. The pattern varies in size and shape depending on size and speed of aircraft that regularly uses the airport. Airports regularly used by large aircraft with faster landing approach speeds have larger traffic patterns.

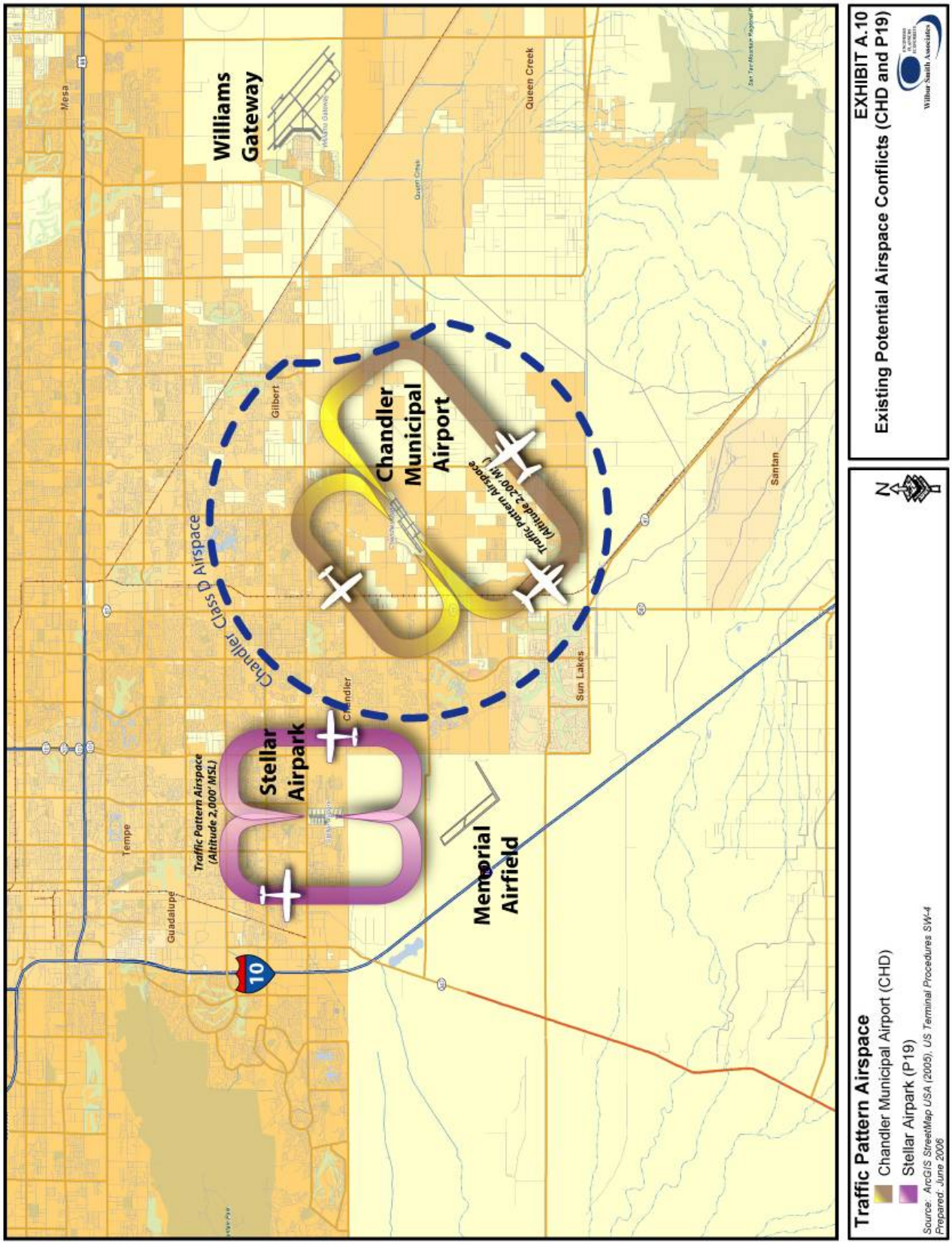
The following sections describe the airspace issues related to Chandler Municipal Airport and how activities at surrounding airports affect operations at Chandler Municipal Airport.

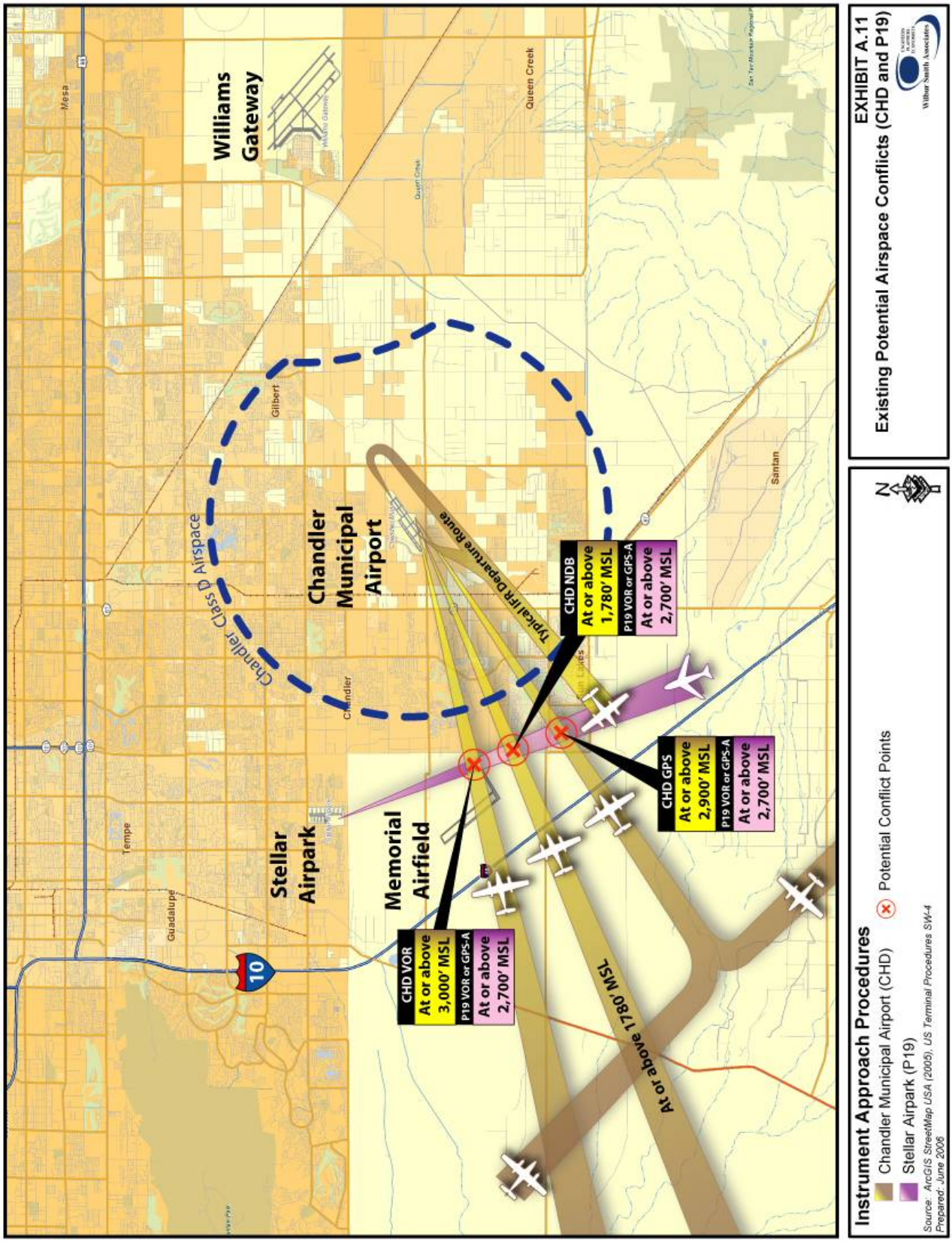
Stellar Airpark

The standard traffic patterns of Stellar Airpark and Chandler Municipal Airport are separated by approximately 2 miles at the closest point. Stellar Airpark is a privately owned, public use facility located approximately 5.5 NM west of Chandler Municipal Airport. The privately owned facility has numerous private homes and commercial facilities with direct taxiway and runway access. Stellar Airpark does not have a control tower. **Exhibit A.10** depicts the standard traffic patterns of Stellar Airpark and Chandler Municipal Airport. The Stellar Airpark traffic pattern is located in uncontrolled airspace underneath the Phoenix Class B Airspace shelf. While this is relatively close, VFR operations can be conducted at each airport with minimal impact on each facility. Additionally, aircraft are required to receive clearance before entering the Chandler Class D Airspace which is located less than one mile east of Stellar Airpark. This requirement tends to keep aircraft operating at Stellar Airpark outside of the Chandler Municipal Airport Traffic area.

Stellar Airpark is served by a VOR and GPS IAP that arrives from the south. This approach procedure crosses the final approach course of all three IAPs to Chandler Municipal Airport. Because of the intersecting approach courses, aircraft operating under IFR to either airport must be sequenced by ATC to avoid conflicts. However, due to the low number of aircraft operating IFR at Stellar Airpark, separating IFR arrivals at the two facilities has seldom been an issue. **Exhibit A.11** shows the instrument approach procedures to Stellar Airpark and Chandler Municipal Airport.


Mesa
Falcon Field
Williams
Gateway
Chandler
Municipal
Airport
Stellar
Airpark
Memorial
Airfield
Phoenix Sky Harbor
International Airport
Traffic Pattern Airspace
(Altitude 2,200'-2,700' MSL)
Traffic Pattern Airspace
(Altitude 2,600' MSL)
Traffic Pattern Airspace
(Altitude 2,200' MSL)
Traffic Pattern Airspace
(Altitude 2,200'-2,700' MSL)
Traffic Pattern Airspace
(Altitude 3,100'-3,300' MSL)
Traffic Pattern Airspace
(Altitude 2,200' MSL)
10
N
EXHIBIT A.9
Traffic Pattern Airspace
Wilbur Smith Associates
Traffic Pattern Airspace
Chandler Municipal Airport
Phoenix Sky Harbor International
Williams Gateway
Memorial Airfield
Stellar Airpark
Mesa Falcon Field
Source: ArcGIS StreetMap USA (2005), US Terminal Procedures SW-4
Prepared: June 2006

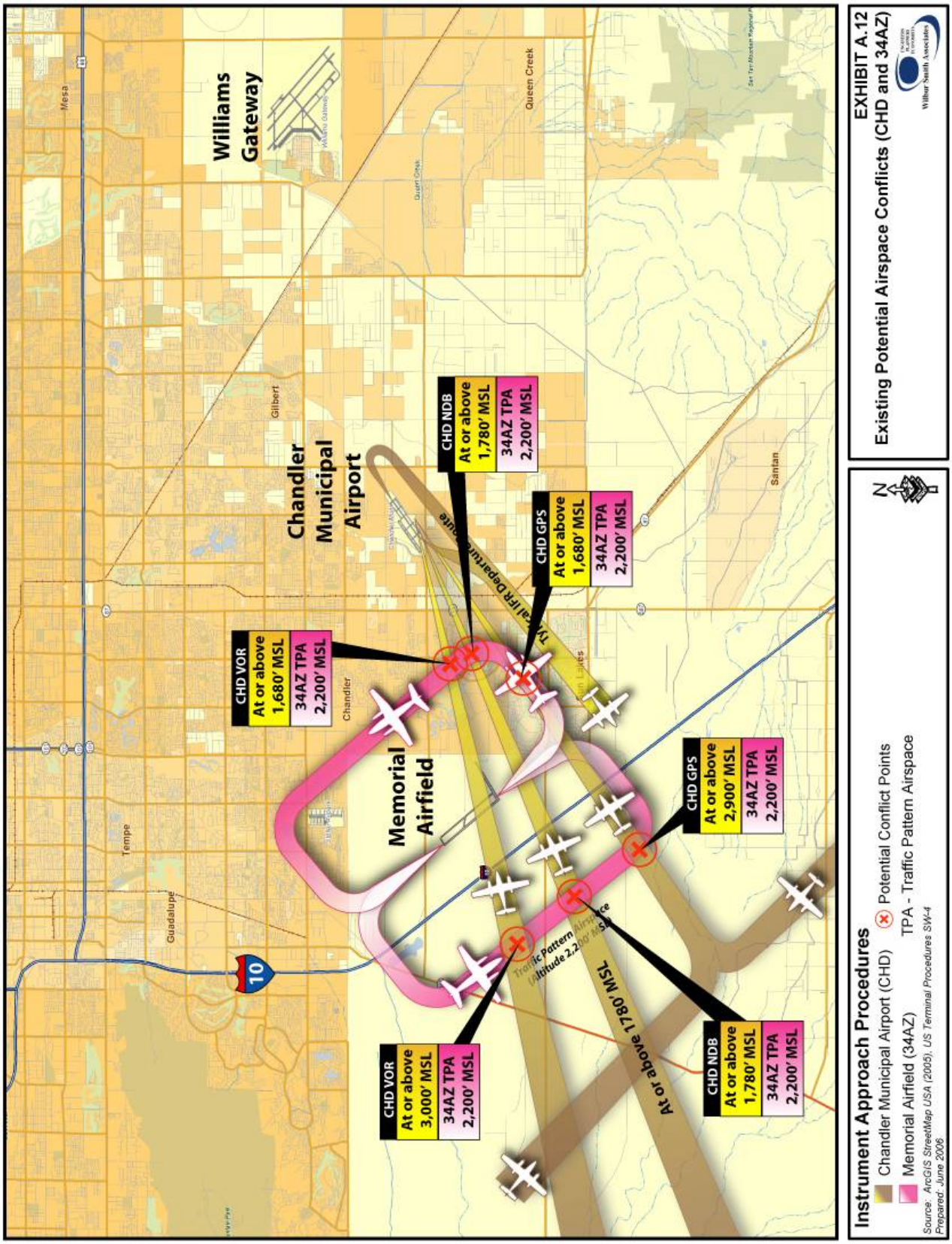

Williams Gateway
Chandler Municipal Airport
Traffic Pattern Airspace (Altitude 2,200' MSL)
Chandler Class D Airspace
Stellar Airpark
Traffic Pattern Airspace (Altitude 2,000' MSL)
Memorial Airfield
Mesa
Gilbert
Queen Creek
Chandler
Sun Lakes
Santan
Tempe
Guadalupe
10
EXHIBIT A.10
Existing Potential Airspace Conflicts (CHD and P19)
Wilbur Smith Associates
N
Traffic Pattern Airspace
Chandler Municipal Airport (CHD)
Stellar Airpark (P19)
Source: ArcGIS StreetMap USA (2005), US Terminal Procedures SW-4
Prepared: June 2006

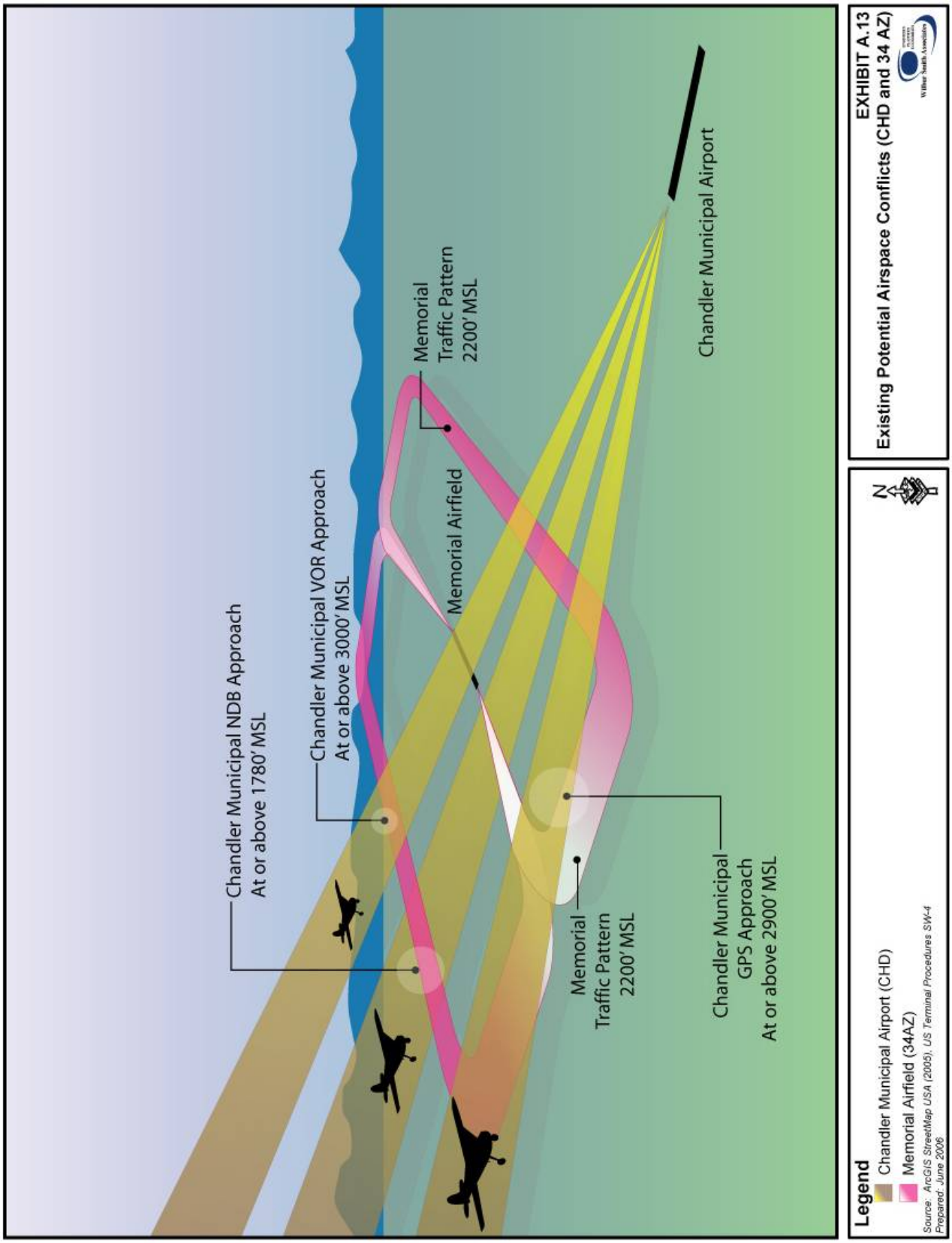

Williams Gateway
Chandler Municipal Airport
Chandler Class D Airspace
Typical IFR Departure Route
Stellar Airpark
Memorial Airfield
CHD VOR
At or above 3,000' MSL
P19 VOR or GPS-A
At or above 2,700' MSL
CHD NDB
At or above 1,780' MSL
P19 VOR or GPS-A
At or above 2,700' MSL
CHD GPS
At or above 2,900' MSL
P19 VOR or GPS-A
At or above 2,700' MSL
At or above 1,780' MSL
Mesa
Gilbert
Queen Creek
Chandler
Tempe
Guadalupe
Santan
10
EXHIBIT A.11
Existing Potential Airspace Conflicts (CHD and P19)
Wilbur Smith Associates
Instrument Approach Procedures
Chandler Municipal Airport (CHD)
Stellar Airpark (P19)
Potential Conflict Points
N
Source: ArcGIS StreetMap USA (2005), US Terminal Procedures SW-4
Prepared: June 2006

Memorial Airfield

Memorial Airfield is a private airport owned and operated by the Gila River Indian Community. Because the airport is privately owned pilots must receive prior permission from the Gila River Airport Authority before using this airport. This requirement significantly reduces the amount of activity at this facility. Currently the only aircraft operations conducted at the airport are from aircraft based at the airport. Memorial Airfield is located approximately six miles west of Chandler Municipal Airport underneath the southern shelf of the Phoenix Class B Airspace. Memorial Airfield does not have a control tower or IAPs. The standard VFR traffic patterns for Chandler Municipal Airport and Memorial Airfield are relatively close to each other. However, the Chandler Class D airspace boundary is located less the one mile east of the Memorial Airfield, and requires an ATC clearance before entering. Because of restrictions on entering Chandler Class D airspace and the limited amount of activity at Memorial Airfield the two facilities currently have limited impact on each other during VFR conditions.

Currently Memorial Airfield is not served by an IAP and does not accommodate IFR operations. **Exhibits A.12** and **A.13** illustrate the traffic pattern airspace of Memorial Airfield, and the IAP's for Chandler Municipal Airport. It should be noted that the traffic pattern airspace and the IAPs depicted on the exhibits illustrate the routes and altitudes that aircraft typically fly. Some aircraft may fly a smaller pattern and remain closer to the airport, while others may fly a larger pattern further away from the airport. The three IAPs to Chandler Municipal Airport cross from west to east directly over, through, or under the Memorial Airfield traffic pattern airspace. Because the IAPs to Chandler are all non-precision procedures, the altitudes that aircraft cross over the Memorial Airfield traffic pattern airspace can vary. The altitudes depicted on the exhibits represent the lowest altitude aircraft are allowed to descend before the runway environment is in site. Because Memorial Airfield is a private facility, a traffic pattern altitude is not published. A standard traffic pattern altitude is typically 1,000 feet above ground level (AGL). Utilizing this standard, the traffic pattern altitude at Memorial Airfield would be 2,200 feet MSL. Aircraft utilizing the VOR approach to Chandler Municipal Airport cross over the Memorial Airfield traffic pattern at or above 3,000 feet MSL. Aircraft utilizing the GPS approach to Chandler Municipal airport cross over the Memorial Airfield traffic pattern at or above 2,900 feet MSL. Aircraft utilizing the NDB approach are authorized to descend from 2,800 feet MSL to 1,780 feet MSL once the aircraft is within 10 NM of the Airport, and established inbound on the approach. Aircraft utilizing the NDB approach to Chandler Municipal Airport could cross over at or even below the Memorial Airfield traffic pattern altitude. These intersecting flight paths create the potential for conflict between aircraft operating under VFR in the traffic pattern at Memorial Airfield and aircraft on an instrument approach to Chandler Municipal Airport. Currently the low level of activity and the lack of operations at Memorial Airfield during IMC conditions make the potential for conflict limited. Additionally, radar coverage in the area enables ATC to identify aircraft in the pattern at Memorial and issue traffic advisories to aircraft on approach to Chandler.

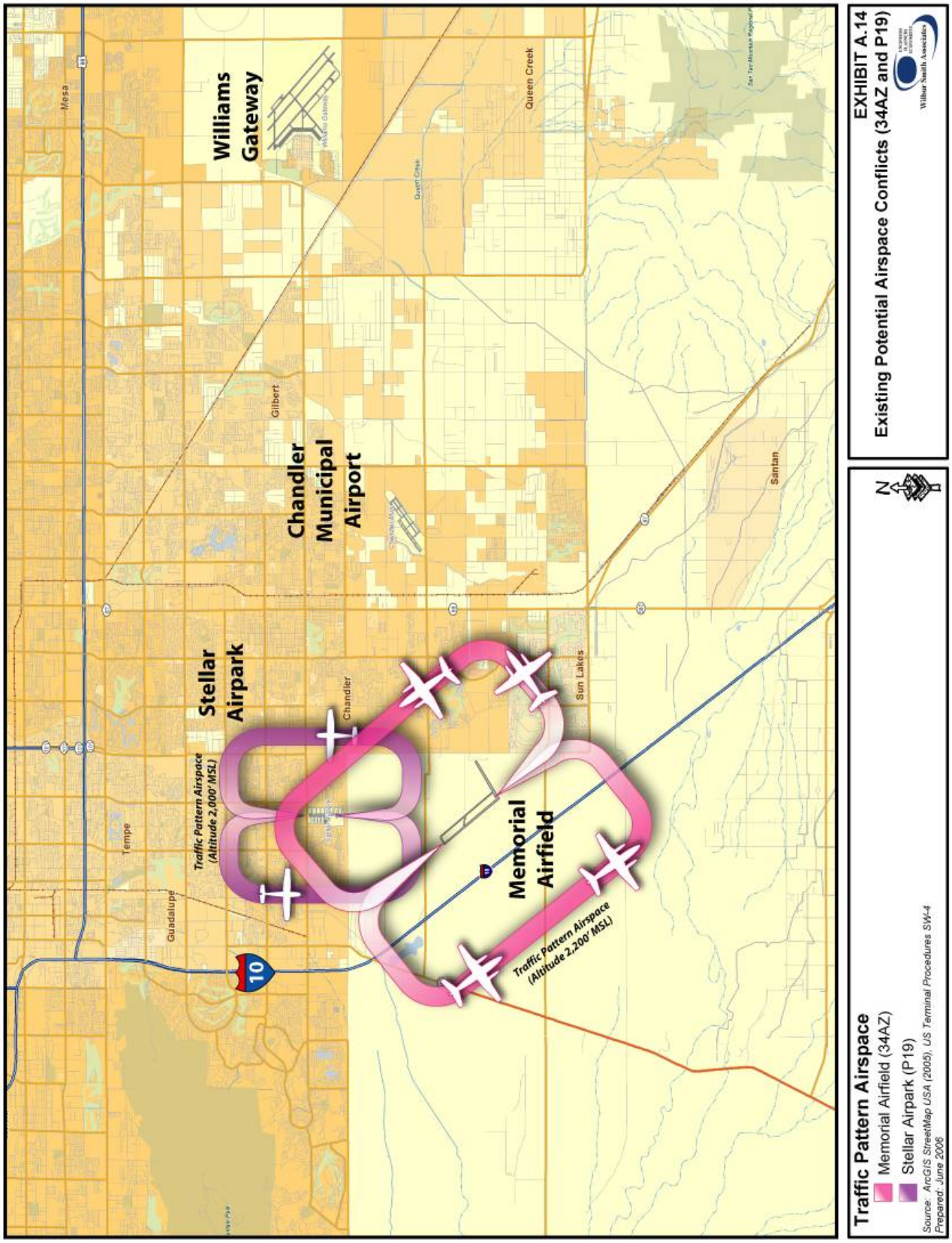

Williams Gateway
Chandler Municipal Airport
Memorial Airfield
Mesa
Gilbert
Queen Creek
Chandler
Tempe
Guadalupe
Santan
10
CHD VOR
At or above 1,680' MSL
34AZ TPA
2,200' MSL
CHD NDB
At or above 1,780' MSL
34AZ TPA
2,200' MSL
CHD GPS
At or above 1,680' MSL
34AZ TPA
2,200' MSL
CHD GPS
At or above 2,900' MSL
34AZ TPA
2,200' MSL
CHD VOR
At or above 3,000' MSL
34AZ TPA
2,200' MSL
CHD NDB
At or above 1,780' MSL
34AZ TPA
2,200' MSL
At or above 1780' MSL
Traffic Pattern Airspace
Instrument Approach Procedures
Chandler Municipal Airport (CHD)
Memorial Airfield (34AZ)
Potential Conflict Points
TPA - Traffic Pattern Airspace
Source: ArcGIS StreetMap USA (2005), US Terminal Procedures SW-4
Prepared: June 2006
N
EXHIBIT A.12
Existing Potential Airspace Conflicts (CHD and 34AZ)
Wilbur Smith Associates

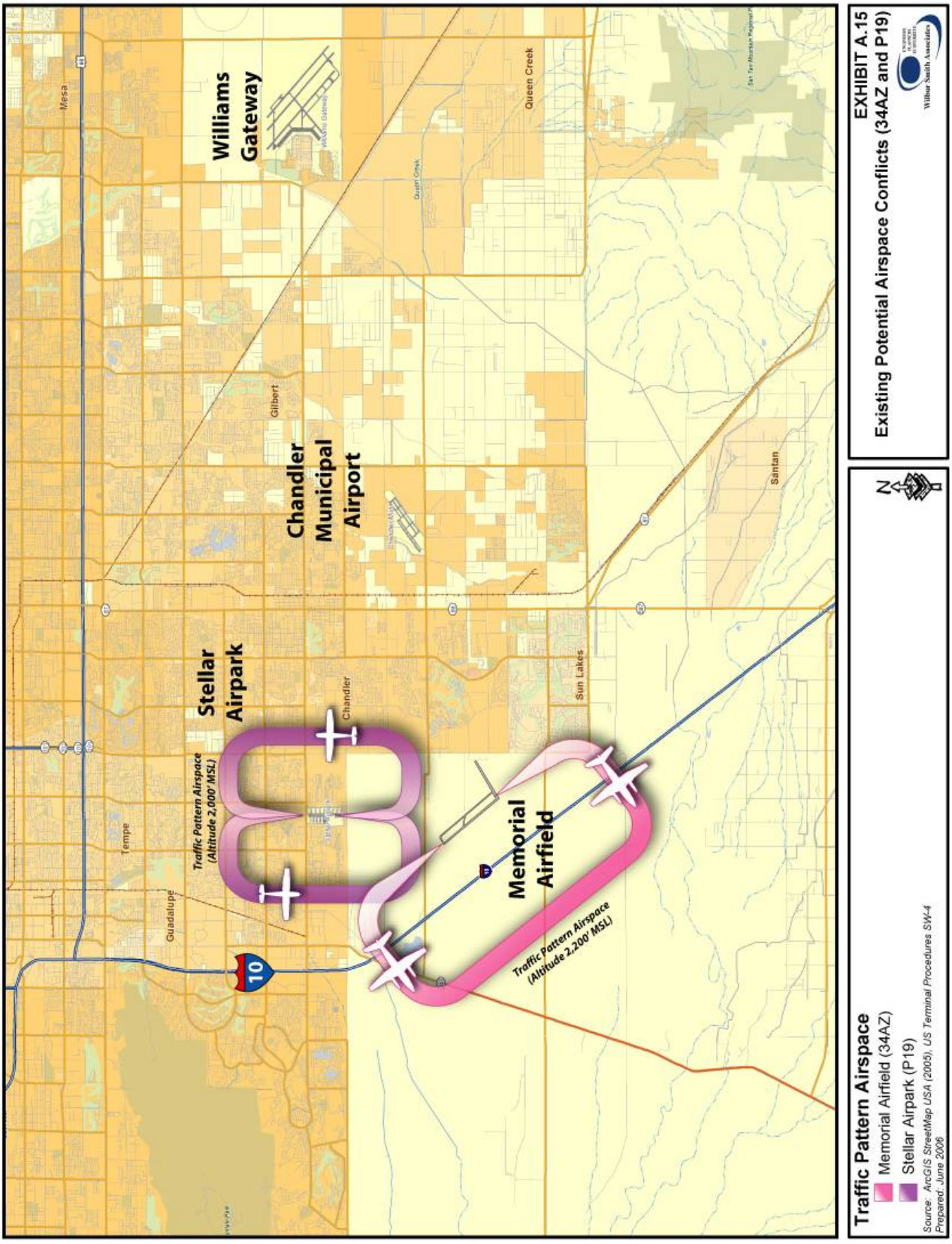

Chandler Municipal NDB Approach
At or above 1780' MSL
Chandler Municipal VOR Approach
At or above 3000' MSL
Memorial
Traffic Pattern
2200' MSL
Memorial Airfield
Chandler Municipal Airport
Memorial
Traffic Pattern
2200' MSL
Chandler Municipal
GPS Approach
At or above 2900' MSL
N
Legend
Chandler Municipal Airport (CHD)
Memorial Airfield (34AZ)
Source: ArcGIS StreetMap USA (2005), US Terminal Procedures SW-4
Prepared: June 2006
EXHIBIT A.13
Existing Potential Airspace Conflicts (CHD and 34 AZ)
Wilbur Smith Associates

Stellar Airpark – Memorial Airfield

Memorial Airfield is located less the 2 NM south of Stellar Airpark. **Exhibit A.14** depicts the current traffic patterns of both airports. As shown in the exhibit, the standard traffic pattern on the northeast side of Memorial Airfield overlaps a significant portion of the traffic pattern at Stellar Airpark, creating the potential for a conflict at both facilities. Currently the limited activity and the requirement for prior permission to use the Memorial Airfield have reduced any conflicts between these airports. Because of the requirement to receive prior permission, pilots using Memorial Airfield are likely to be familiar with the location of Stellar Airpark and aware of the potential conflicts with the Stellar Airpark traffic pattern. If Memorial Airfield becomes a public use facility, and is utilized by transient pilots less familiar with the local area, there could be a greater potential for a conflict between the two facilities. To reduce this conflict the FAA has recommended that Memorial Airfield implement a right traffic pattern on runway 30. In addition, a left traffic pattern should be exercised when accessing from southwest of Memorial Airfield for landing on runway 12. Implementing this change would shift the pattern for runway 30 and runway 12 to the southwest side of the airport. This would reduce conflicts with Chandler IAPs and with Stellar Airpark traffic patterns. In recognition of the potential for conflicts, Stellar Airpark has prohibited practice instrument approaches to its runway.

Exhibit A.15 depicts the traffic patterns of both airports with this recommended change in place. As shown, this action would not entirely eliminate the conflict between Stellar Airpark and Memorial Airfield, but would significantly reduce it.

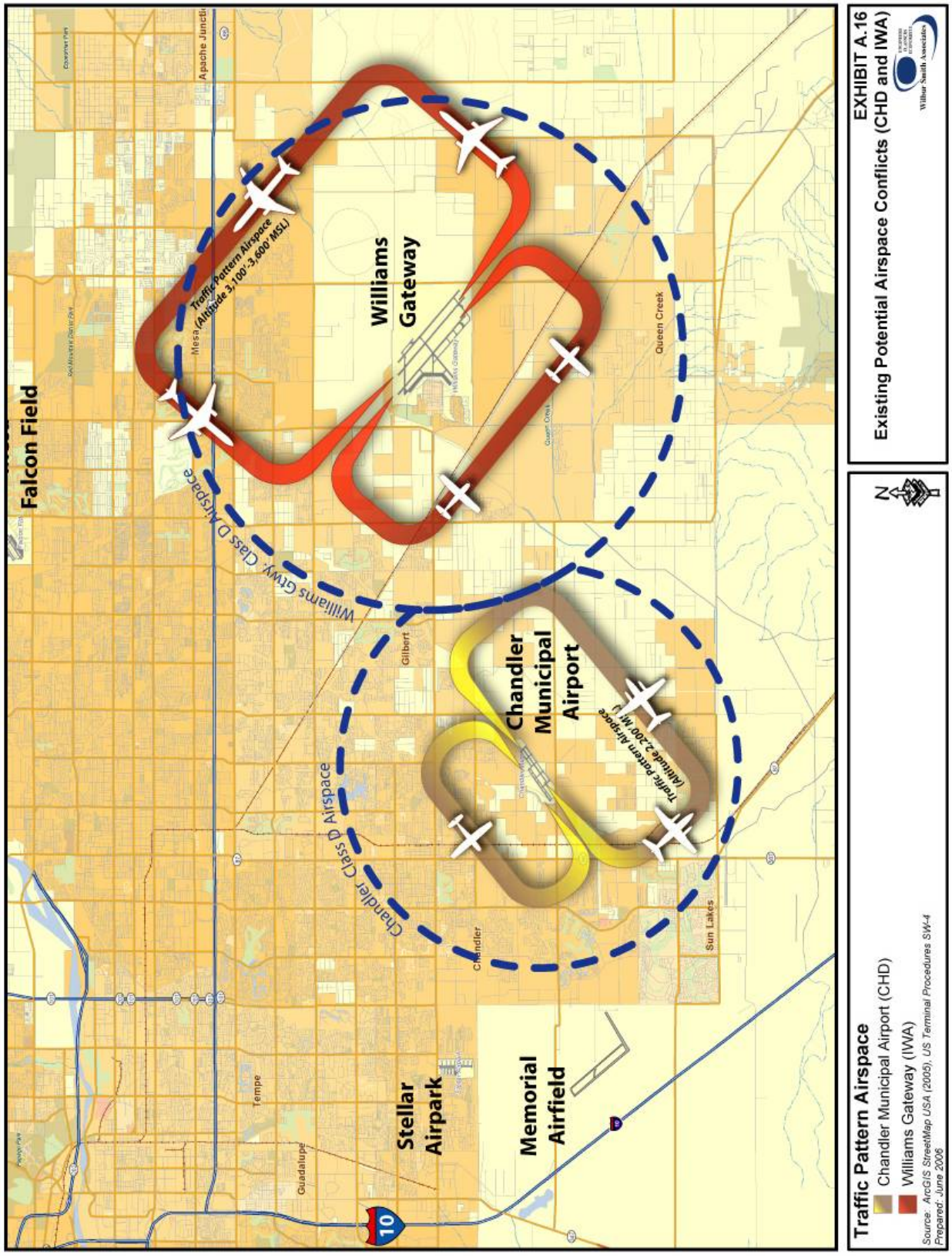

Williams Gateway
Chandler Municipal Airport
Stellar Airpark
Memorial Airfield
Traffic Pattern Airspace (Altitude 2,000' MSL)
Traffic Pattern Airspace (Altitude 2,200' MSL)
Mesa
Gilbert
Queen Creek
Chandler
Sun Lakes
Santan
Tempe
Guadalupe
10
EXHIBIT A.14
Existing Potential Airspace Conflicts (34AZ and P19)
Wilbur Smith Associates
N
Traffic Pattern Airspace
Memorial Airfield (34AZ)
Stellar Airpark (P19)
Source: ArcGIS StreetMap USA (2005), US Terminal Procedures SW-4
Prepared: June 2006

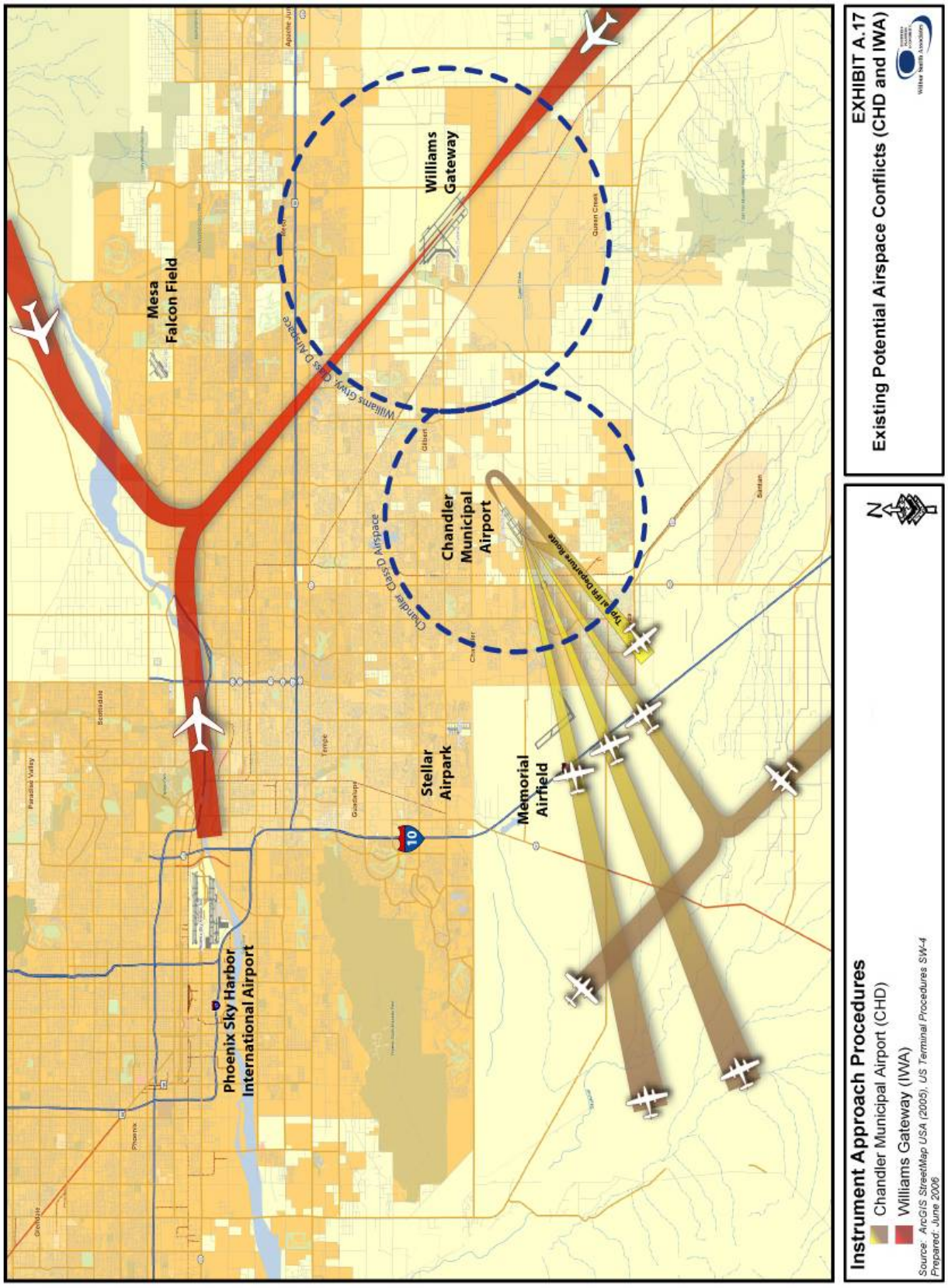

Williams Gateway
Chandler Municipal Airport
Stellar Airpark
Memorial Airfield
Traffic Pattern Airspace (Altitude 2,000' MSL)
Traffic Pattern Airspace (Altitude 2,200' MSL)
Mesa
Gilbert
Queen Creek
Chandler
Sun Lakes
Santan
Tempe
Guadalupe
10
EXHIBIT A.15
Existing Potential Airspace Conflicts (34AZ and P19)
Wilbur Smith Associates
Traffic Pattern Airspace
Memorial Airfield (34AZ)
Stellar Airpark (P19)
N
Source: ArcGIS StreetMap USA (2005), US Terminal Procedures SW-4
Prepared: June 2006

Williams Gateway Airport

Williams Gateway Airport is a public use reliever airport that was previously the Williams Air Force Base. The airport is located approximately 8 miles east of Chandler Municipal Airport and services a wide variety of general aviation and cargo operations. The Williams Gateway has an operating control tower with the associated Class D airspace slightly overlapping that of Chandler Municipal Airport. The distance between the two facilities is sufficient for VFR operations to occur at each airport with very little impact on each other. Operating control towers at both facilities further limit conflict between these two airports during both VFR and IFR conditions. **Exhibit A.16** depicts the traffic pattern airspace of both facilities.

Due to conflicts with aircraft arriving and departing Phoenix Sky Harbor International Airport, the IFR approaches to Williams Gateway arriving from the northwest are seldom utilized. Almost all aircraft operating IFR to Williams Gateway arrive from the southeast, outside the area used by the majority of aircraft operating to and from Chandler Municipal Airport. **Exhibit A.17** shows the IAP flight paths to both airports.


Falcon Field
Williams Gateway
Traffic Pattern Airspace
(Altitude 3,100'-3,600' MSL)
Williams Gtwy. Class D Airspace
Chandler Municipal Airport
Traffic Pattern Airspace
(Altitude 2,200' MSL)
Chandler Class D Airspace
Stellar Airpark
Memorial Airfield
Mesa
Gilbert
Chandler
Tempe
Queen Creek
Sun Lakes
Guadalupe
Apache Junction
10
Traffic Pattern Airspace
Chandler Municipal Airport (CHD)
Williams Gateway (IWA)
Source: ArcGIS StreetMap USA (2005), US Terminal Procedures SW-4
Prepared: June 2006
N
EXHIBIT A.16
Existing Potential Airspace Conflicts (CHD and IWA)
Wilbur Smith Associates


Williams Gateway
Mesa Falcon Field
Chandler Municipal Airport
Stellar Airpark
Memorial Airfield
Phoenix Sky Harbor International Airport
Williams Gtwy Class D Airspace
Chandler Class D Airspace
Typical VFR Departure Route
10
EXHIBIT A.17
Existing Potential Airspace Conflicts (CHD and IWA)
N
Instrument Approach Procedures
Chandler Municipal Airport (CHD)
Williams Gateway (IWA)
Source: ArcGIS StreetMap USA (2005), US Terminal Procedures SW-4
Prepared: June 2006

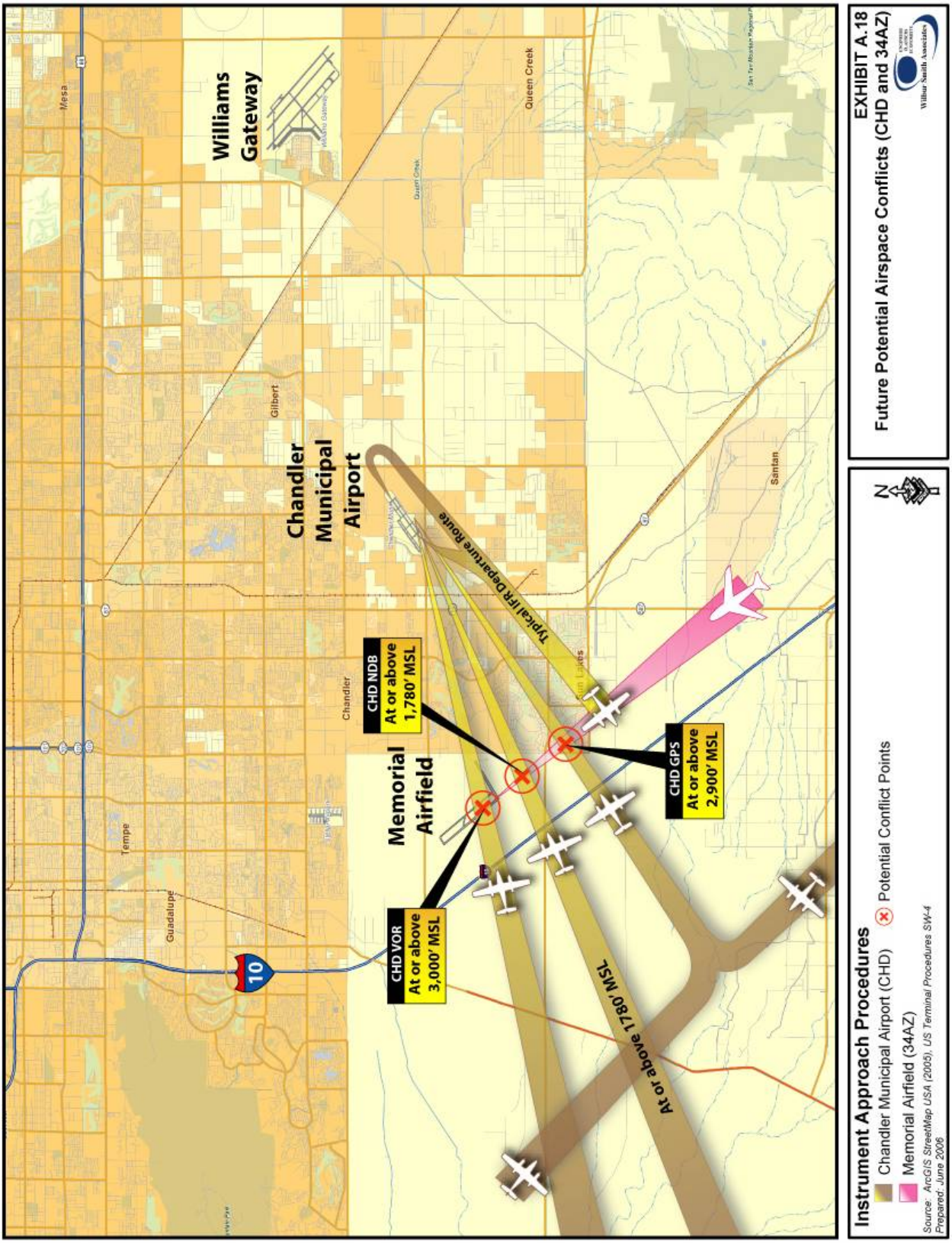
FUTURE POTENTIAL AIRSPACE ISSUES

The previous analysis indicated where airspace conflicts in the existing airspace structure could occur relative to activity at Chandler Municipal Airport. There are several future potential aviation-related changes that may impact the airspace in the region. The following sections describe these potential future airspace issues as they relates to Chandler Municipal Airport

Memorial Airfield

The Memorial Airfield is currently in the process of a Master Plan Update. One of the development alternatives of the draft plan proposes to realign the existing runway and equip the airport with a GPS instrument approach. The proposed runway realignment would rotate the runway eleven degrees to a more north – south alignment and shift the runway approximately 2,400 feet north. The intent of the propose runway realignment and shift is to minimize the impacts of aircraft over flight on the Sun Lakes community located south of Memorial Airfield. The runway realignment and shift are not anticipated to have a significant effect on operations at Chandler Municipal Airport. The most significant impact on Chandler Municipal Airport will be the increased utilization of Memorial Airfield that will occur as a result of the airport being improved and designated as a public use facility. The draft Master Plan Update indicates the potential for construction of 418 hangar units. With the strong demand for hangar facilities in the Phoenix area, it is anticipated that new hangars at Memorial Airfield would be in high demand, creating the potential for a significant increase in aircraft activity at Memorial Airfield. The Master Plan Update projects Memorial Airfield to accommodate approximately 60,000 total operations at the end of the planning period (20 years). This level of activity would not meet FAA requirements for the establishment of an air traffic control tower. However, if the Gila River Airport Authority were to establish an air traffic control tower, the facility would most likely be a Non-Federal Control Tower, and would not have associated Class D airspace.

Currently Memorial Airfield does not have an IAP. The Master Plan Update proposes that the airport be designed to accommodate an instrument approach with not lower than one-half mile visibility minimums to the south end of the runway, and an approach with not lower the one mile visibility to the north end of the runway. Similar to the approach at Stellar Airpark, the approach to the south end of the runway would cross the approach paths of aircraft utilizing the instrument approach procedures at Chandler Municipal Airport. To eliminate this conflict, approaches to each airport would require sequencing by ATC, meaning that from and ATC standpoint the two airports would be treated as one, with only one aircraft being allowed to execute an instrument approach to either airport at one time. The approach to the north end of the runway is not anticipated to have a significant impact on operations at Chandler Municipal Airport, but could effect operations at Phoenix Sky Harbor International Airport. **Exhibit A.18** depicts the anticipated approach path of the IAP arriving from the south to Memorial Airfield with the proposed runway realignment.


Williams Gateway
Chandler Municipal Airport
Memorial Airfield
Typical IFR Departure Route
CHD NDB
At or above
1,780' MSL
CHD VOR
At or above
3,000' MSL
CHD GPS
At or above
2,900' MSL
At or above 1780' MSL
Mesa
Gilbert
Chandler
Tempe
Guadalupe
Queen Creek
Santan
10
EXHIBIT A.18
Future Potential Airspace Conflicts (CHD and 34AZ)
Wilbur Smith Associates
N
Instrument Approach Procedures
Chandler Municipal Airport (CHD)
Potential Conflict Points
Memorial Airfield (34AZ)
Source: ArcGIS StreetMap USA (2005), US Terminal Procedures SW-4
Prepared: June 2006

Class B Airspace Redesign

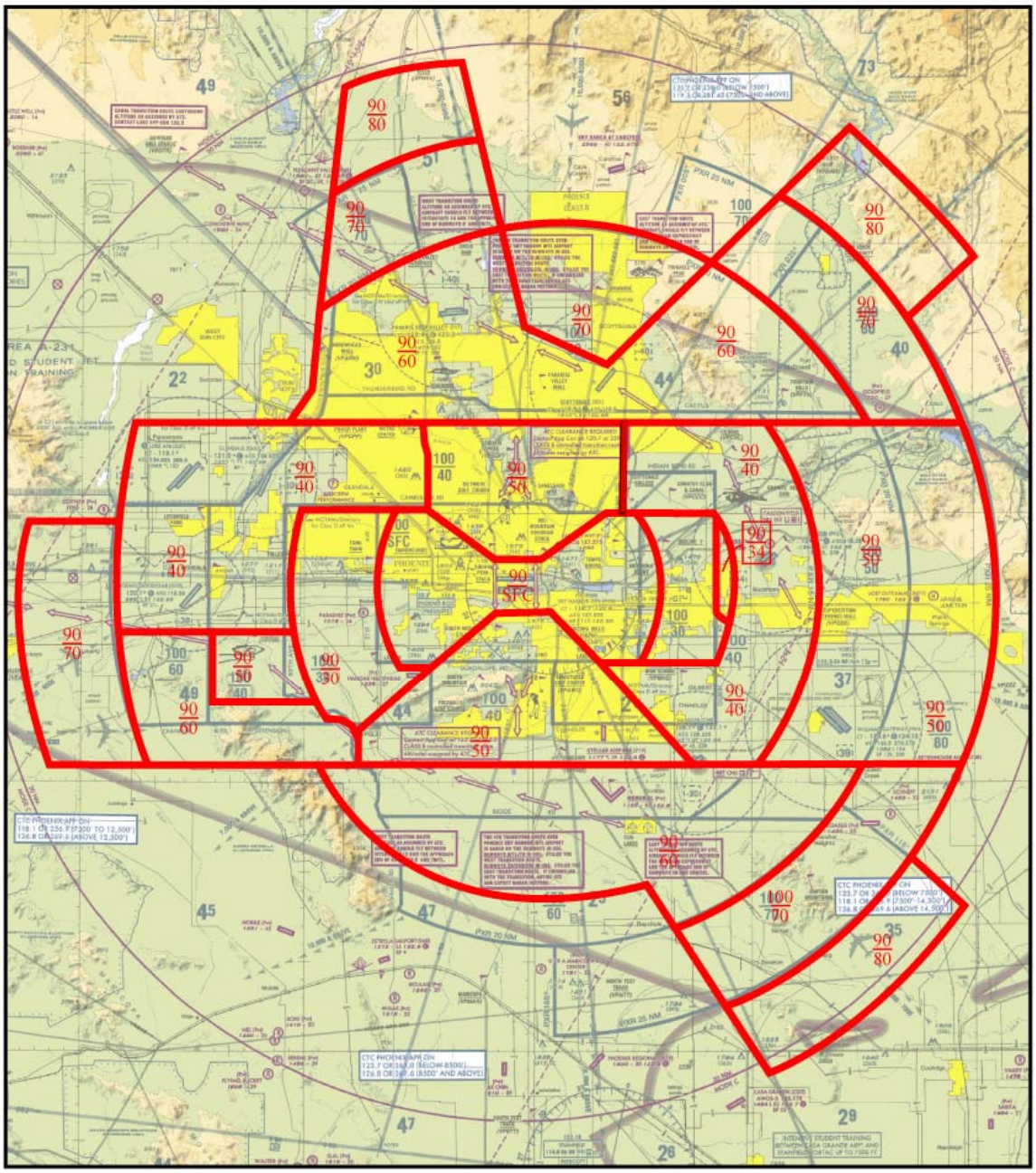
The current Phoenix Class B airspace configuration was published in November 1998. Since that time the Phoenix Sky Harbor International Airport has experienced a significant increase in air carrier traffic. In order to accommodate the increase in airline traffic, the FAA has proposed a series of revisions to the Class B airspace. **Exhibit A.19** depicts the Phoenix Class B airspace with the proposed changes.

Numerous changes are proposed for the Phoenix Class B airspace. The following lists the major airspace changes proposed:

- Lowers the top of the Class B airspace from 10,000 feet MSL to 9,000 feet MSL
- Lowers the floor of the Class B airspace directly east of Phoenix Sky Harbor International Airport from 3,000 feet MSL to 2,700 feet MSL
- Lowers the floor of the far eastern shelf of the Class B airspace from 8,000 feet MSL to 5,000 feet MSL
- Creates a new 4,000 to 9,000 feet MSL Class B shelf over Luke AFB
- Lowers the floor of the Class B shelf over Goodyear Airport from 6,000 to 4,000 feet MSL
- Raises the floor of the airspace directly south of Chandler Municipal from 4,000 to 6,000 feet MSL
- Adds an 8,000 to 9,000 feet MSL shelf north of Deer Valley Airport
- Adds an 8,000 to 9,000 feet MSL shelf on the northeast and southeast outer portion of the Class B airspace, extending just beyond the 30 NM Mode C boundary
- Adds an 4,000 to 9,000 feet MSL shelf west of Goodyear Airport

The proposed changes to the Class B airspace will have varying impacts on the airports in the Phoenix region.

The impact on operations at Chandler Municipal Airport appears to be minimal. The altitude of the Class B airspace shelf overlying Chandler Municipal Airport remains the same, or is higher in some areas than the existing airspace configuration. The intent of the proposed airspace changes is to increase the capacity for operations at Phoenix Sky Harbor International. IFR arrivals and departures to and from Chandler Municipal Airport are sequenced with arrivals and departures at Phoenix Sky Harbor International Airport. Thus improvements to the IFR capacity of Phoenix Sky Harbor International Airport, will improve ATC's ability to sequence IFR traffic to and from Chandler Municipal Airport.



Legend

Class B Airspace

90 / 60 — Ceiling in hundreds of feet MSL / Floor in hundreds of feet MSL

Source: Source Title

EXHIBIT A.19
Proposed Phoenix Class B Airspace

Wilbur Smith Associates — Engineers, Planners, Economists

Other airports in the Phoenix area appear to have more significant impacts as a result of the proposed changes. Luke Air Force base is currently outside the boundaries of the Class B airspace. The proposed changes include a 4,000 to 9,000 feet MSL Class B shelf over most of the Luke Air Force base Class D airspace; when Luke Air Force Base is flying, RAPCON will retain air traffic control service. The Goodyear Airport would see the Class D airspace lowered over the northwest portion of the Goodyear Class D airspace from 6,000 feet MSL to 4,000 feet MSL. Other minor changes include small portions of the Class B airspace overlying the Williams Gateway and Falcon Field Class D airspace that would be lower than before. The primary effect of these changes will be on aircraft who choose not to receive ATC services, or those who are not able to receive ATC clearance through the Class B airspace. These aircraft who are trying to avoid the Class B airspace will be required to fly at lower altitudes that before in order to remain outside of the Class B airspace boundaries. In these cases aircraft will be required to fly at lower altitudes over heavily populated areas increasing the potential for noise complaints in these areas. It should be noted that the currently proposed Class B airspace redesign is being reviewed with additional changes proposed by a wide cross section of organization representing various local aviation interests.

SUMMARY

The airspace in the Phoenix metropolitan area is a precious commodity. Proper allocation of airspace and coordination between controlling agencies becomes increasingly important as traffic density increases, as is projected for Chandler Municipal Airport, and the other airports in the Phoenix area. The projected increase in aircraft activity and the development of additional facilities to accommodate this demand will make day-to-day air traffic management and airspace control in this heavily congested area a continuing challenge. The purpose of this analysis is to identify existing and potential future airspace conflicts as they relate to the existing conditions at Chandler Municipal Airport, as well as potential improvements that would affect future development at Chandler Municipal Airport. Early identification of conflicts will provide local stakeholders and controlling agencies a better opportunity to find solutions to mitigate current and potential future airspace conflicts.

The following is a list of the current and potential future airspace conflicts identified in this analysis.

Current Issues

- IFR approaches to Chandler Municipal Airport cross through the VFR traffic pattern airspace of Memorial Airfield.

- The traffic pattern airspace at Memorial Airfield overlaps the traffic pattern airspace of Stellar Airpark.

- The instrument approach to Stellar Airpark crosses the three instrument approach paths to Chandler Municipal Airport.

Future Issues

- A future instrument approach at Memorial Airport would cross the current instrument approaches at Chandler Municipal Airport. This will require ATC to sequence aircraft using the IAPs at either airport.

- Activity at Memorial Airfield is projected to significantly increase if the airfield is redeveloped and improved. As activity at Memorial increases, the potential for airspace conflicts increases as well.

APPENDIX B: ECONOMIC IMPACT OF AIRPORT INFRASTRUCTURE DEVELOPMENT

INTRODUCTION

This appendix encapsulates an analysis of the economic impacts that could result from the implementation of the findings of the *Chandler Municipal Airport Master Plan Update*. Specifically, this analysis assesses the direct economic impacts that would be projected to result from the enhancements of the existing infrastructure at the Airport, with principal consideration given to an extended primary runway. The analysis includes a comparative review of the potential economic and market impacts of the Airport under existing conditions, under conditions of an enhanced infrastructure, as well as a review of other selected, comparable airports.

BACKGROUND

Chandler Municipal Airport serves as one of seven "reliever" airports for Phoenix Sky Harbor International Airport as designated by the Federal Aviation Administration's (FAA) National Plan of Integrated Airport Systems (NPIAS). The role of a reliever airport is to provide an alternate location for general aviation aircraft to operate away from a large commercial service airport. As a reliever, Chandler Municipal supports general aviation aircraft activity in the Phoenix metropolitan area and the City of Chandler. In 2005, Chandler Municipal Airport accommodated over 235,000 operations and had over 450 based general aviation aircraft.

As an important part of the economic infrastructure of both the City of Chandler and the Phoenix metropolitan area, Chandler Municipal Airport generates significant economic impacts for the region and stimulates economic development through its provision of aviation services and transportation infrastructure. The primary airport activities at Chandler Municipal include those conducted by private and non-commercial aircraft operators, flight schools, and other general aviation operations or fixed base operators (FBOs). These types of activities generally consist of providing support services for general aviation aircraft, including fuel and maintenance; providing aircraft charter operations; corporate aircraft support operations; as well as services for local residents who own and operate general aviation aircraft.

Note that the types of activities and aircraft that can be accommodated at an airport are largely dependent on the basic airfield infrastructure that is available for use. Different aircraft have different needs with regards to runway length, approaches, fuel and maintenance services, and parking and/or hangar size. The availability of these services and required infrastructure are considered each time a pilot opts to utilize an airport that lies within the vicinity of the aircraft passengers' final destination.

The purpose of this analysis is to evaluate the potential change in economic impact that could result from infrastructure improvements at Chandler Municipal Airport. While this analysis is being prepared separately from the Airport Master Plan, its objective is to provide more information on the economic impacts of the potential airport improvements being considered as part of that plan. Therefore, relevant findings of the Master Plan will be incorporated directly into this analysis.

RELEVANT MASTER PLAN FINDINGS

The on-going Master Plan Update for Chandler Municipal Airport is currently being concluded, having reached consensus on establishing a long-term airport development program for the 20-year planning period. For the purposes of this economic impact analysis, key development concepts and their potential impacts on airport operations must be identified and quantified. Specifically, and of greatest relevance, is the proposed extension of the Airport's primary runway, and how this extension could impact the Airport's future operational levels and aircraft fleet mix.

Through the master planning process, an 830-foot extension to Runway 4R-22L, bringing its total usable length up from 4,870 feet to 5,700 feet, has been identified as being a key component of the Airport's long-term development program. In general, this extension will:

- Enhance the overall level of airport operational safety;
- Improve the stage length capabilities of aircraft that operate on the runway;
- Reduce or eliminate any operational weight limitations currently being realized by aircraft operating on the existing runway;
- Result in quieter aircraft operations; and
- Enhance the Airport's overall economic benefits to the surrounding communities.

Directly attributable to the benefits listed above, the extended runway is projected to result in an increase in corporate jet aircraft activity at the Airport. This increase is detailed in the following table (**Table B.1**). Note that these projections are based on airport operations being constrained by airfield infrastructure conditions; in this case the constraint is runway length. As shown in this table, the extended runway is projected to result in an increase of 2,404 jet operations at the Airport, or approximately 6.6 operations per day.

Table B.1
CONSTRAINED JET OPERATIONS FORECAST

	4,870 ft Runway		5,700 ft Runway		Net Difference	
	Jet Ops	Total Ops	Jet Ops	Total Ops	Jet Ops	Total Ops
2005	3,527	235,111	NA	NA	NA	NA
2010	4,029	265,915	5,641	267,527	1,612	1,612
2015	4,604	303,831	6,445	305,672	1,841	1,841
2020	5,259	345,341	7,363	347,445	2,104	2,104
2025	6,009	392,588	8,413	394,992	2,404	2,404

SOURCE: Wilbur Smith Associates.
PREPARED: September 2006

As important as it is to quantify the overall operational benefits of a longer runway, it is equally important to identify its qualitative benefits. In this case, an analysis of the runway length requirements of corporate jet aircraft through application of the FAA's Runway Design 4.2 model analysis (reflected in Chapter Three, *Capacity Analysis and Facility Requirements*) indicates that a 5,700 foot runway at Chandler Municipal would be capable of handling 75 percent of the business jet fleet at 60 percent useful load throughout the entire year (**Table B.2**).

Table B.2
AIRPLANES THAT MAKE UP 75% OF FLEET

Manufacturer	Model	Manufacturer	Model
Aeospatiale	Sn-601 Corvette	**Dassault**	**Falcon 10**
BAE	127-700	**Dassault**	**Falcon 20**
Beech Jet	**400A**	**Dassault**	**Falcon 50/50EX**
Beech Jet	Premier I	Dassault	Falcon 900/900B
Beech Jet	2000 Starship	IAI	Jet Commander 1121
Bombardier	Challenger 300	IAI	Westwind 1123/1124
Cessna	500 Citation/501 Citation Sp	**Learjet**	**20 series**
Cessna	**Citation I/II/III**	**Learjet**	**31/31A/31A ER**
Cessna	**525A Citation II (CJ-2)**	**Learjet**	**35/35A/36/36A**
Cessna	**550 Citation Bravo**	**Learjet**	**40/45**
Cessna	550 Citation II	Mitsubishi	Mu-300 Diamond
Cessna	551 Citation II/Special	**Raytheon**	**390 Premier**
Cessna	552 Citation	**Raytheon Hawker**	**400/400XP**
Cessna	**560 Citation Encore**	Raytheon Hawker	600
Cessna	**560/560 XL Citation Excel**	Sabreliner	75A
Cessna	560 Citation V Ultra	Sabreliner	80
Cessna	650 Citation VII	Sabreliner	T-37

SOURCE: FAA AC 150/5324-4B, Runway Length Requirements for Airport Design
PREPARED: July 2006
NOTE: Those aircraft noted in bold currently operate at Chandler Municipal Airport.

It should also be noted that many of the aircraft that are included in the remaining 25 percent of the business jet fleet mix not shown above are currently operating at the Airport. As such, Chandler Municipal would continue to accommodate those aircraft, albeit at some reduced operational capabilities.

ECONOMIC IMPACT ANALYSIS

General aviation airports are an integral component of a region's overall multi-modal transportation infrastructure. Furthermore, general aviation airports serve as an important economic stimulus by generating revenues, payroll, and jobs. Additionally, not only do the airports themselves generate direct economic benefits, but many non-aviation employers who rely on airports to support their daily business activities also contribute to the overall economy.

Economic Impact at Comparable Airports

It is important to note that no two airports, whether they are commercial service or general aviation, are exactly alike. However, by comparing airports based on similarities such as FAA role (i.e. commercial, reliever, general aviation), Airport Reference Code (ARC), proximity to a metropolitan area, facilities, activity levels, as well as the many other commonalities that airports share, the economic impact derived from an airport and its facilities can be estimated.

As such, the four airports that share such commonalities with Chandler Municipal and whose economic impacts will be compared include Phoenix Deer Valley (DVT) in the Phoenix area; Spirit of Saint Louis (SUS) in St. Louis, Missouri; Charles B. Wheeler Downtown (MKC) in Kansas City, Missouri; and Van Nuys Regional (VNY) in Los Angeles, California. These airports are all located in major metropolitan areas which have experienced similar socioeconomic growth and have similar types of airport activity. Further, all airports have an ARC of either C or D and serve as reliever facilities for major metropolitan commercial service airports.

Table B.3 shows that while Chandler Municipal Airport has a shorter runway length than the other four comparable airports, it actually exceeds the based aircraft and annual operational levels of two of those other airports. However, when the most recent available economic impact is examined, Chandler Municipal's economic impact is significantly lower than all but one. One reasonable conclusion that can be drawn from this information is that if Chandler Municipal Airport had a longer runway, the economic benefit to the community and the region could increase. This increase would be due to the ability to support operations by more jet aircraft year round with limited or no restrictions to payload and/or fuel capacity. While precise estimates of additional economic impacts resulting from additional runway length at Chandler Municipal are impossible, it is reasonable to expect gains in economic benefit if the runway at the Airport were extended to better accommodate jet aircraft activities.

Table B.3
ECONOMIC IMPACT AND FACILITIES AT COMPARABLE AIRPORTS

Facilities					
	CHD	DVT	SUS	MKC	VNY
Primary Runway Length	4,870'	8,208'	7,485'	7,002'	8,001'
Based Aircraft Total	457	890	416	202	712
Jets	1	13	126	43	155
Annual Operations	235,095	290,791	146,145	102,807	504,502
Economic Activity*					
	CHD	DVT	SUS	MKC	VNY
Employment	845.0	2,209.0	3,053.0	591.0	12,014.0
Payroll (in millions)	$24.3	$59.4	$116.0	$12.5	$327.5
Economic Activity (in millions)	$58.4	$135.4	$411.6	$46.0	$1,471.2

SOURCE: Chandler Municipal Airport Records; www.airnav.com; *The Economic Impact of Aviation in Arizona*, 2002; *The Economic Benefit of Missouri's Airport System, 2005; Economic Impact of Van Nuys Airport-Update 1998, 1999*
PREPARED: August 2006
NOTE: All impacts associated with the economic activity have been adjusted for inflation.

From a business standpoint, the presence of a modern general aviation airport is commonly listed in business location studies as being one of the top ten reasons a firm chooses a specific location to base its operations. Over 90 percent of *Fortune 500* firms own and operate general aviation aircraft, and a majority of these are business jet aircraft. Moreover, the business jet segment of the nation's general aviation fleet is currently the fastest-growing segment, and the FAA expects this trend to continue at least through 2017. The ability to safely and efficiently operate at Chandler Municipal Airport would allow large companies to more effectively conduct business in Chandler and nearby communities. Similarly, Chandler-area businesses would also benefit from a longer runway, as many of those firms' clients and vendors would have an easier, more efficient means of access via a local, full service, jet-capable runway.

Economic Impact of Jet Aircraft Operations

An economic impact analysis of reliever airports throughout the U.S. conducted by Wilbur Smith Associates indicates that, on average, reliever airports similar to Chandler Municipal experience an economic impact of $961 per jet aircraft operation. Based on this level of economic impact, **Table B.4** presents the possible economic impacts of the proposed 5,700-foot runway, as well as the economic impact that could be expected to be realized from jet aircraft operations with the current runway length of 4,870 feet. The totals represent the sum of the annual projected economic impacts from 2010 to 2025. The analysis indicates that if the runway were extended to 5,700 feet, almost $31 million of additional economic impact could be realized over the 15-year period between 2010 and 2025.

Table B.4
ECONOMIC IMPACT OF JET AIRCRAFT OPERATIONS

Year	Total Annual Economic Impact @ 4,870 ft	Total Annual Economic Impact @ 5,700 ft
2010	$3,871,869	$5,420,617
2015	$4,423,964	$6,193,549
2020	$5,053,899	$7,075,459
2025	$5,774,649	$8,084,509
Total 2010 – 2025 Economic Impact	**$76,328,867**	**$106,860,413**
Total 2010 – 2025 Additional Economic Impacts	**$0**	**$30,531,547**

SOURCE: Wilbur Smith Associates.
PREPARED: September 2006

Additionally, a Wilbur Smith Associates economic impact analysis of airports throughout the U.S. indicates that a typical corporate flight department employs, on average, 11 workers and has an annual output of $4,032,000. These facilities tend to provide high paying jobs comprised of corporate pilots, mechanics and aircraft operational dispatchers. The flight departments themselves also purchase goods and services from local vendors such as catering companies and FBOs. Presented below, **Table B.5** summarizes the potential economic impact generated by corporate flight departments located at Chandler Municipal Airport, assuming that the runway were to be extended to 5,700 feet. The scenario also assumes that additional corporate flight departments will locate at the Airport in five-year increments. In this capacity alone, corporate flight departments based at the Airport could potentially contribute over $137.0 million to the local Chandler economy over a 20-year period.

Finally, it is noteworthy that many corporations' insurance policies require aircraft operations to be conducted on runways of at least 5,000 feet in order for coverage to be in effect. In other words, corporate aircraft under this type of insurance restriction would be effectively prohibited from operating at Chandler Municipal in its current configuration. It is also notable that the availability of developable land and a convenient location gives Chandler Municipal Airport an advantage in attracting corporate flight departments over the other airports in the Phoenix area, again provided that the runway length is sufficient to meet aircraft performance and insurance requirements.

Table B.5
5,700-FOOT LONG RUNWAY EXTENSION
CHD CORPORATE FLIGHT DEPARTMENT ECONOMIC IMPACT

Year	Number of Corporate Flight Departments	Number of Employees	Annual Output
2010	1	11	$4,032,000
2011	1	11	$4,032,000
2012	1	11	$4,032,000
2013	1	11	$4,032,000
2014	1	11	$4,032,000
2015	2	22	$8,064,000
2016	2	22	$8,064,000
2017	2	22	$8,064,000
2018	2	22	$8,064,000
2019	2	22	$8,064,000
2020	3	33	$12,096,000
2021	3	33	$12,096,000
2022	3	33	$12,096,000
2023	3	33	$12,096,000
2024	3	33	$12,096,000
2025	4	44	$16,128,000
Total			**$137,088,000**

SOURCE: Wilbur Smith Associates.
PREPARED: September 2006

Economic Impact of Corporate Flight Departments

Airports located in metropolitan areas, especially those located near major corporations, typically accommodate corporate flight departments. Corporate flight departments are utilized by many businesses, including most *Fortune 500* companies, in order to transport their employees for business purpose on aircraft that are owned or leased by the corporation. With a longer runway that could accommodate a higher level of service for these corporate-class aircraft, Chandler Municipal Airport would likely attract corporate flight departments of existing or new businesses in the metropolitan area.

According to a study conducted by the Arizona Department of Transportation (ADOT), the economic impact of Chandler Municipal Airport was $53.8 million in 2002. Applying the Airport Master Plan's based aircraft forecast annual growth rate of 2.44 percent to the total economic impact for the 20-year period indicates that the Airport's economic impact is estimated to grow to $87.1 million by 2025 without any significant improvements to the airfield. If the runway were extended to 5,700 feet and corporate flight departments were to locate on the Airport, the impact by 2025 would be $105.5 million, a 17.5 percent increase. **Table B.6** summarizes the total annual economic impacts of a 5,700-foot long runway.

Table B.6
TOTAL ANNUAL ECONOMIC IMPACT OF A 5,700-FOOT RUNWAY EXTENSION AND CHD CORPORATE FLIGHT DEPARTMENT

Year	Economic Impact Forecast for CHD Based on Current Runway Length	Economic Impact Forecast for CHD Based on 5,700-ft Runway Length	Economic Impact from Additional Operations	Scenario A Corporate Flight Department(s)	Total New Impacts
2005	$53,800,000	NA	NA	NA	NA
2010	$60,689,164	$66,270,296	$1,549,132	$4,032,000	$5,581,132
2015	$68,460,495	$78,293,696	$1,769,201	$8,064,000	$9,833,201
2020	$77,226,956	$91,344,900	$2,021,944	$12,096,000	$14,117,944
2025	**$87,115,974**	**$105,554,218**	$2,310,244	$16,128,000	**$18,438,244**

SOURCE: Wilbur Smith Associates.
PREPARED: September 2006

Benefits

Benefits are defined as the services that a community receives by developing and maintaining an airport, and differ from the economic impact discussed in the previous section. Airports support a variety of public benefits, the most substantial of which is the time and cost saved by utilizing air transportation. Other benefits can include increased levels of safety, comfort and convenience, the access to the national airport system that an airport provides, and enhancements to the community sense of well-being. Note that these benefits cannot always be expressed in terms of dollars.

Transportation Benefits

Jet aircraft that are currently operating at Chandler Municipal are often doing so at various degrees of constraints because of the constraining impact of the primary runway's existing length. As a result, weight and fuel restrictions may require flights to further destinations may be forced to stop en route for refueling purposes.

Additionally, there are quantifiable costs associated with each refueling stop. These associated operational costs are described below on a per incident basis:

- Stopping to refuel adds approximately 50 minutes (30 minute average turnaround time for actual refueling and 20 minute average to climb to appropriate altitude) of flight time to operating costs. Per minute average operating costs for the planes being used and projected to be used (i.e., Beech Jet 400A or Citation X) is $35.32[1]. Thus, every re-fueling stop avoided saves on average $1,765.85.

- With a longer runway, aircraft are more capable of operating at optimum capacity and weights. Each gallon of Jet A fuel that an aircraft cannot take due to weight

[1] Source: Aviation Research Group/US Inc. *Fractional Program Cost Comparison Utility* between a Beech Jet 400A and Citation X results in a direct cost per flight hour of $1,900 and $2,338, respectively. The average per minute flight cost for these two aircraft is $35.32.

restrictions results in an average loss of $4.97[2] per gallon to the local fixed base operator (FBO), as well as any fuel flowage fee realized by the Airport. Thus, for every 1,000 pounds of additional fuel weight taken on results in fuel sales of $596.64.

SUMMARY

The *Chandler Municipal Airport 2010 Master Plan Update* has concluded that in order for the Airport to better fulfill its designated role of "reliever" airport within the national transportation system, an extension of the Airport's primary runway to 5,700 feet is necessary to better accommodate corporate-class aircraft. While some corporate-class aircraft currently operate at Chandler Municipal, they are projected to use the Airport with greater frequency as population and employment in the City of Chandler continues to grow. As such, from Airport safety, operational, and economic impact perspectives, it is desirable to upgrade the existing Airport and airfield infrastructure to meet the projected needs of these aircraft. This appendix has identified the potential economic impact and benefits that could be realized by the City of Chandler, the surrounding communities, and the other users of the Airport if the runway were upgraded to better accommodate larger corporate-class aircraft.

[2] Source: Aviation Research Group/US Inc., *ARG/US Fuel Price Survey, September 2006.* Western average for Jet A fuel is $4.97 per gallon. The national average as of September 2006 for Jet A fuel is $4.68 per gallon.

APPENDIX C: AIRPORT LAYOUT PLAN DRAWINGS

At the conclusion of the Alternatives Analysis, an evaluation was made of future options for airfield and landside development. This resulted in the selection of an alternative for the future development of Chandler Municipal Airport. Specific improvements needed to accommodate previously identified requirements for airport facilities were noted in the Airport Development Schedule and Financial Analysis. This appendix provides the Airport Layout Plan drawings that depict the results of the previous analysis, including the specific projects recommended for development, the impact of these projects on airspace and approaches to the Airport, land uses around the Airport, and the Airport's property map.

A set of plans, referred to as Airport Layout Plans, has been prepared to graphically depict the recommendations for airfield layout, disposition of obstructions, and future use of land in the vicinity of Chandler Municipal Airport. This set of plans includes the following:

- Sheet Index
- Airport Layout Plan
- Part 77 Airspace Plan
- Approach Zones Profiles
- Runway Protection Zone Plans and Profiles
- Land Use Plan
- Airport Property Map

The airport layout plan set has been prepared on a computer-aided drafting system for future ease of use. The computerized plan set provides detailed information of existing and future facility layout on multiple layers that permit the user to focus in on any section of the Airport at any desirable scale. The plan can be used as base information for design, and can be easily updated in the future to reflect new development and more detail concerning existing conditions as made available through design surveys. The plan set is provided in 22-inch x 34-inch reproducible hard copy in accordance with current FAA standards. The airport layout plan set has been developed in accordance with FAA-Western Pacific Region and ADOT-Aeronautics Division through the use of checklists provided by both agencies.

In order to comply with A.R.S. 28-8486, the Land Use Plan was developed to include overlays of the traffic pattern airspace and the airport noise contours for the 2025 condition using 60 and 55 DNL contours (55 DNL is required by the City of Chandler).

The drawings comprising the airport layout plan set for Chandler Municipal Airport are depicted in the following sheets.

CHANDLER MUNICIPAL AIRPORT

Airport Layout Plan

AZDOT PROJECT NO. E5S64 - MARICOPA COUNTY

Chandler, Arizona

LOCATION MAP

AIRPORT LAYOUT PLAN SET
SHEET INDEX

VICINITY MAP

ENGINEERS
PLANNERS
ECONOMISTS

WilburSmith
ASSOCIATES

1508 W. Tara Drive
Gilbert, Arizona 85233
Phone: 480-775-4344

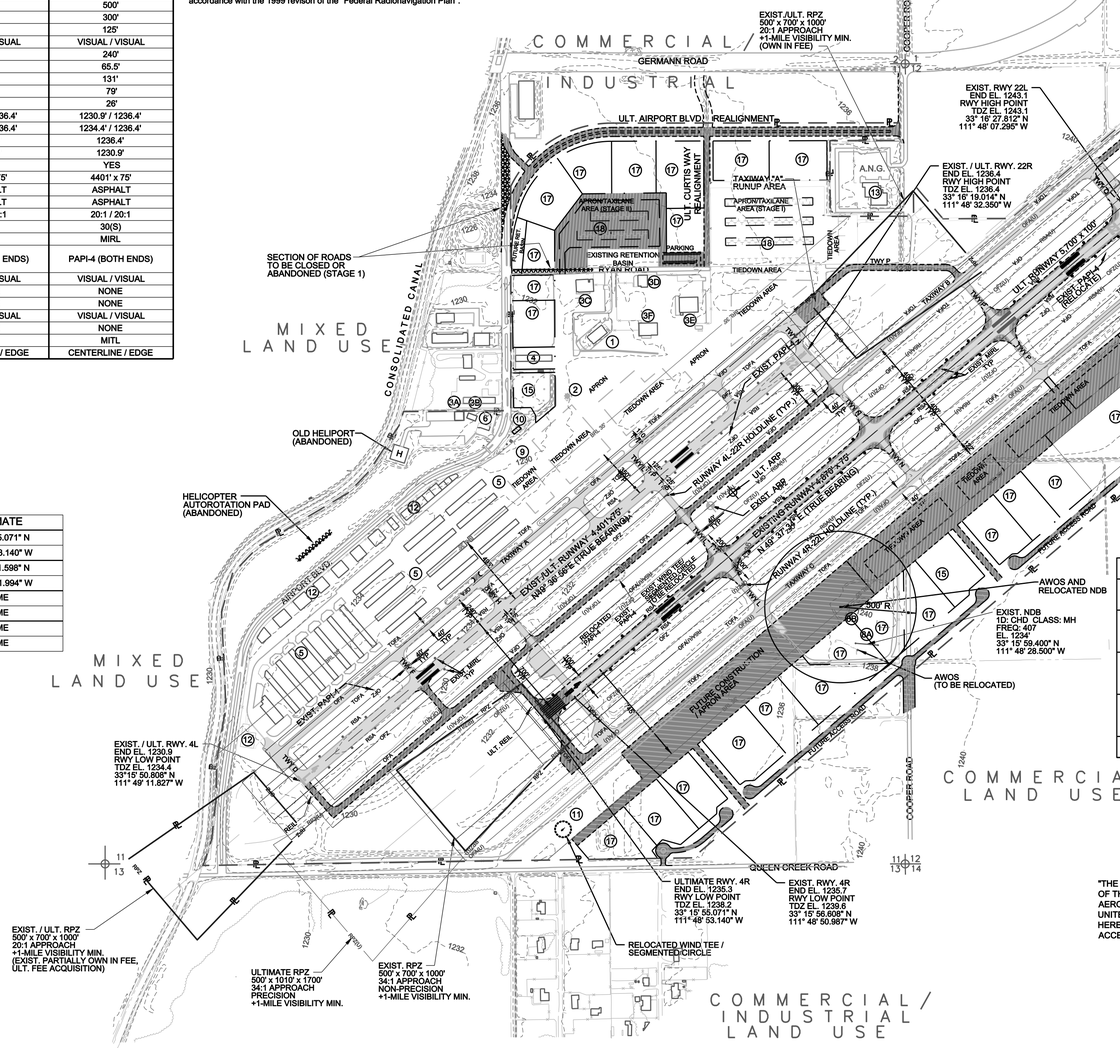
RUNWAY DATA	RUNWAY 4R-22L		RUNWAY 4L-22R	
	EXISTING	ULTIMATE	EXISTING	ULTIMATE
AIRPORT REFERENCE CODE	B-II	C-II	B-II	B-II
RUNWAY AZIMUTH	49.6261	SAME	49.6154	49.6154
RUNWAY BEARING	N49° 37' 34"E	SAME	N49° 36' 56"E	N49° 36' 56"E
WIND COVERAGE (12 mph/15 mph)	12 MPH 98.02% / 15 MPH 99.88%		12 MPH 98.02% / 15 MPH 99.88%	
CRITICAL DESIGN AIRCRAFT (CDA)	BEECH 400A	CITATION X	KING AIR B200	KING AIR B200
CDA WINGSPAN	43' 6"	63' 7"	54' 6"	54' 6"
CDA UNDERCARRIAGE WIDTH	9' 4"	10' 7"	17' 2"	17' 2"
CDA MAXIMUM CERTIFIED TAKEOFF WEIGHT (lbs)	16,100	30,000	12,500	12,500
CDA APPROACH SPEED (KNOTS)	105	139	103.5	103.5
RUNWAY EFFECTIVE GRADIENT (in %)	0.16%	0.16%	0.18%	0.18%
RUNWAY MAXIMUM GRADIENT (in %)	0.16%	0.16%	0.18%	0.18%
APPROACH VISIBILITY MINIMUMS	>1 MILE / >1 MILE	>1 MILE / >1 MILE	>1 MILE / >1 MILE	>1 MILE / >1 MILE
RUNWAY SAFETY AREA (RSA) WIDTH	150'	500'	150'	150'
RSA LENGTH BEYOND EACH RUNWAY END	300'	1000'	300'	300'
RUNWAY OBSTACLE FREE ZONE (OFZ) WIDTH	250'	400'	250'	250'
OFZ LENGTH BEYOND EACH RUNWAY END	200'	200'	200'	200'
RUNWAY OBJECT FREE AREA (ROFA) WIDTH	500'	800'	500'	500'
ROFA LENGTH BEYOND EACH RUNWAY END	300'	1000'	300'	300'
DISTANCE FROM RWY CENTERLINE TO HOLDLINE	200'	200'	125'	125'
FAR PART 77 CATEGORY	NONPREC / VISUAL	PRECISION / VISUAL	VISUAL / VISUAL	VISUAL / VISUAL
STANDARD SEPARATION - RUNWAY CENTERLINE	400'	400'	240'	240'
STANDARD SEPARATION - TAXIWAY CENTERLINE	65.5'	65.5'	65.5'	65.5'
TAXIWAY OBJECT FREE AREA WIDTH	131'	131'	131'	131'
TAXIWAY SAFETY AREA WIDTH	79'	79'	79'	79'
TAXIWAY WINGTIP CLEARANCE	26'	26'	26'	26'
RUNWAY END ELEVATION (above MSL)	1235.7' / 1243.1'	1235.3' / 1244.0'	1230.9' / 1236.4'	1230.9' / 1236.4'
TOUCHDOWN ZONE ELEVATION (above MSL)	1239.6' / 1243.1'	1238.2' / 1244.0'	1234.4' / 1236.4'	1234.4' / 1236.4'
RUNWAY HIGH POINT (ABOVE MSL)	1243.1'	1244.0'	1236.4'	1236.4'
RUNWAY LOW POINT (ABOVE MSL)	1235.7'	1235.3'	1230.9'	1230.9'
LINE OF SIGHT REQUIREMENT MET	YES	YES	YES	YES
RUNWAY DIMENSIONS	4870' x 75'	5700' x 100'	4401' x 75'	4401' x 75'
RUNWAY SURFACE TYPE	ASPHALT	ASPHALT	ASPHALT	ASPHALT
TAXIWAY SURFACE TYPE	ASPHALT	ASPHALT	ASPHALT	ASPHALT
RUNWAY APPROACH SLOPES	34:1 / 20:1	34:1 / 20:1	20:1 / 20:1	20:1 / 20:1
PAVEMENT STRENGTH (in thousand lbs.)[1]	30(S)	75 (D)	30(S)	30(S)
RUNWAY LIGHTING	MIRL	MIRL	MIRL	MIRL
NAVIGATIONAL AND VISUAL AIDS	RNAV (GPS)(RWY 4R) PAPI-4 (BOTH ENDS) REIL (BOTH ENDS)	LPV (RWY 4R) PAPI-4 (BOTH ENDS) REIL (BOTH ENDS)	PAPI-4 (BOTH ENDS)	PAPI-4 (BOTH ENDS)
RUNWAY INSTRUMENTATION	NONPREC / VISUAL	PRECISION / VISUAL	VISUAL / VISUAL	VISUAL / VISUAL
RUNWAY THRESHOLD DISPLACEMENT	NONE	NONE	NONE	NONE
PAVEMENT SURFACE TREATMENT	NONE	NONE	NONE	NONE
RUNWAY MARKING	NONPREC / VISUAL	NONPREC / VISUAL	VISUAL / VISUAL	VISUAL / VISUAL
RUNWAY APPROACH LIGHTING	NONE	NONE	NONE	NONE
TAXIWAY LIGHTING	MITL	MITL	MITL	MITL
TAXIWAY MARKING	CENTERLINE / EDGE	CENTERLINE / EDGE	CENTERLINE / EDGE	CENTERLINE / EDGE

[1] Pavement strengths are expressed in Single(S) and Dual(D) wheel loading capacities.

AIRPORT DATA			
CHANDLER MUNICIPAL AIRPORT (CHD)			
CITY: CHANDLER, ARIZONA		COUNTY: MARICOPA	
RANGE: 5 EAST TOWNSHIP: 2 SOUTH		CIVIL TOWNSHIP:	
		EXISTING	ULTIMATE
NATIONAL PLAN OF INTERGRATED AIRPORT SYSTEMS (NPIAS) SERVICE LEVEL		RELIEVER (RL)	SAME
AIRPORT REFERENCE CODE		B-II	C-II
DESIGN AIRCRAFT		BEECH 400A	CITATION X
AIRPORT ELEVATION (above MSL)		1243 MSL	1244 MSL
MEAN MAXIMUM TEMPERATURE OF HOTTEST MONTH		105.8 (July)	SAME
AIRPORT REFERENCE POINT	Latitude	33° 16' 08.80"N	33° 16' 09.665" N
(ARP) COORDINATES (NAD 83)	Longitude	111° 48' 40.00"W	111° 48' 38.251" W
AIRPORT and TERMINAL NAVIGATIONAL AIDS		ROTATING BEACON ATCT ⚠VOR / GPS (Rwy. 4L) AWOS ⚠NDB (Rwy. 4R)	ROTATING BEACON ATCT GPS LPV AWOS

⚠NDB and VOR will eventually be phased out (circa 2020), in accordance with the 1999 revison of the "Federal Radionavigation Plan".

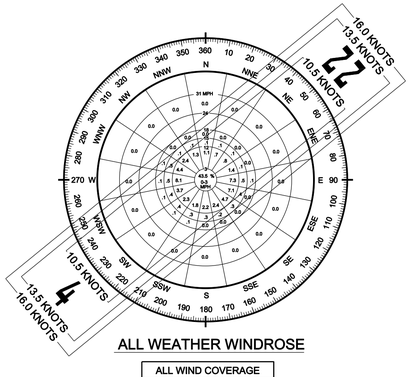
RUNWAY END COORDINATES (NAD 83)		EXISTING	ULTIMATE
RUNWAY 4R	Latitude	33° 15' 56.608" N	33° 15' 55.071" N
	Longitude	111° 48' 50.987" W	111° 48' 53.140" W
RUNWAY 22L	Latitude	33° 16' 27.812" N	33° 16' 31.598" N
	Longitude	111° 48' 07.295" W	111° 48' 01.994" W
RUNWAY 4L	Latitude	33° 15' 50.808" N	SAME
	Longitude	111° 49' 11.827" W	SAME
RUNWAY 22R	Latitude	33° 16' 19.014" N	SAME
	Longitude	111° 48' 32.350" W	SAME



RUNWAY PROTECTION ZONE DATA										
RUNWAY END	EXISTING RPZ DIMENSIONS				ULTIMATE RPZ DIMENSIONS				RPZ OWNERSHIP	
	A	B	C	ACREAGE	A	B	C	ACREAGE	EXISTING	ULTIMATE
4R	500	700	1000	13.77	500	1010	1700	29.47	100% - FEE	72% - FEE 28% - AV EASEMENT
22L	500	700	1000	13.77	500	1010	1700	29.47	100% - FEE	58% - FEE 42% - AV EASEMENT
4L	500	700	1000	13.77	500	700	1000	13.77	46% - FEE 54% - FUTURE AV EASEMENT	46% - FEE 54% - AV EASEMENT
22R	500	700	1000	13.77	500	700	1000	13.77	100% - FEE	NO CHANGE

CONSTRUCTION NOTICE REQUIREMENT

To protect operational safety and future development, all proposed construction on the airport must be coordinated by the airport owner with the FAA Airports District Office prior to construction. FAA's review takes approximately 60 days.



ALL WEATHER WINDROSE

ALL WIND COVERAGE	
RUNWAY 4-22	
12 MPH (10.5 KNOTS)	98.02%
15 MPH (13.5 KNOTS)	99.88%
18 MPH (16.0 KNOTS)	99.95%

USAFETAC
Air Weather Service (MAC)
DATA STATION:
Williams Air Force Base, Mesa, Arizona
OBSERVATIONS:
53,403 Observations, 1983-1992

NOTES:

1. THERE ARE NO OFZ PENETRATIONS.
2. THERE ARE NO THRESHOLD SITING SURFACE OBJECT PENETRATIONS.
3. THE TOPOGRAPHICAL BASE (2-FOOT CONTOUR INTERVAL) FOR THE CHANDLER AIRPORT ALP WAS REATED BY COOPER AERIGI OF PHOENIX, INC. USING GROUND SURVEY, FLIGHT SURVEY, AND END ANALYTICS. (DATE: 01-28-1997)
4. PROPERTY LINES ESTABLISHED BASED ON SURVEY AND AIRPORT OWNER INFORMATION. TO BE USED FOR PLANNING PURPOSES ONLY.

"This signature certifies the Sponsor's approval of the information contained in this plan"

SPONSOR'S NAME _____ DATE _____

TITLE

EXISTING AND FUTURE FACILITIES

THE EXISTING AND FUTURE FACILITIES TABLE, AS WELL AS ASSOCIATED ELEVATIONS, ARE LISTED ON SHEET 1A OF THIS PLAN.

"THE CONTENTS OF THIS PLAN DO NOT NECESSARILY REFLECT THE OFFICIAL VIEWS OR POLICY OF THE FAA OR ADOT AERONAUTICS. ACCEPTANCE OF THIS DOCUMENT BY THE FAA OR ADOT AERONAUTICS DOES NOT IN ANY WAY CONSTITUTE A COMMITMENT ON THE PART OF THE UNITED STATES OR THE STATE OF ARIZONA TO PARTICIPATE IN ANY DEVELOPMENT DEPICTED HEREIN NOR DOES IT INDICATE THAT THE PROPOSED DEVELOPMENT IS ENVIRONMENTALLY ACCEPTABLE IN ACCORDANCE WITH APPROPRIATE PUBLIC LAWS."

LEGEND

EXISTING	ULTIMATE	DESCRIPTION
		ABANDONED PAVEMENT (To Be Removed)
		AIRPORT PAVEMENT
		AIRPORT PROPERTY LINE
		AIRPORT REFERENCE POINT (ARP)
		AIRPORT ROTATING BEACON
		BUILDING ABANDONMENT (To Be Removed)
		BUILDINGS
H	H	HELIPAD
BRL 30'	BRL 30'	BUILDING RESTRICTION LINE (BRL)
OFA	OFA (U)	RUNWAY OBJECT FREE AREA
RSA	RSA (U)	RUNWAY SAFETY AREA
OFZ	OFZ (U)	OBJECT FREE ZONE
TSA	TSA (U)	TAXIWAY SAFETY AREA
TOFA	TOFA (U)	TAXIWAY OBJECT FREE AREA
		FACILITY CONSTRUCTION
		FENCING
VASI-4	PAPI-4	NAVIGATIONAL AID INSTALLATION (GVGI)
		RUNWAY THRESHOLD LIGHTS and REIL
M 1/4 S 21/22		SECTION CORNER
		SEGMENTED CIRCLE/WIND INDICATOR
1080		TOPOGRAPHY (Source: Digital Survey Data)
		WIND INDICATOR (Lighted)

DEVELOPMENT STAGES

STAGE I 0-5 YEARS	STAGE II 6-10 YEARS	STAGE III 11-20 YEARS

REVISIONS:		
REV. NO.	DATE	DESCRIPTION OF REVISION

500 0 500 1000 1500
SCALE: 1" = 500'

DESIGNED BY	SP	DATE	11/06
DRAWN BY	LKH	DATE	04/10
CHECKED BY	JM	DATE	04/10

APPROVALS:

TITLE DATE

TITLE DATE

TITLE DATE

PLANS PREPARED BY

WilburSmith ASSOCIATES ENGINEERS PLANNERS ECONOMISTS

1508 W. Tara Drive
Gilbert, Arizona 85233
Phone: 480-775-4344

PLANS PREPARED FOR

CHANDLER MUNICIPAL AIRPORT
CHANDLER, ARIZONA

AIRPORT LAYOUT PLAN

PROJECT NO. (CLIENT)	PROJECT NO. (WSA)	
AZDOT - E5S64	A31476	1

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EXISTING BUILDINGS / FACILITIES

NO.	DESCRIPTION	ULTIMATE DISPOSITION	EXISTING ELEVATION
1	TERMINAL / ADMINISTRATION BUILDING	UNCHANGED	1252.53
2	AIRPORT TRAFFIC CONTOL TOWER (ATCT) & ROTATING BEACON	UNCHANGED	1319.49
3A	AIRPORT OPERATIONS AND MAINTENANCE	UNCHANGED	1256.60
3B	FIXED BASE OPERATOR / TENANTS	UNCHANGED	1245.18
3C	FIXED BASE OPERATOR / TENANTS	UNCHANGED	1254.96
3D	FIXED BASE OPERATOR / TENANTS	UNCHANGED	1257.22
3E	FBO / TENANTS AND FUEL STORAGE FACILITY	UNCHANGED	1266.14
3F	FIXED BASE OPERATOR / TENANTS	UNCHANGED	1252.61
3G	FIXED BASE OPERATOR / TENANTS	UNCHANGED	1276.48
4	SHADE HANGAR	UNCHANGED	1246.89
5A	T-HANGARS	UNCHANGED	1253.19
5B	T-HANGARS	UNCHANGED	1250.00
5C	T-HANGARS	UNCHANGED	1249.48
5D	T-HANGARS	UNCHANGED	1252.13
5E	T-HANGARS	UNCHANGED	1250.32
5F	T-HANGARS	UNCHANGED	1250.83
5G	T-HANGARS	UNCHANGED	1251.30
5H	T-HANGARS	UNCHANGED	1251.72
5I	T-HANGARS	UNCHANGED	1251.50
5J	T-HANGARS	UNCHANGED	1248.19
5K	T-HANGARS	UNCHANGED	1250.10
5L	T-HANGARS	UNCHANGED	1247.88
5M	T-HANGARS	UNCHANGED	1254.79
5N	T-HANGARS	UNCHANGED	1250.47
5O	T-HANGARS	UNCHANGED	1248.58
5P	T-HANGARS	UNCHANGED	1250.08
5Q	T-HANGARS	UNCHANGED	1253.91
5R	T-HANGARS	UNCHANGED	1245.99
5S	T-HANGARS	UNCHANGED	1246.52
5T	T-HANGARS	UNCHANGED	1248.70
6	UNDERGROUND FUEL STORAGE FACILITY	UNCHANGED	1228.00
7	RELOCATED HELIPORT	UNCHANGED	1244.06
8A	EXISTING NDB / AWOS SITE	REMOVE	1234.00
9	FUEL FACILITY	UNCHANGED	1230.00
10	OLD TERMINAL BUILDING	REMOVED	--
12A	CONVENTIONAL HANGAR	UNCHANGED	1255.43
12B	CONVENTIONAL HANGAR	UNCHANGED	1257.62
12C	CONVENTIONAL HANGAR	UNCHANGED	1255.67
12D	CONVENTIONAL HANGAR	UNCHANGED	1257.24
12E	CONVENTIONAL HANGAR	UNCHANGED	1256.65
12F	CONVENTIONAL HANGAR	UNCHANGED	1256.64
12G	CONVENTIONAL HANGAR	UNCHANGED	1256.72
12H	CONVENTIONAL HANGAR	UNCHANGED	1256.41
12I	CONVENTIONAL HANGAR	UNCHANGED	1257.53
12J	CONVENTIONAL HANGAR	UNCHANGED	1255.46
13	AIR NATIONAL GUARD	UNCHANGED	1260.19

* INDIVIDUAL BUILDING NUMBERS AND LOCATIONS CAN BE FOUND ON SHEET 2 "TERMINAL AREA PLAN"

** BUILDING ELEVATIONS WERE SURVEYED BY AZTEC ENGINEERING IN MARCH 2010

FUTURE BUILDINGS / FACILITIES

NO.	DESCRIPTION
8B	RELOCATED NDB / AWOS SITE
11	WIND TEE / SEGMENTED CIRCLE
14	CONVENTIONAL HANGAR
15	FBO OFFICE
16	T-HANGAR
17	CORPORATE PARCELS
18	T-SHADE HANGARS

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REVISIONS:

REV. NO.	DATE	DESCRIPTION OF REVISION

500 0 500 1000 1500

SCALE: 1" = 500'

DESIGNED BY SP DATE 11/06

DRAWN BY LKH DATE 04/10

CHECKED BY JM DATE 04/10

APPROVALS:

TITLE DATE

TITLE DATE

TITLE DATE

PLANS PREPARED BY

ENGINEERS PLANNERS ECONOMISTS

WilburSmith ASSOCIATES

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Phone: 480-775-4344

PLANS PREPARED FOR

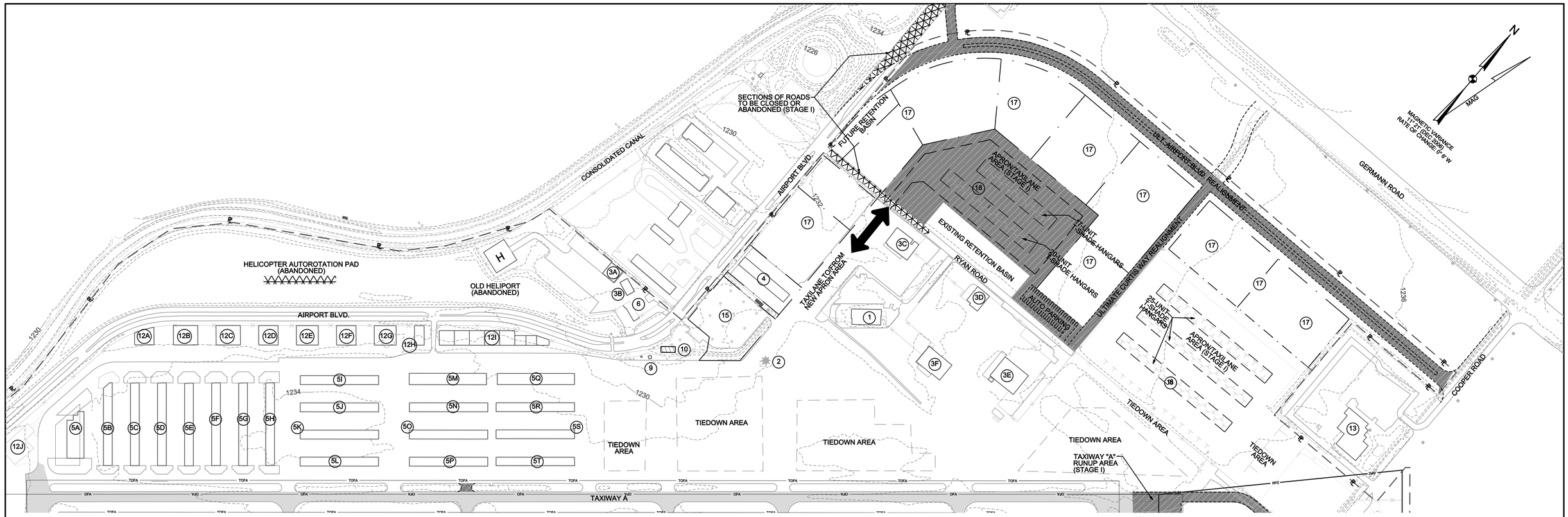
CHANDLER MUNICIPAL AIRPORT
CHANDLER, ARIZONA

PROJECT NO. (CLIENT) AZDOT - E5S64

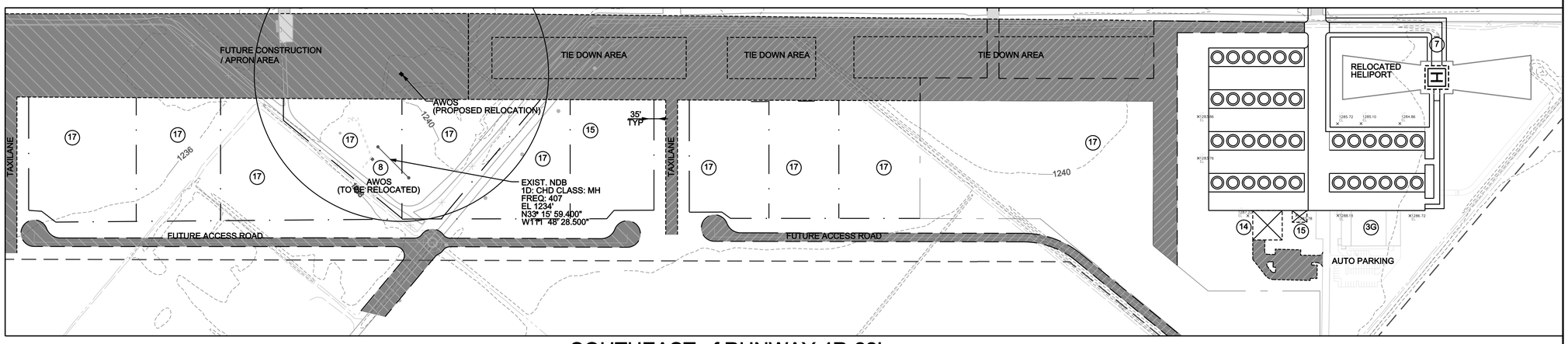
PROJECT NO. (WSA) A31476

ALP DETAIL TABLES

1A



NORTHWEST of RUNWAY 4L-22R



SOUTHEAST of RUNWAY 4R-22L

NOTES:

1. THE TOPOGRAPHICAL BASE (2-FOOT CONTOUR INTERVAL) FOR THE CHANDLER AIRPORT ALP WAS CREATED BY COOPER AERIGI OF PHOENIX, INC. USING GROUND SURVEY, FLIGHT SURVEY, AND END ANALYTICS. (DATE: 01-28-1997)
2. BUILDING LEGEND WITH ELEVATIONS CAN BE FOUND ON SHEET 1A.

LEGEND

EXISTING	ULTIMATE	DESCRIPTION
		ABANDONED PAVEMENT (To Be Removed)
		AIRPORT PAVEMENT
		AIRPORT PROPERTY LINE
		AIRPORT REFERENCE POINT (ARP)
		AIRPORT ROTATING BEACON
		BUILDING ABANDONMENT (To Be Removed)
		BUILDINGS
H	H	HELIPAD
BRL 35'	BRL 35'	BUILDING RESTRICTION LINE (BRL)
OFA	OFA (U)	RUNWAY OBJECT FREE AREA
RSA	RSA (U)	RUNWAY SAFETY AREA
OFZ	OFZ (U)	OBJECT FREE ZONE
TSA	TSA (U)	TAXIWAY SAFETY AREA
TOFA	TOFA (U)	TAXIWAY OBJECT FREE AREA
		FACILITY CONSTRUCTION
		FENCING
VASI-4	PAPI-4	NAVIGATIONAL AID INSTALLATION (GVGI)
		RUNWAY THRESHOLD LIGHTS and REIL
		SECTION CORNER
		SEGMENTED CIRCLE/WIND INDICATOR
1080		TOPOGRAPHY (Source: Digital Survey Data)
		WIND INDICATOR (Lighted)
×1283.86		LIGHT POLE (with elevation)

DEVELOPMENT STAGES

STAGE I 0-5 YEARS	STAGE II 6-10 YEARS	STAGE III 11-20 YEARS

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REVISIONS:

REV. NO.	DATE	DESCRIPTION OF REVISION

200 0 200 400 600

SCALE: 1" = 200'

DESIGNED BY SP DATE 11/06

DRAWN BY LKH DATE 04/10

CHECKED BY JM DATE 04/10

APPROVALS:

TITLE DATE

TITLE DATE

TITLE DATE

PLANS PREPARED BY

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PLANS PREPARED FOR

CHANDLER MUNICIPAL AIRPORT
CHANDLER, ARIZONA

TERMINAL AREA PLANS

PROJECT NO. (CLIENT)	PROJECT NO. (WSA)	
AZDOT - E5S64	A31476	2

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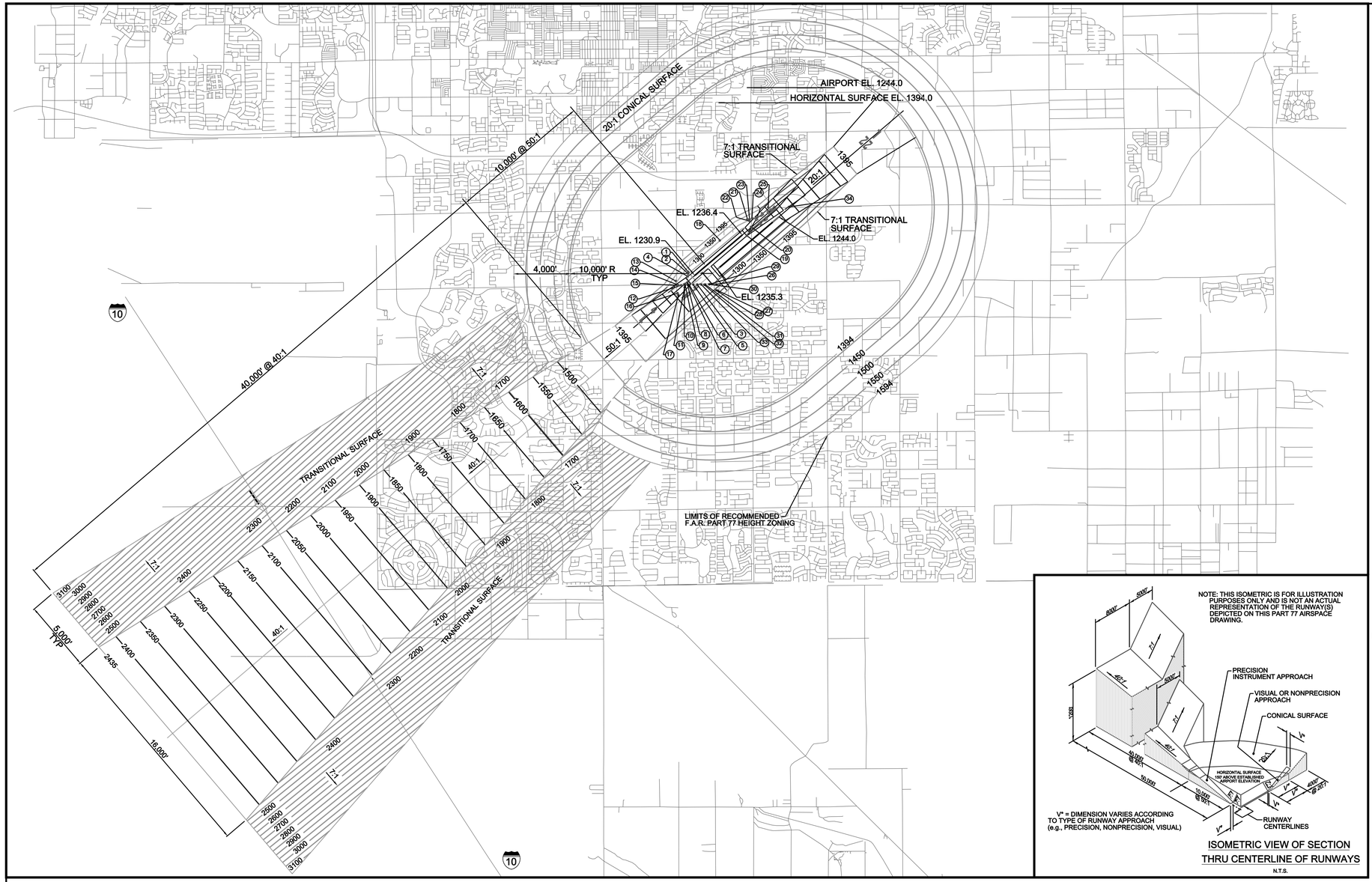

ISOMETRIC VIEW OF SECTION
THRU CENTERLINE OF RUNWAYS
N.T.S.

N

MAG

MAGNETIC VARIANCE
11° 21' (DEC 2006)
RATE OF CHANGE: 0° 6' W

GENERAL NOTES

1. OBSTRUCTIONS, CLEARANCES, AND LOCATIONS ARE CALCULATED FROM ULTIMATE RUNWAY END ELEVATIONS AND ULTIMATE APPROACH SURFACES, UNLESS OTHERWISE NOTED.
2. DEPICTION OF FEATURES AND OBJECTS WITHIN THE PRIMARY, TRANSITIONAL, AND HORIZONTAL PART 77 SURFACES, ARE ILLUSTRATED ON THIS DRAWING, THE PART 77 AIRSPACE PLAN.
3. DEPICTION OF FEATURES AND OBJECTS WITHIN THE OUTER PORTION OF THE APPROACH SURFACES IS ILLUSTRATED ON THE APPROACH PROFILES DRAWING, SHEET 4 OF THESE PLANS.
4. DEPICTION OF FEATURES AND OBJECTS WITHIN THE INNER PORTION OF THE APPROACH SURFACES, IS ILLUSTRATED ON THE RUNWAY PROTECTION ZONE PLAN AND PROFILE DRAWINGS, SHEETS 5, 6 AND 7 OF THESE PLANS.
5. EXISTING AND FUTURE HEIGHT AND HAZARD ORDINANCES ARE TO BE AMENDED AND / OR REFERENCED UPON APPROVAL OF UPDATED AIRPORT AIRSPACE DRAWING.
6. ADDITIONAL OBSTRUCTION DATA IS ILLUSTRATED ON NATIONAL OCEAN SURVEY DOCUMENT OC 6494, AIRPORT OBSTRUCTION CHART.

OBSTRUCTION TABLE

	OBSTRUCTION NUMBER	OBJECT DESCRIPTION	ELEVATION (MSL)	SURFACE PENETRATION / CLEARANCE	ULTIMATE OBJECT DISPOSITION
RUNWAY 4L	1	ROAD	1246	15	UNCHANGED
	2	ROAD	1246	13	UNCHANGED
	3	POLE	1264	4	UNCHANGED
	4	ROAD	1244	9	UNCHANGED
	5	POLE	1264	26	UNCHANGED
	6	POLE	1263	22	UNCHANGED
	7	POLE	1257	15	UNCHANGED
	8	POLE	1263	19	UNCHANGED
	9	POLE	1264	18	UNCHANGED
	10	ROAD	1246	0	UNCHANGED
	11	TREE	1290	41	UNCHANGED
	12	POLE	1266	16	UNCHANGED
	13	POLE	1274	21	UNCHANGED
	14	CAMERA ON LIGHT POLE	1263	9	UNCHANGED
	15	POLE	1265	12	UNCHANGED
	16	TREE	1286	24	UNCHANGED
	17	TREE	1289	27	UNCHANGED
RUNWAY 22R	18	ANTENNA	1337	10	UNCHANGED
	19	BUSH	1238	1	REMOVE
	20	FENCE	1245	-4	RELOCATE
	21	TOWER	1319	52	UNCHANGED
	22	BUILDING VENT	1259	6	UNCHANGED
	23	TREE	1265	2	REMOVE
	24	POLE	1272	13	UNCHANGED
	25	TREE	1281	-5	REMOVE
RUNWAY 4R	26	TREE	1266	16	UNCHANGED
	27	TREE	1282	1	REMOVE
	28	TREE	1275	21	UNCHANGED
	29	CANTENARY	1263	16	UNCHANGED
	30	POLE	1266	4	UNCHANGED
	31	POLE	1265	7	UNCHANGED
	32	TREE	1267	2	REMOVE
	33	POLE	1264	3	UNCHANGED
RUNWAY 22L	34	POLE	1261	-3	REMOVE

NOTE:
THE OBSTRUCTION DATA WAS COLLECTED IN ACCORDANCE WITH FAA AREA NAVIGATION APPROACH (ANA-LPV) SURVEY SPECIFICATIONS NOAA - NATIONAL GEODETIC SURVEY - (4-1-2005)

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REVISIONS:

REV. NO.	DATE	DESCRIPTION OF REVISION

4000 0 4000 8000 12000
SCALE: 1" = 4000'

DESIGNED BY SP DATE 11/06
DRAWN BY LKH DATE 04/10
CHECKED BY JM DATE 04/10

APPROVALS:

TITLE DATE
TITLE DATE
TITLE DATE

PLANS PREPARED BY

ENGINEERS PLANNERS ECONOMISTS
WilburSmith ASSOCIATES

1508 W. Tara Drive
Gilbert, Arizona 85233
Phone: 480-775-4344

PLANS PREPARED FOR

CHANDLER MUNICIPAL AIRPORT
CHANDLER, ARIZONA

PROJECT NO. (CLIENT) AZDOT - E5S64
PROJECT NO. (WSA) A31476

PART 77 AIRSPACE PLAN

3

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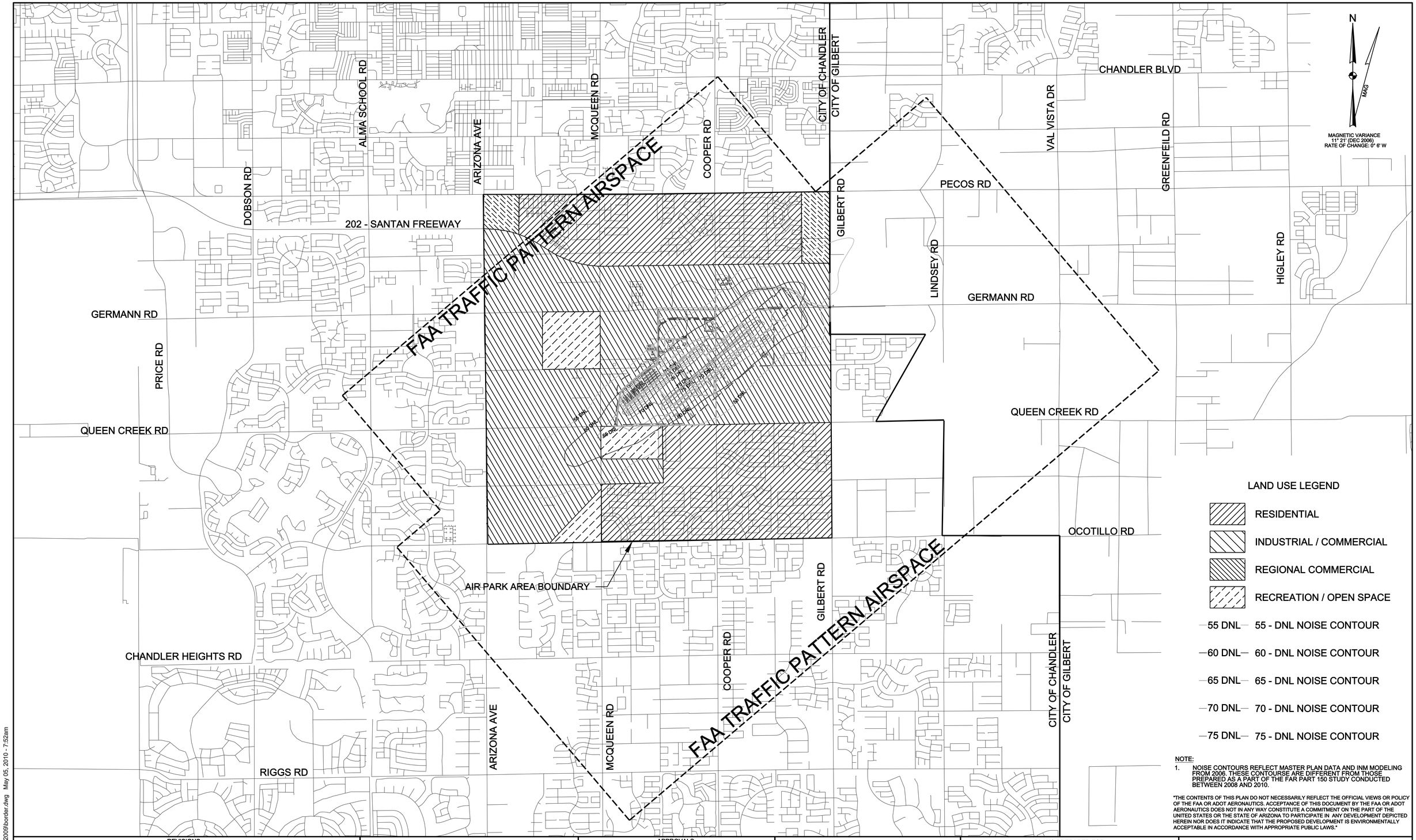

LAND USE LEGEND

- RESIDENTIAL
- INDUSTRIAL / COMMERCIAL
- REGIONAL COMMERCIAL
- RECREATION / OPEN SPACE
- 55 DNL — 55 - DNL NOISE CONTOUR
- 60 DNL — 60 - DNL NOISE CONTOUR
- 65 DNL — 65 - DNL NOISE CONTOUR
- 70 DNL — 70 - DNL NOISE CONTOUR
- 75 DNL — 75 - DNL NOISE CONTOUR

NOTE:

1. NOISE CONTOURS REFLECT MASTER PLAN DATA AND INM MODELING FROM 2006. THESE CONTOURSE ARE DIFFERENT FROM THOSE PREPARED AS A PART OF THE FAR PART 150 STUDY CONDUCTED BETWEEN 2008 AND 2010.

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REVISIONS:

REV. NO.	DATE	DESCRIPTION OF REVISION

2000 0 2000 4000 6000
SCALE: 1" = 2000'

DESIGNED BY SP DATE 11/06
DRAWN BY LKH DATE 04/10
CHECKED BY JM DATE 04/10

APPROVALS:

TITLE DATE
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PLANS PREPARED BY

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PLANS PREPARED FOR

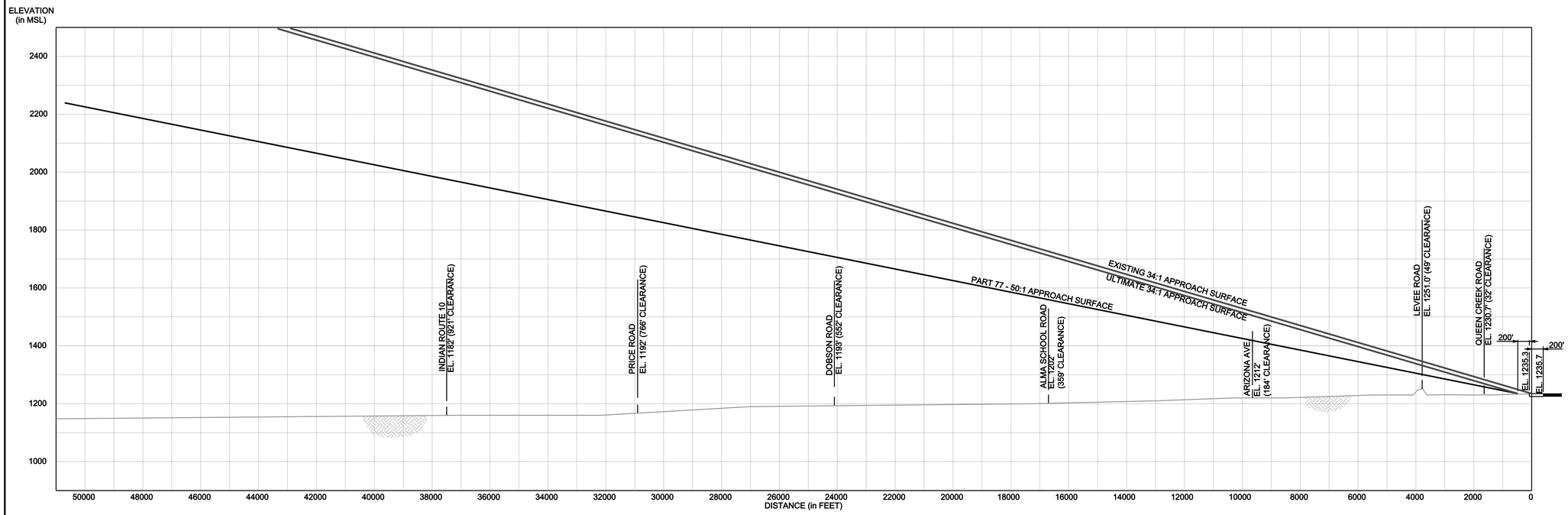
CHANDLER MUNICIPAL AIRPORT
CHANDLER, ARIZONA

PROJECT NO. (CLIENT) AZDOT - E5S64
PROJECT NO. (WSA) A31476

LAND USE PLAN

8

Q:\Chandler ALP Update 2009\border.dwg May 05, 2010 - 7:52am

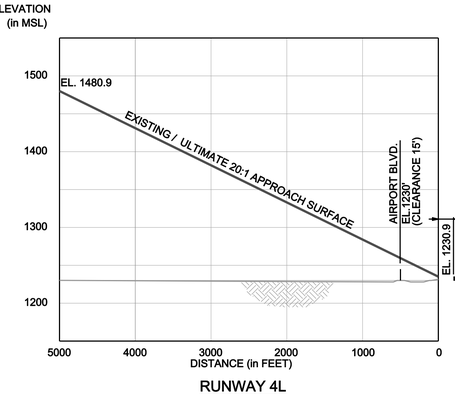


RUNWAY 4R PRECISION APPROACH ZONE PROFILES

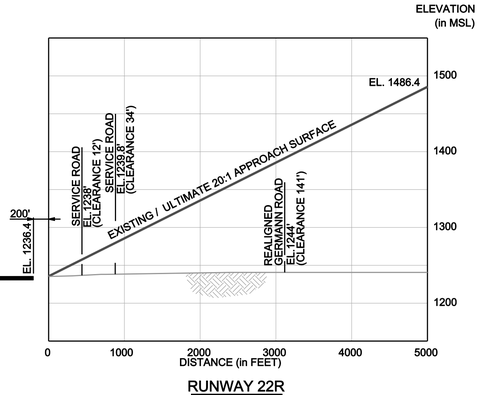
SCALE: 1" = 2000' HORIZ.
1" = 200' VERT.

RUNWAY 22L APPROACH ZONE PROFILE

SCALE: 1" = 1000' HORIZ.
1" = 100' VERT.



RUNWAY 4L



RUNWAY 22R

RUNWAY 4L-22R APPROACH ZONES PROFILES

SCALE: 1" = 1000' HORIZ.
1" = 100' VERT.

OBSTRUCTION TABLE

OBJECT DESCRIPTION	OBJECT ELEVATION	OBSTRUCTED PART 77 SURFACE	SURFACE ELEVATION	OBJECT PENETRATION	PROPOSED OBJECT DISPOSITION
NO OBSTRUCTIONS NOTED					

NOTES:
1. TERRAIN PROFILE REPRESENTS THE HIGHEST POINT ACROSS THE WIDTH AND ALONG THE LENGTH OF THE APPROACH SURFACE AND PRIMARY SURFACE.
2. THE TOPOGRAPHICAL BASE (2-FOOT CONTOURS) FOR THE CHANDLER AIRPORT ALP WAS CREATED BY COOPER AERIGI OF PHOENIX, INC. USING GROUND SURVEY, FLIGHT SURVEY, AND END ANALYTICS. (DATE: 01-28-1997)

REVISIONS:

REV. NO.	DATE	DESCRIPTION OF REVISION

SCALE: AS NOTED

DESIGNED BY SP DATE 11/06
DRAWN BY LKH DATE 04/10
CHECKED BY JM DATE 04/10

APPROVALS:

TITLE DATE
TITLE DATE
TITLE DATE

PLANS PREPARED BY
WilburSmith ASSOCIATES ENGINEERS PLANNERS ECONOMISTS
1508 W. Tara Drive
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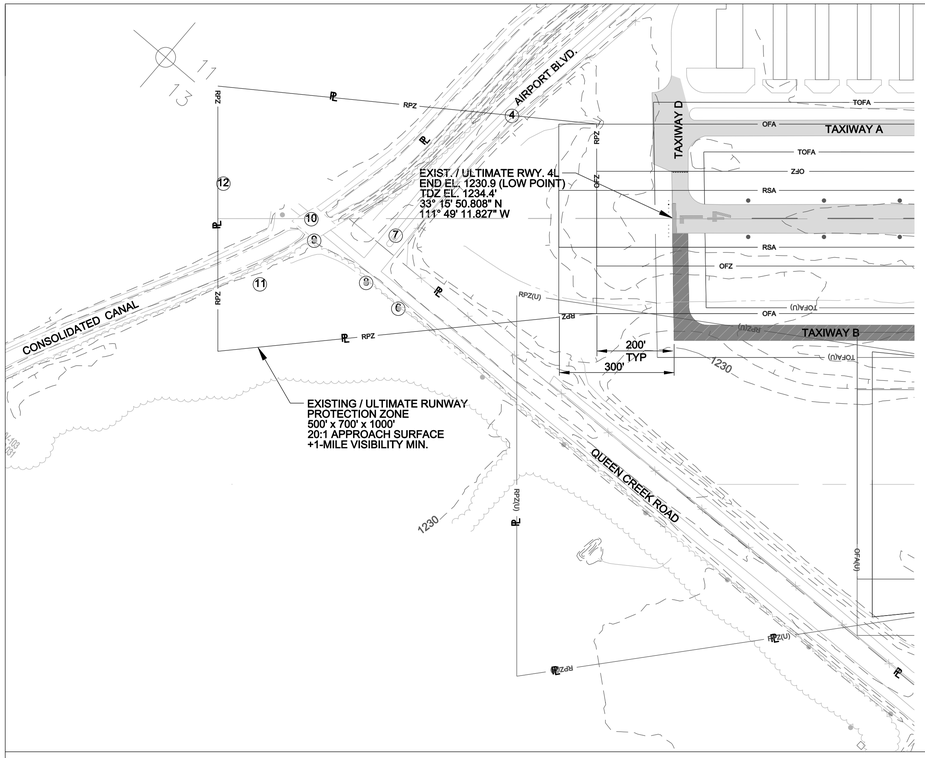
Phone: 480-775-4344

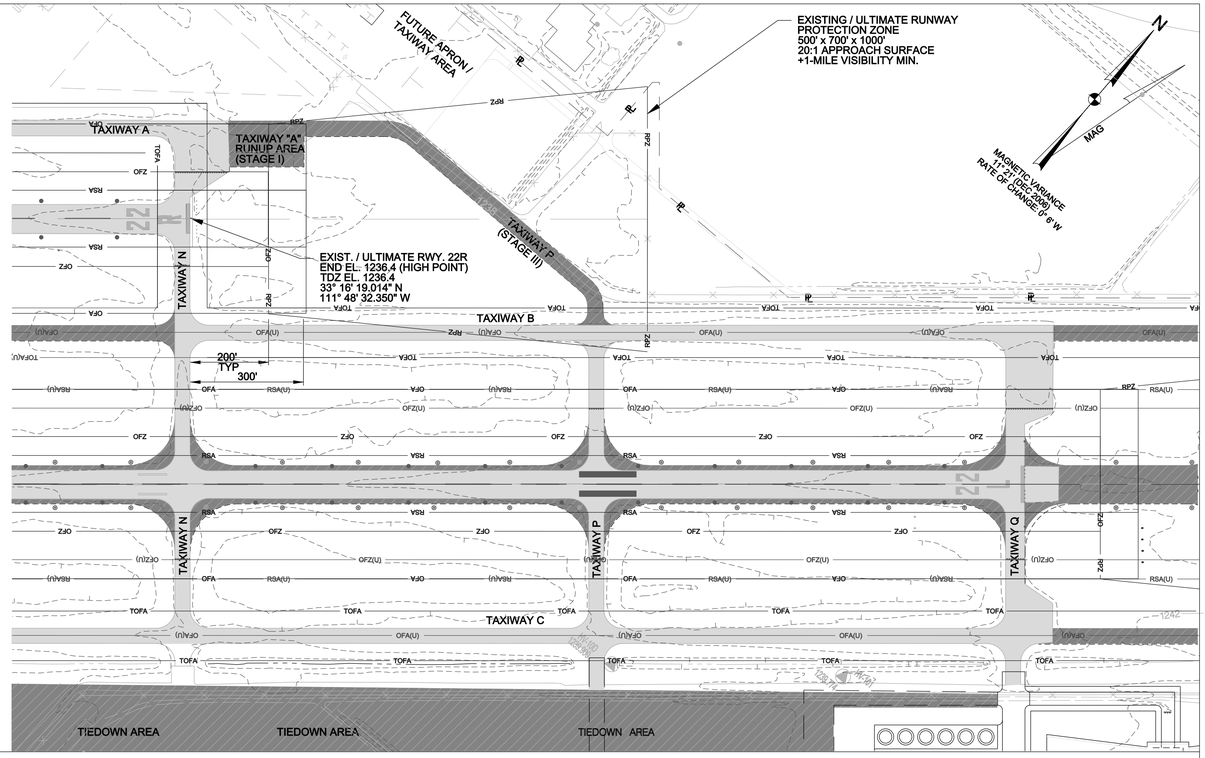
PLANS PREPARED FOR
CHANDLER MUNICIPAL AIRPORT
CHANDLER, ARIZONA

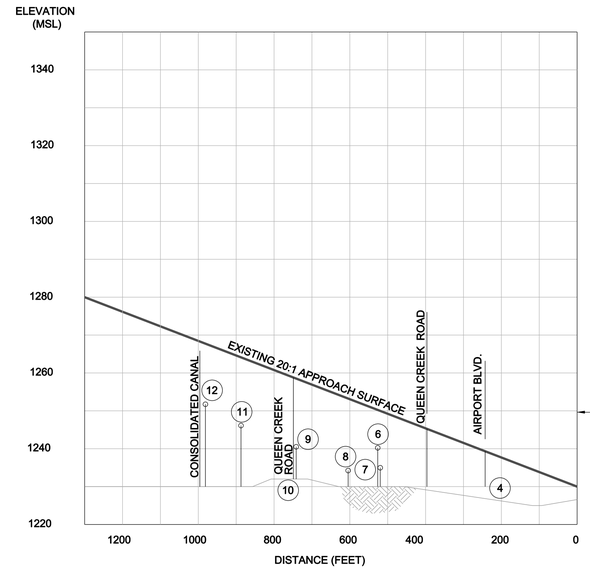
PROJECT NO. (CLIENT) AZDOT - E5S64
PROJECT NO. (WSA) A31476

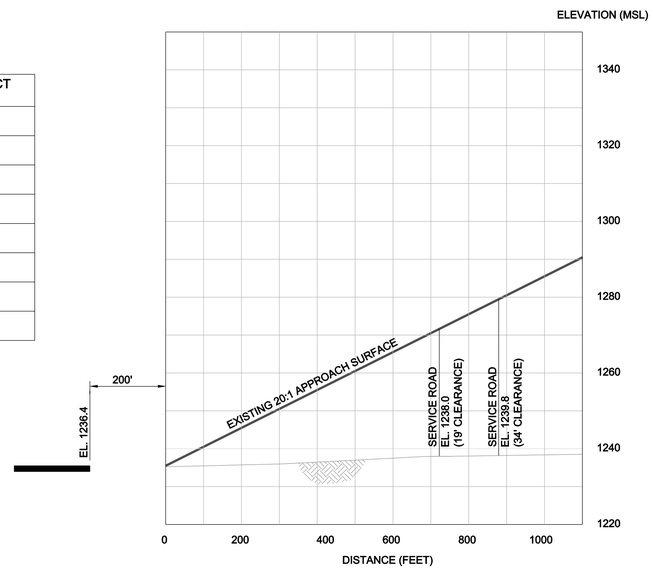
APPROACH ZONE PROFILES

4









OBSTRUCTION TABLE

OBSTRUCTION NUMBER	OBJECT DESCRIPTION	ELEVATION (MSL)	SURFACE PENETRATION / CLEARANCE	ULTIMATE OBJECT DISPOSTION
4	AIRPORT BLVD.	1244	9	UNCHANGED
6	POLE	1263	32	REMOVE
7	POLE	1257	26	UNCHANGED
8	POLE	1263	32	REMOVE
9	POLE	1264	33	REMOVE
10	QUEEN CREEK RD.	1246	15	UNCHANGED
11	TREE	1290	59	UNCHANGED
12	POLE	1266	35	UNCHANGED

NOAA - NATIONAL GEODETIC SURVEY (4-1-2005)

NO OBSTRUCTIONS - RUNWAY 22R

NOTE:
TERRAIN PROFILE REPRESENTS THE HIGHEST POINT ACROSS THE WIDTH AND ALONG THE LENGTH OF THE APPROACH SURFACE AND PRIMARY SURFACE

LEGEND

EXISTING	ULTIMATE	DESCRIPTION
		ABANDONED PAVEMENT (To Be Removed)
		AIRPORT PAVEMENT
		AIRPORT PROPERTY LINE
		AIRPORT REFERENCE POINT (ARP)
		AIRPORT ROTATING BEACON
		BUILDING ABANDONMENT (To Be Removed)
		BUILDINGS
H	H	HELIPAD
BRL 35'	BRL 35'	BUILDING RESTRICTION LINE (BRL)
OFA	OFA (U)	RUNWAY OBJECT FREE AREA
RSA	RSA (U)	RUNWAY SAFETY AREA
OFZ	OFZ (U)	OBJECT FREE ZONE
TSA	TSA (U)	TAXIWAY SAFETY AREA
TOFA	TOFA (U)	TAXIWAY OBJECT FREE AREA
		FACILITY CONSTRUCTION
		FENCING
VASI-4	PAPI-4	NAVIGATIONAL AID INSTALLATION (GVGI)
		RUNWAY THRESHOLD LIGHTS and REIL
		SECTION CORNER
		SEGMENTED CIRCLE/WIND INDICATOR
1060		TOPOGRAPHY (Source: Digital Survey Data)
		WIND INDICATOR (Lighted)

DEVELOPMENT STAGES

STAGE I 0-5 YEARS	STAGE II 6-10 YEARS	STAGE III 11-20 YEARS

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RUNWAY 4L-22R PROTECTION ZONES and PROFILES

REVISIONS:		
REV. NO.	DATE	DESCRIPTION OF REVISION

SCALE: 1" = 200' HORIZ
1" = 20' VERT

DESIGNED BY	SP	DATE	11/06
DRAWN BY	LKH	DATE	04/10
CHECKED BY	JM	DATE	04/10

APPROVALS:

TITLE	DATE
TITLE	DATE
TITLE	DATE

PLANS PREPARED BY

ENGINEERS PLANNERS ECONOMISTS
WilburSmith ASSOCIATES

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Phone: 480-775-4344

PLANS PREPARED FOR

CHANDLER MUNICIPAL AIRPORT
CHANDLER, ARIZONA

RUNWAY PROTECTION ZONES
PLAN AND PROFILE
RUNWAY 4L-22R

PROJECT NO. (CLIENT)	PROJECT NO. (WSA)	
AZDOT - E5S64	A31476	7

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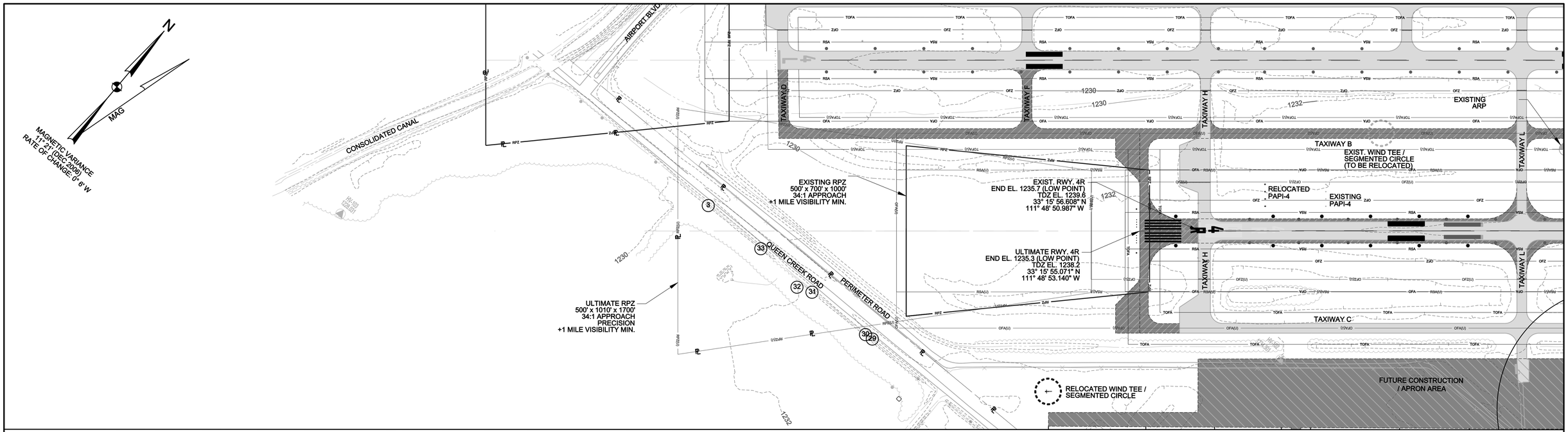

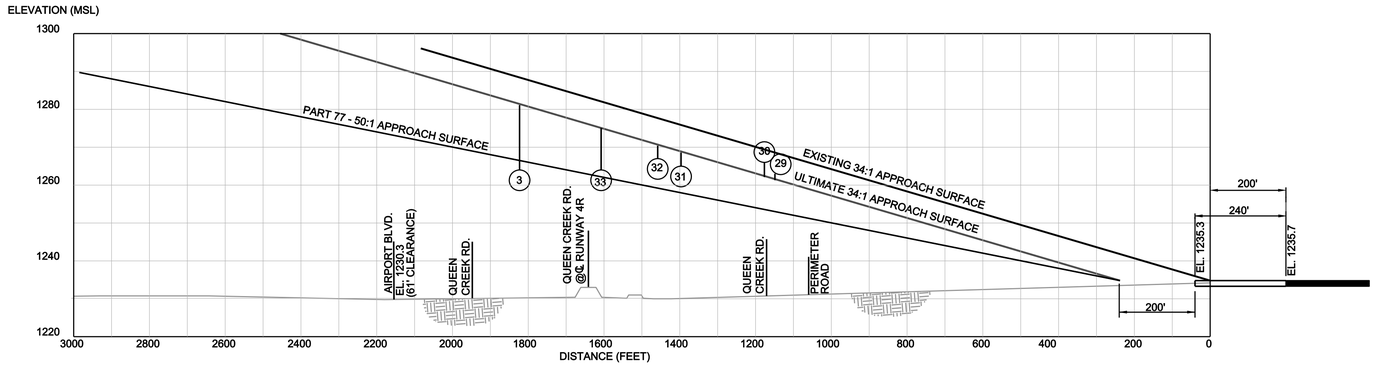

OBSTRUCTION TABLE

OBSTRUCTION NUMBER	OBJECT DESCRIPTION	ELEVATION (MSL)	SURFACE PENETRATION / CLEARANCE	ULTIMATE OBJECT DISPOSTION
(3)	POLE	1264	9	REMOVE
(29)	CATENARY	1263	4	REMOVE
(30)	POLE	1266	7	REMOVE
(31)	POLE	1265	2	REMOVE
(32)	TREE	1267	3	REMOVE
(33)	POLE	1264	-4	REMOVE

NOAA - NATIONAL GEODETIC SURVEY (4-1-2005)

NOTES:
1. TERRAIN PROFILE REPRESENTS THE HIGHEST POINT ACROSS THE WIDTH AND ALONG THE LENGTH OF THE APPROACH SURFACE AND PRIMARY SURFACE.
2. THE TOPOGRAPHICAL BASE (2-FOOT CONTOURS) FOR THE CHANDLER AIRPORT ALP WAS CREATED BY COOPER AERIGI OF PHOENIX, INC. USING GROUND SURVEY, FLIGHT SURVEY, AND END ANALYTICS. (DATE: 01-28-1997)

"THE CONTENTS OF THIS PLAN DO NOT NECESSARILY REFLECT THE OFFICIAL VIEWS OR POLICY OF THE FAA OR ADOT AERONAUTICS. ACCEPTANCE OF THIS DOCUMENT BY THE FAA OR ADOT AERONAUTICS DOES NOT IN ANY WAY CONSTITUTE A COMMITMENT ON THE PART OF THE UNITED STATES OR THE STATE OF ARIZONA TO PARTICIPATE IN ANY DEVELOPMENT DEPICTED HEREIN NOR DOES IT INDICATE THAT THE PROPOSED DEVELOPMENT IS ENVIRONMENTALLY ACCEPTABLE IN ACCORDANCE WITH APPROPRIATE PUBLIC LAWS."

LEGEND

EXISTING	ULTIMATE	DESCRIPTION
		ABANDONED PAVEMENT (To Be Removed)
		AIRPORT PAVEMENT
		AIRPORT PROPERTY LINE
		AIRPORT REFERENCE POINT (ARP)
		AIRPORT ROTATING BEACON
		BUILDING ABANDONMENT (To Be Removed)
		BUILDINGS
H	H	HELIPAD
BRL 30'	BRL 30'	BUILDING RESTRICTION LINE (BRL)
OFA	OFA (U)	RUNWAY OBJECT FREE AREA
RSA	RSA (U)	RUNWAY SAFETY AREA
OFZ	OFZ (U)	OBJECT FREE ZONE
TSA	TSA (U)	TAXIWAY SAFETY AREA
TOFA	TOFA (U)	TAXIWAY OBJECT FREE AREA
		FACILITY CONSTRUCTION
		FENCING
VASI-4	PAPI-4	NAVIGATIONAL AID INSTALLATION (GVGI)
		RUNWAY THRESHOLD LIGHTS and REIL
		SECTION CORNER
		SEGMENTED CIRCLE/WIND INDICATOR
1080		TOPOGRAPHY (Source: Digital Survey Data)
		WIND INDICATOR (Lighted)

DEVELOPMENT STAGES

STAGE I 0-5 YEARS	STAGE II 6-10 YEARS	STAGE III 11-20 YEARS

REVISIONS:

REV. NO.	DATE	DESCRIPTION OF REVISION

SCALE: 1" = 200' HORIZ
1" = 20' VERT

DESIGNED BY SP DATE 11/06
DRAWN BY LKH DATE 04/10
CHECKED BY JM DATE 04/10

APPROVALS:

TITLE DATE
TITLE DATE
TITLE DATE

PLANS PREPARED BY

WilburSmith ASSOCIATES
ENGINEERS PLANNERS ECONOMISTS
1508 W. Tara Drive
Gilbert, Arizona 85233
Phone: 480-775-4344

PLANS PREPARED FOR

CHANDLER MUNICIPAL AIRPORT
CHANDLER, ARIZONA

PROJECT NO. (CLIENT) AZDOT - E5S64
PROJECT NO. (WSA) A31476

RUNWAY PROTECTION ZONE PLAN AND PROFILE RUNWAY 4R

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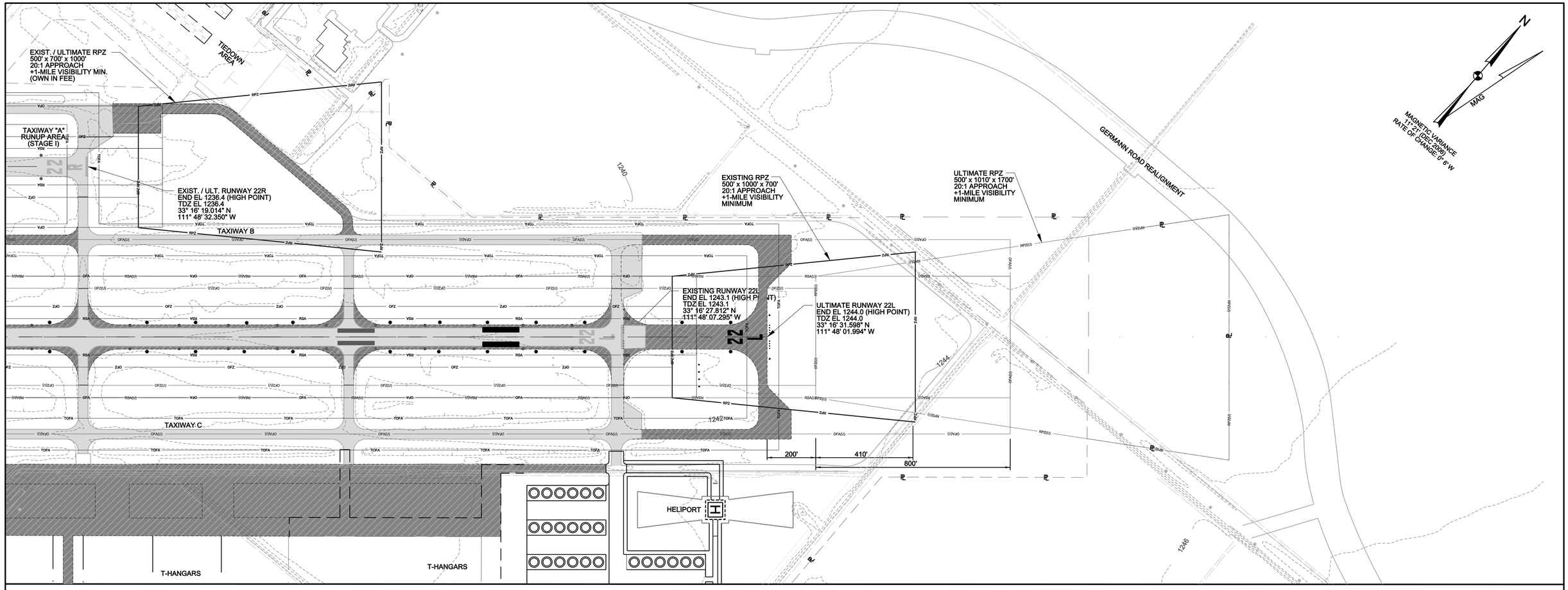


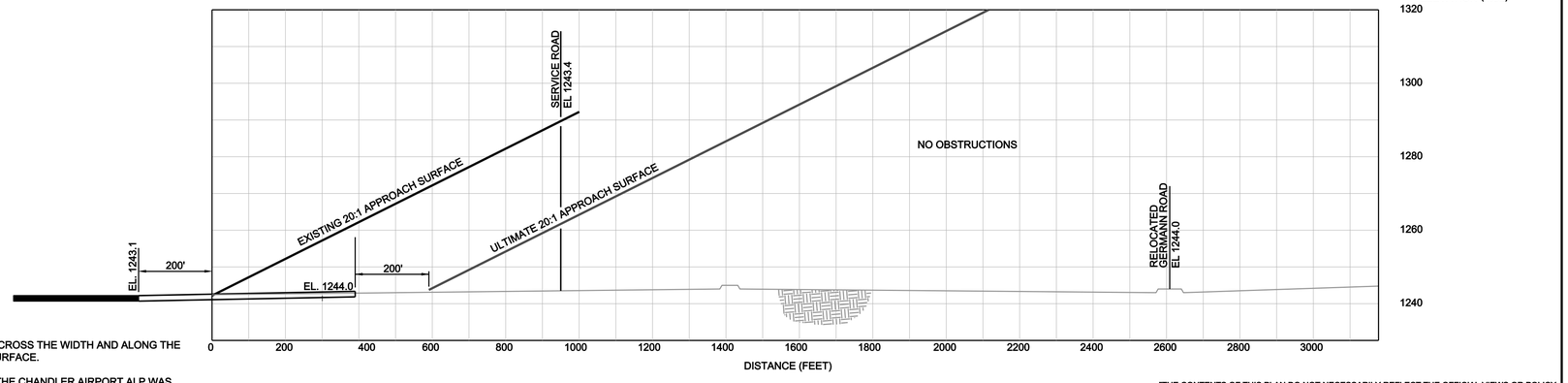
LEGEND

EXISTING	ULTIMATE	DESCRIPTION
		ABANDONED PAVEMENT (To Be Removed)
		AIRPORT PAVEMENT
		AIRPORT PROPERTY LINE
		AIRPORT REFERENCE POINT (ARP)
		AIRPORT ROTATING BEACON
		BUILDING ABANDONMENT (To Be Removed)
		BUILDINGS
H	H	HELIPAD
BRL 35'	BRL 35'	BUILDING RESTRICTION LINE (BRL)
OFA	OFA (U)	RUNWAY OBJECT FREE AREA
RSA	RSA (U)	RUNWAY SAFETY AREA
OFZ	OFZ (U)	OBJECT FREE ZONE
TSA	TSA (U)	TAXIWAY SAFETY AREA
TOFA	TOFA (U)	TAXIWAY OBJECT FREE AREA
		FACILITY CONSTRUCTION
		FENCING
VASI-4	PAPI-4	NAVIGATIONAL AID INSTALLATION (GVGI)
		RUNWAY THRESHOLD LIGHTS and REIL
		SECTION CORNER
		SEGMENTED CIRCLE/WIND INDICATOR
1060		TOPOGRAPHY (Source: Digital Survey Data)
		WIND INDICATOR (Lighted)

DEVELOPMENT STAGES

STAGE I 0-5 YEARS	STAGE II 6-10 YEARS	STAGE III 11-20 YEARS

NO OBSTRUCTIONS ON RUNWAY 22L



NOTES:
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REVISIONS:

REV. NO.	DATE	DESCRIPTION OF REVISION

SCALE: 1" = 200' HORIZ
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DESIGNED BY SP DATE 11/06
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APPROVALS:

TITLE DATE
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PLANS PREPARED BY
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PLANS PREPARED FOR
CHANDLER MUNICIPAL AIRPORT
CHANDLER, ARIZONA

PROJECT NO. (CLIENT) AZDOT - E5S64
PROJECT NO. (WSA) A31476

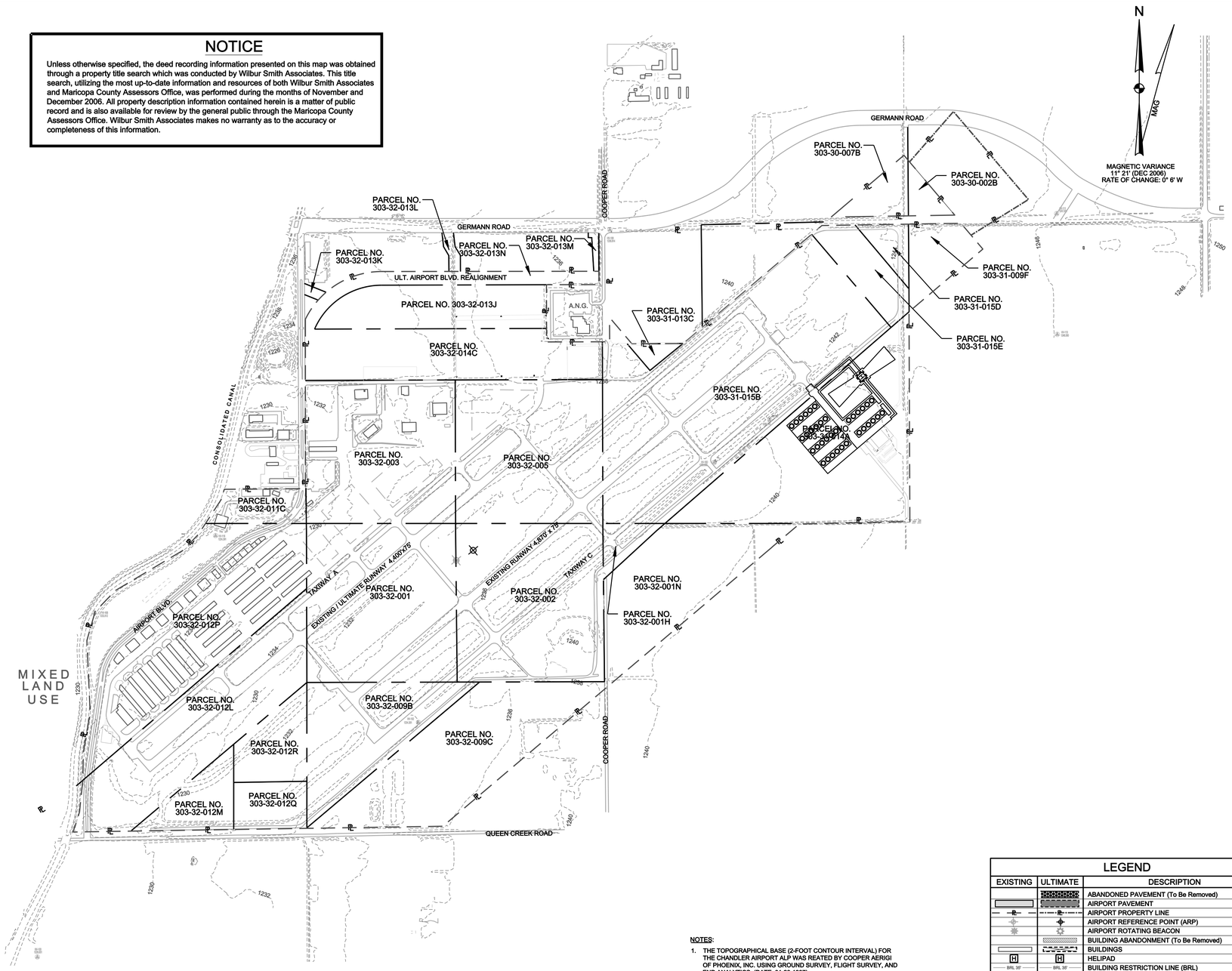
RUNWAY PROTECTION ZONE PLAN AND PROFILE RUNWAY 22L

DEED RECORDING INFORMATION (COUNTY ASSESSOR - MARICOPA COUNTY, AZ)

OWNER: PARCEL NUMBER	ACREAGE	DEED DATE	RECORDING INFORMATION	GRANTOR / DEED TYPE	FAAP/ADAP/AIP NUMBER GRANT ACCEPTANCE
City of Chandler 303-32-001	40	5-28-1948	Deed #: NOD-44446 Book: 303 Map: 32 Parcel: 1	State of Arizona / Warranty	FAAP 9-02-008-6604 7-14-1959
City of Chandler 303-32-002	39	5-28-1948	Deed #: NOD-44447 Book: 303 Map: 32 Parcel: 2	State of Arizona / Warranty	FAAP 9-02-008-6604 7-14-1959
City of Chandler 303-32-003	38.96	5-28-1948	Deed #: NOD-44448 Book: 303 Map: 32 Parcel: 3	State of Arizona / Warranty	FAAP 9-02-008-6604 7-14-1959
City of Chandler 303-32-005	39	5-28-1948	Deed #: NOD-44445 Book: 303 Map: 32 Parcel: 5	State of Arizona / Warranty	FAAP 9-02-008-6604 7-14-1959
City of Chandler 303-32-009B	21.043	3-31-1988	Deed #: 880150742 Book: 303 Map: 32 Parcel: 009B	John Demetria LTD. / Warranty	AIP-3-04-0008-04 8-25-1987
City of Chandler 303-32-009C	35.702	1-26-1994	Deed #: 9400066751 Book: 303 Map: 32 Parcel: 009C	Airpark Associates LTD. Liability Company Warranty	AIP-3-04-0008-09 9-23-1993
City of Chandler 303-32-011C	6.625	10-24-1985	Deed #: 860101579 Book: 303 Map: 32 Parcel: 011C	Roosevelt Water Conservation District / Warranty	--
City of Chandler 303-32-012L	31.8	1-27-1975	Deed #: 11009-0175 Book: 303 Map: 32 Parcel: 012L	Roosevelt Water Conservation District / Warranty	AIP-3-04-0008-01 9-24-1984
City of Chandler 303-32-012M	7.83	9-6-1987	Deed #: 870499012 Book: 303 Map: 32 Parcel: 012M	Queen Creek Trust / Warranty	AIP-3-04-0008-03 9-26-1986
City of Chandler 303-32-012Q	6	12-31-1986	Deed #: 860733678 Book: 303 Map: 32 Parcel: 012Q	D.J. Patterson / Warranty	AIP-3-04-0008-07 7-25-1991
City of Chandler 303-32-012R	8.914	12-31-1986	Deed #: 860733678 Book: 303 Map: 32 Parcel: 012R	D.J. Patterson / Warranty	ADAP-5-04-0008-02 9-30-1978
City of Chandler 303-32-012P	44.834	3-3-1986	Deed #: 860101579 Book: 303 Map: 32 Parcel: 012X	Roosevelt Water Conservation District / Warranty	AIP-3-04-0008-06 5-18-1989
City of Chandler 303-32-013J	24.65	5-29-2002	Deed #: 887110100 Book: 303 Map: 32 Parcel: 013J	AJ Chandler Air Park LLC / Warrranty	AIP-3-04-0008-11 ADOT E1135 ADOT E1102 7-14-2000, 7-1-2000, and 4-2-2001
City of Chandler 303-32-013K	0.21	5-29-2002	Deed #: 887110100 Book: 303 Map: 32 Parcel: 013K	AJ Chandler Air Park LLC / Warrranty	AIP-3-04-0008-11 ADOT E1135 ADOT E1102 7-14-2000, 7-1-2000, and 4-2-2001
City of Chandler 303-32-013L	0.71	5-29-2002	Deed #: 887110100 Book: 303 Map: 32 Parcel: 013L	AJ Chandler Air Park LLC / Warrranty	AIP-3-04-0008-11 ADOT E1135 ADOT E1102 7-14-2000, 7-1-2000, and 4-2-2001
City of Chandler 303-32-013M	0.43	5-29-2002	Deed #: 887110100 Book: 303 Map: 32 Parcel: 013M	AJ Chandler Air Park LLC / Warrranty	AIP-3-04-0008-11 ADOT E1135 ADOT E1102 7-14-2000, 7-1-2000, and 4-2-2001
City of Chandler 303-32-013N	2.11	5-29-2002	Deed #: 887110100 Book: 303 Map: 32 Parcel: 013N	AJ Chandler Air Park LLC / Warrranty	AIP-3-04-0008-11 ADOT E1135 ADOT E1102 7-14-2000, 7-1-2000, and 4-2-2001
City of Chandler 303-32-014C	19.536	1-4-1993	Deed #: 930000184 Book: 303 Map: 32 Parcel: 014C	D.W. Patterson / Warranty	AIP-3-04-0008-06 5-18-1989
City of Chandler 303-31-001R	1.464	11-2-87	Deed #: 870666054 Book: 303 Map: 31 Parcel: 001H	Spitler / Warranty	AIP-3-04-0008-03 9-25-1986
City of Chandler 303-31-001N	22.076	9-12-1994	Deed #: 940672607 Book: 303 Map: 31 Parcel: 001N	R & E Farms / Special Warranty Deed	AIP-3-04-0008-08 6-25-1992
City of Chandler 303-31-009F	6.971	6-10-1988	Deed #: 880282164 Book: 303 Map: 31 Parcel: 009F	Chandler Airpark Limited Partnership / Warranty	AIP-3-04-0008-04 8-25-1987
City of Chandler 303-31-013C	1.72	1-4-1993	Deed #: 930000185 Book: 303 Map: 31 Parcel: 013C	C. Max Killian / Special Warranty Deed	--
City of Chandler 303-31-014A	46.589	6-11-1993	Deed #: 930370306 Book: 303 Map: 31 Parcel: 014C	D.W. Patterson / Special Warranty Deed	AIP-3-04-0008-08 6-25-1992
City of Chandler 303-31-015B	70	9-2-1988	Deed #: 880437911 Book: 303 Map: 31 Parcel: 015B	D.W. Patterson / Warranty	AIP-3-04-0008-08 8-25-1987 and 6-23-1988
City of Chandler 303-31-015D	3	8-31-1990	Deed #: 900394579 Book: 303 Map: 31 Parcel: 015D	D.W. Patterson / Warranty	AIP-3-04-0008-06 5-18-1989
City of Chandler 303-31-015E	6.728	8-31-1990	Deed #: 900394580 Book: 303 Map: 31 Parcel: 015E	D.W. Patterson / Warranty	AIP-3-04-0008-06 5-18-1989
City of Chandler 303-30-002B	2.416	7-7-1988	Deed #: 880330730 Book: 303 Map: 30 Parcel: 002B	Exeter Real Estate Investors / Warranty	AIP-3-04-0008-04 8-25-1987
City of Chandler 303-30-007B	4.16	7-22-1988	Deed #: 880360384 Book: 303 Map: 30 Parcel: 007B	D.W. Patterson / Warranty	AIP-3-04-0008-105 6-23-1988
Total Acreage	532.478	Note: The total acreage shown in this table is the cumulative sum of the above described parcels, whose acreages were obtained from legal descriptions and other legal documents obtained through the title search, referred to in the "Notice" block.			

NOTICE

Unless otherwise specified, the deed recording information presented on this map was obtained through a property title search which was conducted by Wilbur Smith Associates. This title search, utilizing the most up-to-date information and resources of both Wilbur Smith Associates and Maricopa County Assessors Office, was performed during the months of November and December 2006. All property description information contained herein is a matter of public record and is also available for review by the general public through the Maricopa County Assessors Office. Wilbur Smith Associates makes no warranty as to the accuracy or completeness of this information.



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		AIRPORT PROPERTY LINE
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		BUILDING ABANDONMENT (To Be Removed)
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BRL 30'	BRL 30'	BUILDING RESTRICTION LINE (BRL)
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		FENCING
VASI-4	PAPI-4	NAVIGATIONAL AID INSTALLATION (GVGI)
		RUNWAY THRESHOLD LIGHTS and REIL
		SECTION CORNER
		SEGMENTED CIRCLE/WIND INDICATOR
1080		TOPOGRAPHY (Source: Digital Survey Data)
		WIND INDICATOR (Lighted)

NOTES:

1. THE TOPOGRAPHICAL BASE (2-FOOT CONTOUR INTERVAL) FOR THE CHANDLER AIRPORT ALP WAS REATED BY COOPER AERIGI OF PHOENIX, INC. USING GROUND SURVEY, FLIGHT SURVEY, AND END ANALYTICS. (DATE: 01-28-1997)
2. PROPERTY LINES ESTABLISHED BASED ON SURVEY AND AIRPORT OWNER INFORMATION. TO BE USED FOR PLANNING PURPOSES ONLY.
3. PARCEL DATA REFLECTS INFORMATION GATHERED IN 2005. ACCORDING TO THE MARICOPA COUNTY ASSESSOR'S OFFICE, PARCEL DATA CAN CHANGE PERIODICALLY DUE TO THE SUBDIVISION OF PARCELS.

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REVISIONS:

REV. NO.	DATE	DESCRIPTION OF REVISION

500 0 500 1000 1500

SCALE: 1" = 500'

DESIGNED BY	SP	DATE	11/06
DRAWN BY	LKH	DATE	04/10
CHECKED BY	JM	DATE	04/10

APPROVALS:

TITLE DATE

TITLE DATE

TITLE DATE

PLANS PREPARED BY

ENGINEERS PLANNERS ECONOMISTS
WilburSmith ASSOCIATES

1508 W. Tara Drive
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Phone: 480-775-4344

PLANS PREPARED FOR

CHANDLER MUNICIPAL AIRPORT
CHANDLER, ARIZONA

PROJECT NO. (CLIENT): AZDOT - E5S64

PROJECT NO. (WSA): A31476

"EXHIBIT A"
AIRPORT PROPERTY MAP

9

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