Casa Grande Municipal Airport

Airport Master Plan

RESOLUTION NO. 4377

A RESOLUTION OF THE COUNCIL OF THE CITY OF CASA GRANDE, ARIZONA, APPROVING THE CASA GRANDE MUNICIPAL AIRPORT MASTER PLAN FOR THE CITY OF CASA GRANDE.

BE IT RESOLVED by the Council of the City of Casa Grande, Arizona, as follows:

1. The Mayor and Council of the City of Casa Grande hereby approve the Casa Grande Municipal Airport Master Plan.

2. The Plan shall be a public record and an official copy shall be kept on file with the Office of the City Clerk.

PASSED AND ADOPTED by the Mayor and Council of the City of Casa Grande, Arizona, this 8th day of September, 2009.

Mayor

ATTEST:

City Clerk

CITY OF CASA GRANDE INCORPORATED 1915 CASA GRANDE, ARIZONA

APPROVED AS TO FORM:

City Attorney

PW R-Adoption of Casa Grande Municipal Airport Master Plan

AIRPORT MASTER PLAN

for

CASA GRANDE MUNICIPAL AIRPORT
Casa Grande, Arizona

Prepared for the

CITY OF CASA GRANDE

by

Coffman Associates, Inc.

December 2009

"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 and 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 the appropriate public laws."

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INTRODUCTION

Introduction

This update of the Casa Grande Municipal Airport (CGZ) Master Plan has been undertaken to evaluate the airports capabilities and role, to review forecasts of future aviation demand, and to plan for the timely development of new or expanded facilities that may be required to meet that demand. The ultimate goal of the master plan is to provide systematic guidelines for the airport's overall development, maintenance, and operation.

The master plan is intended to be a proactive document which identifies and then plans for future facility needs well in advance of the actual need for the facilities. This is done to ensure that the City of Casa Grande, Arizona Department of Transportation (ADOT), and the Federal Aviation Administration (FAA) can coordinate project approvals, design, financing, and construction to avoid experiencing detrimental effects due to inadequate facilities.

An important result of the master plan is reserving sufficient areas for future facility needs. This protects development areas and ensures they will be readily available when required to meet future demand. The intended result is a development concept which outlines the proposed uses for all areas of airport property.

The preparation of this master plan is evidence that the City of Casa Grande recognizes the importance of air transportation to their community and the associated challenges inherent in providing for its unique operating and improvement needs. The cost of maintaining an airport is an investment which yields impressive benefits to the community and the region. With a sound and realistic master plan, Casa

Grande Municipal Airport can maintain its role as an important link to the national air transportation system for the community and maintain the existing public and private investments in its facilities.

MASTER PLAN GOALS AND OBJECTIVES

The primary objective of the master plan is to provide the community and public officials with proper guidance for future development which will address aviation demands and be wholly compatible with the environment. The accomplishment of this objective requires the evaluation of the existing airport and determination of what actions should be taken to maintain an adequate, safe, and reliable airport facility in support of those long term goals. This master plan will provide an outline of necessary development and give those responsible an advance notice of future airport funding needs so that appropriate steps can be taken to ensure that adequate funds are budgeted and planned.

Specific goals for the airport are:

- To preserve and protect public and private investments in existing airport facilities;
- To enhance the safety of aircraft operations;
- To be reflective of community and regional goals, needs, and plans;
- To ensure that future development is environmentally compatible;
- To establish a schedule of development priorities and a program to meet the needs of the proposed improvements in the master plan;
- To develop a plan that is responsive to air transportation demands;
- To develop an orderly plan for use of the airport;
- To coordinate this master plan with local, regional, state, and federal agencies, and;
- To develop active and productive public involvement throughout the planning process.

Specific objectives of this master plan designed to help in attaining these goals include:

- Examining the projected aviation demand and identifying the facilities necessary to accommodate the demand.
- Defining the property required to support forecast demand for approach protection and building area uses (e.g., storage hangars and FBO leaseholds).
- Evaluating the current and future airport design standards based on identified critical aircraft.
- Recommending improvements that will enhance the airport's safety and capacity, to the maximum extent possible.
- Completing an environmental overview considering *National En-*

vironmental Policy Act (NEPA) rules and regulations.

- Developing active and productive public involvement throughout the planning process.

- Updating the Master Plan and Airport Layout Plan so that all deliverables comply with all FAA directives, specifically Advisory Circulars 150/5070-6B "Airport Master Plans" and 150/5300-13.

The Master Plan will provide recommendations from which the City Of Casa Grande may take action to improve the airport and all associated services important to public needs, convenience, and economic growth. The plan will benefit all residents of the area by providing a single, comprehensive plan which supports and balances the continued growth of aviation activity with the preservation of the surrounding environs.

BASELINE ASSUMPTIONS

While the ultimate recommendations of this Master Plan have yet to be determined, a study such as this typically requires several baseline assumptions that will be used throughout the analysis. The baseline assumptions for this study are as follows:

- Casa Grande Municipal Airport will remain as a general aviation airport through the planning period.

- The City of Casa Grande and Pinal County population, employment, and economy will continue to grow positively through the 20-year period of this Master Plan as forecast recently by Pinal County.

- The general aviation industry will continue to grow positively through the planning period as forecast by the FAA in its annual Aerospace Forecasts.

- Civil aviation activity will continue to share the Arizona airspace with the military air installations and its training operations.

- Both a federal program and state program will be in place through the planning period to assist in funding future capital development needs.

MASTER PLAN ELEMENTS AND PROCESS

The Casa Grande Municipal Airport Master Plan is being prepared in a systematic fashion following FAA guidelines and industry-accepted principles and practices. The master plan has six chapters that are intended to assist in the discovery of future facility needs and provide the supporting rationale for their implementation.

Chapter One - Inventory summarizes the inventory efforts. The inventory efforts are focused on collecting and assembling relevant data pertaining to the airport and the area it serves. Information is collected on existing airport facilities and operations. Local economic and demographic data is collected to define the local growth

trends. Planning studies which may have relevance to the master plan are also collected.

Chapter Two - Forecasts examines the potential aviation demand for aviation activity at the airport. This analysis reviews and updates the Casa Grande Municipal Airport demand forecasts previously prepared for the City of Casa Grande in the 1997 *Master Plan Study for Casa Grande Municipal Airport*. The forecast effort takes into account local socioeconomic information, as well as national air transportation trends to quantify the levels of aviation activity which can reasonably be expected to occur at Casa Grande Municipal Airport through the year 2027. The results of this effort are used to determine the types and sizes of facilities which will be required to meet the projected aviation demands on the airport through the planning period.

Chapter Three - Facility Requirements comprises the demand/capacity and facility requirements analyses. The intent of these analyses is to compare the existing facility capacities to forecast aviation demand and determine where deficiencies in capacities (as well as excess capacities) may exist. Where deficiencies are identified, the size and type of new facilities to accommodate the demand are identified. The airfield analysis focuses on improvements needed to serve the type of aircraft expected to operate at the airport in the future, as well as navigational aids to increase the safety and efficiency of operations. This element also examines the terminal area facilities, general aviation facilities, and support needs.

Chapter Four - Alternatives considers a variety of solutions to accommodate the projected facility needs. This element proposes various facility and site plan configurations which can meet the projected facility needs. An analysis is completed to identify the strengths and weaknesses of each proposed development alternative, with the intention of determining a conceptual direction for development.

Chapter Five – Recommended Master Plan Concept provides both a graphic and narrative description of the recommended plan for the use, development, and operation of the airport. An environmental overview is also provided. The master plan also supports the official Airport Layout Plan (ALP) and detailed technical drawings depicting related airspace, land use, and property data. These drawings are used by the FAA in determining grant eligibility and funding.

Chapter Six - Financial Plan establishes the capital needs program, which defines the schedules and costs for the recommended development projects. The plan then evaluates the potential funding sources to analyze financial strategies for successful implementation of the plan.

Appendices – Appendices will be included in the final Master Plan report. This includes a glossary of aviation terms used in the study, the ALP, as well as other pertinent supplements to the main report.

COORDINATION

The Casa Grande Municipal Airport Master Plan is of interest to many within the local community. This includes local citizens, community organizations, airport users, airport tenants, local and state planning agencies, and aviation organizations. As the airport is a strategic component of the state and national aviation systems, the Casa Grande Municipal Airport Master Plan is of importance to both state and federal agencies responsible for overseeing air transportation.

To assist in the development of the master plan, the City of Casa Grande identified a group of community members and aviation interest groups to act in an advisory role in the development of the master plan. Members of the Planning Advisory Committee (PAC) reviewed phase reports and provided comments throughout the study to help ensure that a realistic, viable plan was developed.

To assist in the review process, phase reports were prepared at the various milestones in the planning process. The phase report process allows for timely input and review during each step within the master plan to ensure that all master plan issues are fully addressed as the recommended program develops.

A public information workshop was also held as part of the plan coordination. The public information workshop is designed to allow any and all interested persons to become informed and provide input concerning the master plan. Notices of the workshop meeting time and location were advertised through the media as well as local neighborhood associations. The phase reports are also available to the public online through a link on the City of Casa Grande website.

SUMMARY AND RECOMMENDATIONS

The proper planning of a facility of any type must consider the demand that may occur in the future. For Casa Grande Municipal Airport, this involved updating forecasts to identify potential future aviation demand. Because of the cyclical nature of the economy, it is virtually impossible to predict with certainty year-to-year fluctuations in activity when looking five, ten, and twenty years into the future.

Recognizing this reality, the Master Plan is keyed more towards potential demand "horizon" levels than future dates in time. These "planning horizons" were established as levels of activity that will call for consideration of the implementation of the next step in the Master Plan program. By developing the airport to meet the aviation demand levels instead of specific points in time, the airport will serve as a safe and efficient aviation facility, which will meet the operational demands of its users while being developed in a cost efficient manner. This program allows the City of Casa Grande to adjust specific development in response to unanticipated needs or demand. The forecast planning horizons are summarized in **Table A**.

TABLE A
Aviation Demand Planning Horizons
Casa Grande Municipal Airport

	2007	Short Term	Intermediate Term	Long Term
ANNUAL OPERATIONS				
Military	1,900	1,900	1,900	1,900
General Aviation				
Itinerant	104,562	114,750	159,500	250,000
Local	12,720	18,630	33,440	75,000
Total Operations	119,182	135,280	194,840	326,900
Based Aircraft	114	150	235	500

The Airport Layout Plan set has also been updated to act as a blueprint for everyday use by management, planners, programmers, and designers. These plans were prepared on computer to help ensure their continued use as an everyday working tool for airport management.

This Master Plan is an update of the previous Casa Grande Municipal Airport Master Plan completed in 1997. Since the completion of that plan the City of Casa Grande has constructed new apron areas, a new terminal building, fuel storage facilities, and new hangar facilities. The updated Master Plan carries many of the previous concepts forward with revisions made to accommodate changes in the industry and in the market area. **Exhibit IA** depicts the updated plan.

With a single runway measuring 5,200 feet, the airport currently operates as a general aviation community airport. In order to serve growing business jet aircraft operations the plan recommends an ultimate length of 8,400 feet and width of 100 feet for the primary runway (Runway 5-23). The extension of the primary runway includes a shift of the Runway 23 threshold by approximately 650 feet. This shift of pavement will allow for increased runway safety areas to fall within existing airport property.

As activity increases a parallel runway may need to be constructed to increase airfield capacity. The proposed parallel runway (Runway 5L-23R) is planned to be constructed to a length of 3,800 feet and a width of 60 feet and will be designed to meet FAA design standards for ARC B-I (small airplanes exclusive) aircraft. The inclusion of the parallel runway is to aid in local land use planning to ensure that appropriate land use measures are put into place to allow for the runway in the future. Separate justification for constructing the runway will be required outside this master plan at the time of implementation.

Prior to the extension of the primary runway or the construction of a parallel runway, the drainage canal that currently runs along the airport's northern border will need to be realigned. This realignment will allow for airfield and landside development in the future.

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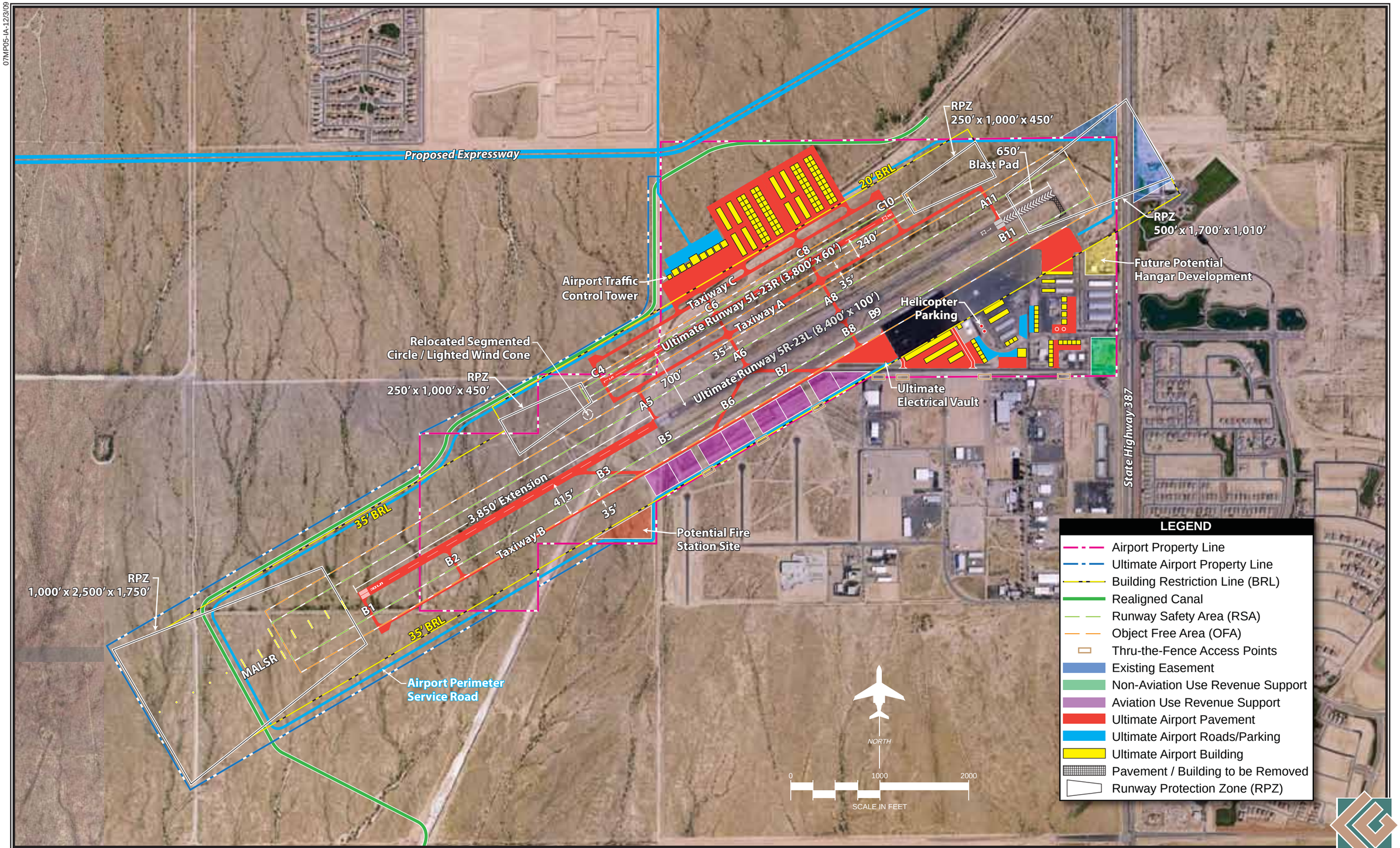

Exhibit IA
AIRFIELD DEVELOPMENT CONCEPT

Additional airfield improvements recommended include taxiway improvements to meet ARC D-II design standards and to improve taxiway circulation.

The development of additional aircraft storage hangars, parking aprons, fuel storage facilities, a new airport traffic control tower, and other aviation services at the airport have been planned to provide adequate facilities for existing and forecast users of the airport.

SHORT TERM PLANNING HORIZON IMPROVEMENTS

- Acquire 213 acres for future airfield and landside developments
- Realign drainage canal
- Expand apron capacity by 11,000 square yards
- Expand automobile parking lot capacity
- Construct airport perimeter service road
- Construct aircraft wash rack
- Extend Runway 5-23 to full length of 8,400 feet
- Construct additional hangar facilities
- Rehab and preservation of existing airfield pavements

INTERMEDIATE TERM PLANNING HORIZON IMPROVEMENTS

- Construct taxiway to north side development area
- Expand apron capacity by 28,200 square yards
- Construct airport traffic control tower
- Construct parallel runway and associated parallel taxiway
- Construction of additional hangar facilities
- Pavement preservation

LONG RANGE PLANNING HORIZON IMPROVEMENTS

- Expand apron capacity by 16,700 square yards
- Construct exit/entrance taxiways for improved taxiway circulation
- Expand automobile parking lot capacity.
- Pavement preservation

Detailed costs were prepared for each development item included in the program. As shown in **Table B**, complete implementation of the plan will require a total financial commitment of approximately $49.3 million dollars over the long-term planning horizon. Nearly 90 percent of the recommended program funding could be funded through state or federal grant-in-aid programs. The source for federal monies is through the Airport Improvement Program (AIP) administered by the Federal Aviation Administration (FAA) established to maintain the integrity of the air transportation system. Federal monies could come from the Aviation Trust Fund which is the depository for federal aviation taxes such as those from airline tickets, aviation fuel, aircraft registrations, and other aviation-related fees. Federal AIP funding of 95 percent can be received from the FAA for eligible projects.

The Arizona Department of Transportation (ADOT) also provides a separate state funding mechanism which receives annual funding appropriation from collection of statewide aviation related taxes. Eligible projects can receive up to 90 percent funding from ADOT for non-federally funded projects, and one-half (2.5 percent) of the local share for projects receiving federal AIP funding. The following table depicts the breakdown of federal, state, and local funding for the implementation of the Master Plan.

TABLE B
Development Funding Summary
Casa Grande Municipal Airport

PLANNING HORIZON	Total Costs	FAA Share	ADOT Share	Local Share
Short Term Program	$23,392,806	$19,477,037	$576,149	$3,339,620
Intermediate Program	$13,315,000	$11,900,650	$313,175	$1,101,175
Long Range Program	$12,570,000	$11,484,550	$302,225	$783,225
TOTAL PROGRAM COSTS	**$49,277,806**	**$42,862,237**	**$1,191,549**	**$5,224,020**

With the airport master plan completed, the most important challenge is implementation. The cost of developing and maintaining aviation facilities is an investment which yields impressive benefits for the community. This plan and associated development program provides the tools the City of Casa Grande will require to meet the challenges of the future. By providing a safe and efficient facility, Casa Grande Municipal Airport will continue to be a valuable asset to the City of Casa Grande and the surrounding region.

Chapter One

INVENTORY

Inventory

The initial step in the preparation of the airport master plan for Casa Grande Municipal Airport (CGZ) is the collection of information pertaining to the airport and the area it serves. The information summarized in this chapter will be used in subsequent analyses in this study. It includes:

- Physical inventories and descriptions of the facilities and services currently provided at the airport, including the regional airspace, air traffic control, and aircraft operating procedures.
- Background information pertaining to Pinal County and the Casa Grande community, including descriptions of the regional climate, surface transportation systems, Casa Grande Municipal Airport's role in the regional, state, and national aviation systems, and development that has taken place recently at the airport.
- Population and other significant socioeconomic data which can provide an indication of future trends that could influence aviation activity at the airport.
- A review of existing local and regional plans and studies to determine their potential influence on the development and implementation of the airport master plan.

The information in this chapter was obtained from several sources, including on-site inspections, interviews with City staff and airport tenants, airport records, related studies, the Federal Aviation Administration (FAA) and a number of internet sites.

A complete listing of the data sources is provided at the end of this chapter.

AIRPORT SETTING

Casa Grande Municipal Airport is located approximately four miles north of downtown Casa Grande on Arizona Highway 387, as illustrated on **Exhibit 1A**. Casa Grande Municipal Airport is situated on 640 acres at 1,464 feet above mean sea level (MSL) and serves as one of five general aviation public-use airport facilities in Pinal County.

Pinal County encompasses approximately 5,374 square miles of south central Arizona. Casa Grande, the county's largest city at 41,869 residents, made up 12.8 percent of the total County population of 326,398 in 2007. Pinal County contains part of the Tohono O'odham National Native American Reservation, as well as the Gila River Indian Reservation.

OWNERSHIP AND MANAGEMENT

Casa Grande Municipal Airport is owned, operated, and maintained by the City of Casa Grande. An Airport Advisory Board has advisory and oversight responsibilities for policies, fees, and general operations. The Airport Advisory Board is made up of five members who serve three-year terms. The City of Casa Grande currently employs two full-time and two part-time employees who perform general maintenance duties and manage the aviation services provided by the City.

AIRPORT DEVELOPMENT HISTORY

To assist in funding capital improvements, the FAA has provided funding assistance to Casa Grande Municipal Airport through the Airport Improvement Program (AIP). The AIP is funded through the Aviation Trust Fund, which was established in 1970 to provide funding for aviation capital investment programs (aviation development, facilities and equipment, and research and development). The Trust Fund also finances a portion of the operation of the FAA. It is funded by user fees, taxes on airline tickets, aviation fuel, and various aircraft parts.

Table 1A summarizes more than $2.7 million in FAA AIP grants received by Casa Grande Municipal Airport in recent years.

Table 1B summarizes Arizona Department of Transportation (ADOT), Aeronautics Division, project grants received by the City of Casa Grande for airport improvements in recent years.

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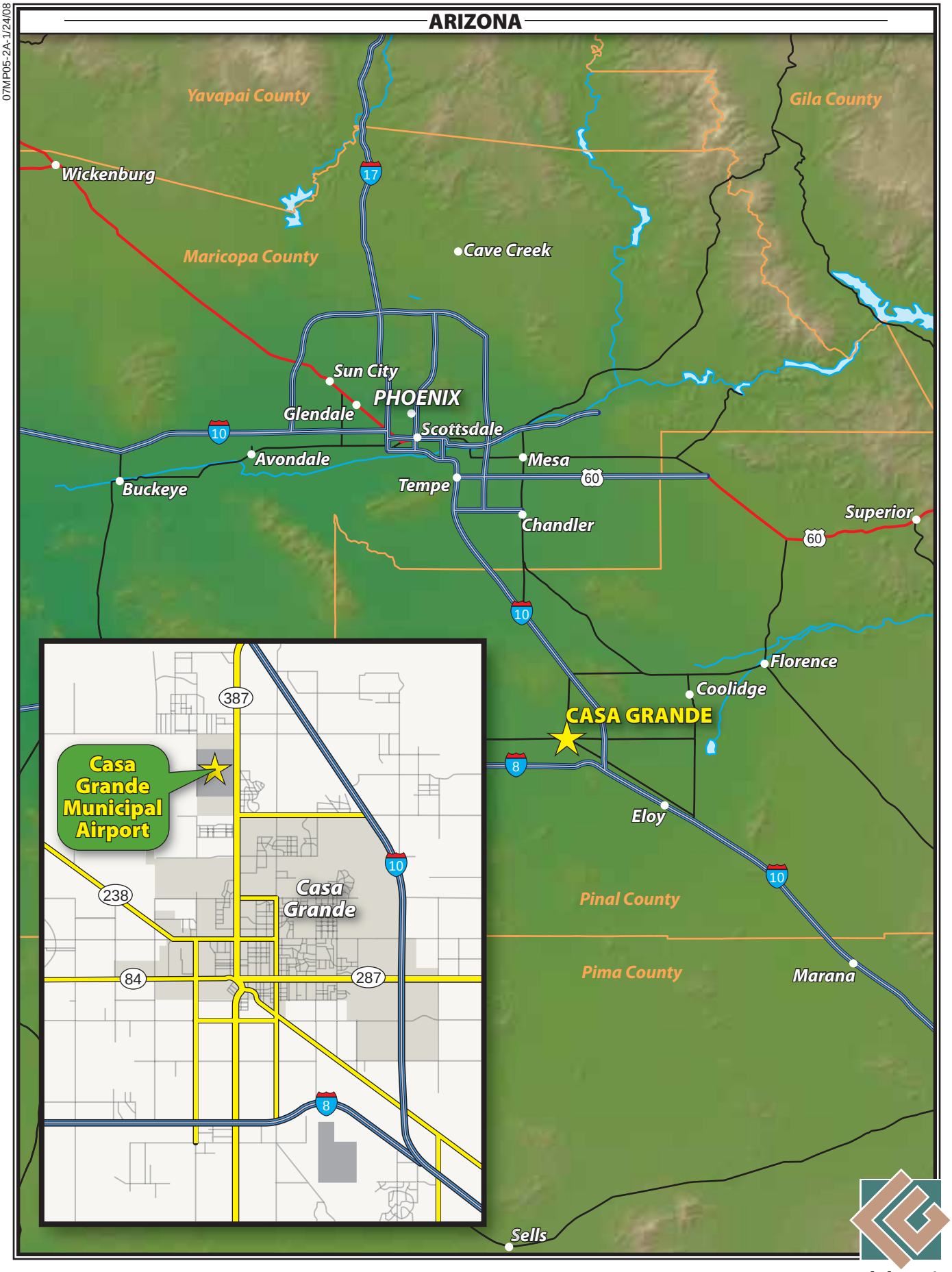

Exhibit 1A
LOCATION MAP

TABLE 1A
Recent AIP Grants for Casa Grande Municipal Airport

AIP Grant Number	Project Description	Total Grant Funds
3-04-0007-08	Install perimeter fencing – Phase I	$157,880
3-04-0007-07	Install security/perimeter fencing – Phase II	$294,520
3-04-0007-05	Construct taxiway connectors	$294,520
3-04-0007-06	Conduct airport master plan update	$294,520
3-04-0007-11	Install perimeter fencing – Phase III	$627,800
3-04-0007-10	Construct west terminal apron	$1,084,920
Total Grant Funds		$2,754,160

Source: Airport Records

TABLE 1B
State Grants to Casa Grande Municipal Airport

ADOT Grant Number	Project Description	Total Grant Funds
5F73	Install perimeter fencing; Install misc.	$3,947
4F48	Install Security/Perimeter Fence	$7,363
3F66	Construct taxiway connectors	$7,363
3F65	Conduct airport master plan update	$7,363
8S36	Master plan update	$135,000
8F66	Install perimeter fencing	$15,695
7S78	Design south terminal apron	$74,127
7F50	Construct west terminal apron	$27,123
6S21	Install utilities	$45,000
5S15	Construct east terminal auto parking	$90,000
Total State Grant Funds		$412,981

Source: Airport Records

THE AIRPORT'S SYSTEM ROLE

Airport planning exists on many levels: local, regional, and national. Each level has a different emphasis and purpose. This master plan is the primary local airport planning document.

The previous *Casa Grande Municipal Airport Master Plan* was approved in 1997. Primary recommendations included a Runway 5-23 extension to 8,540 feet, a new parallel taxiway 400 feet from the runway centerline, general aviation parking apron expansion, and T-hangar and corporate hangar development. Since the last master plan, a new aircraft parking apron has also been constructed along with four new T-hangar buildings. In addition, a new terminal building and associated automobile parking lot have been constructed adjacent to the aircraft apron.

At the state level, Casa Grande Municipal Airport is included in the *Arizona State Aviation System Plan* (SASP). The purpose of the SASP is to ensure that the State has an adequate and efficient system of airports to serve its aviation needs. The SASP defines the specific role of each airport

in the State's aviation system and establishes funding needs. Through the State's continuous aviation system planning process, the SASP is updated every five years. The most recent update to the SASP was in 2000, when the *State Aviation Needs Study* (SANS) was prepared. The SANS provides policy guidelines that promote and maintain a safe aviation system in the State, assess the State's airport's capital improvement needs, and identify resources and strategies to implement the plan. Casa Grande Municipal Airport is one of 112 airports in the 2000 SANS, which includes all airports and heliports in Arizona that are open to the public, including American Indian and recreational airports. The SANS classifies Casa Grande Municipal Airport as a general aviation community airport.

At the national level, Casa Grande Municipal Airport is a part of the FAA's *National Plan of Integrated Airport Systems* (NPIAS). Inclusion within the NPIAS is required to be eligible for Federal Airport Improvement Program (AIP) funding. Casa Grande Municipal Airport is classified as a general aviation (GA) airport in the NPIAS. There are 3,489 existing and proposed airports included in the NPIAS. Casa Grande Municipal Airport is one of 59 NPIAS Arizona airports, and one of 37 of the State's airports with a GA classification.

AIRPORT FACILITIES

Airport facilities can be functionally classified into two broad categories: airside and landside. The airside category includes those facilities directly associated with aircraft operations. The landside category includes those facilities necessary to provide a safe transition from surface to air transportation and support aircraft servicing, storage, maintenance, and operational safety.

AIRSIDE FACILITIES

Airside facilities include runways, taxiways, airfield lighting, and navigational aids. Airside facilities are identified on **Exhibit 1B. Table 1C** summarizes airside facility data.

Runway

Casa Grande Municipal Airport is served by a single asphalt runway. Runway 5-23 is 5,200 feet long and 100 feet wide. Runway 5-23 is oriented northeast-southwest and has a strength rating of 18,500 pounds single wheel loading (SWL) and 65,000 pounds dual wheel loading (DWL). SWL refers to aircraft with a single wheel on each main landing gear, while DWL refers to aircraft having dual wheels on each main landing gear. The runway slopes from its low point 1,445 feet MSL on the southwest end, to its 1,462 feet MSL high point on the northeast end. Thus, the runway gradient (elevation difference between runway high and low points divided by the length of the runway) is 0.3 percent.

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NORTH

0 600 1200

SCALE IN FEET

LEGEND

Airport Property Line

Localizer

Canal

A

PAPI

Segmented Circle / Lighted Wind Cone

Helipad

Runway 5-23 (5,200' x 100')

D

30'

Rotating Beacon

Taxiway B

Lear Ave.

West Airport Rd.

Glide Slope Antenna / AWOS

E

30'

Taxiway E

PAPI

300'

40'

State Highway 387

F

MALSR

Grumman Ave.

N. Piper Ave.

Rockwell Ave.

Cessna Ave.

Lear Ave.

Centennial Blvd.

Rotating Beacon

Wind Cone

Taxiway B

Glide Slope Antenna / AWOS

Runway 5

Localizer

W. Airport Rd.

Exhibit 1B
EXISTING AIRSIDE FACILITIES

TABLE 1C
Airside Facility Data
Casa Grande Municipal Airport

	Runway 5-23	
Length (ft.)	5,200	
Width (ft.)	100	
Surface Material	Asphalt	
Load Bearing Strength (lbs.)		
Single Wheel Loading (SWL)	18,500	
Dual Wheel Loading (DWL)	65,000	
Instrument Approach Procedures	ILS/DME, GPS, VOR	
Runway Edge Lighting	Medium Intensity	
Pavement Markings	Precision/Basic	
Taxiway Edge Lighting	Medium Intensity	
Approach Aids	**Rwy 5**	**Rwy 23**
Global Positioning System (GPS)	Yes	Yes
Precision Approach Path Indicators (PAPI)	Yes	Yes
Runway End Identifier Lights	No	No
Approach Lighting System (MALSR)	Yes	No
End Elevation (ft.)	1,445	1,462
Fixed-Wing Aircraft Traffic Pattern	Left	Right
Weather or Navigational Aids	AWOS-III; Segmented Circle; Lighted Wind Cone; Rotating Beacon	

Source: 1996 Airport ALP, 5010 Airport Master Record
AWOS – Automated Weather Observing System

Taxiways

The existing taxiway system at Casa Grande Municipal Airport is shown on **Exhibit 1B**. Taxiway B is the full-length parallel taxiway located 300 feet southeast of the Runway 5-23 centerline and connects to the terminal apron. Taxiway B has four exit taxiways from Runway 5-23 (Taxiways A, D, E, and F); Taxiways A and F are 40 feet wide, while Taxiways D and E are 30 feet wide. Taxiway E extends from the southwestern portion of the runway east along the airport's south boundary with the industrial park. Taxiway C connects the south end of the terminal apron to Taxiway E. The taxiway system at Casa Grande Municipal Airport is equipped with medium intensity taxiway lighting (MITL).

Pavement Condition

As a condition of receiving federal funds for the development of the airport, the Federal Aviation Administration requires the airport sponsor receiving and/or requesting federal funds for pavement improvement projects to implement a pavement maintenance management program.

Part of the pavement maintenance management program is to develop a Pavement Condition Index (PCI) rat-

ing. The rating is based on the guidelines contained in FAA Advisory Circular 150/5380-6, *Guidelines and Procedures for Maintenance of Airport Pavements*.

The PCI procedure was developed to collect data that would provide engineers and managers with a numerical value indicating overall pavement conditions and that would reflect both pavement structural integrity and operational surface condition. A PCI survey is performed by measuring the amount and severity of certain distresses (defects) observed within a pavement sample unit.

In February 2003, a pavement inspection was conducted at Casa Grande Municipal Airport by the Arizona Department of Transportation. Runway 5-23 received a PCI rating of 64 out of a possible 100. The runway was found to have low to moderate levels of longitudinal and transverse cracking. Taxiway B had a PCI rating of 73, while the terminal apron had PCI ratings between 85 and 100. The hangar taxilanes received ratings between 80 and 100.

Airfield Lighting

Airfield lighting systems extend an airport's usefulness into periods of darkness and/or poor visibility. A variety of lighting systems are installed at the airport and are summarized as follows.

Identification Lighting: The location of an airport at night is universally identified by a rotating beacon. A rotating beacon projects two beams of light, one white and one green, 180 degrees apart. Casa Grande Municipal Airport's beacon is located adjacent to the old terminal building as shown on **Exhibit 1B**.

Pavement Edge Lighting: Pavement edge lighting utilizes light fixtures placed to define the lateral limits of the pavement. This lighting is essential for safe operations at night and/or times of low visibility in order to maintain safe and efficient access to and from the runway and aircraft parking areas. Runway 5-23 is equipped with medium intensity runway lighting (MIRL). Taxiway B and its associated exit taxiways are equipped with MITL.

Pilot-Controlled Lighting: Airfield lighting systems can be controlled through a pilot-controlled lighting system (PCL). PCL allows pilots to turn on or increase the intensity of the airfield lighting systems from the aircraft with the use of the aircraft's radio transmitter. The Runway 5-23 MIRL and the Runway 5 medium intensity approach lighting system with runway alignment indicator lights (MALSR) are connected to the PCL system at Casa Grande Municipal Airport.

Visual Approach Lighting: Two-unit precision approach path indicators (PAPI-2s) are available for both runway approaches. The PAPIs provide approach path guidance by giving the pilot an indication of whether their approach is above, below, or on-path, through a pattern of red and white lights visible from the light units.

Airfield Signs: Airfield identification signs assist pilots in identifying their location on the airfield and directing them to their desired location. Current airfield signage includes a mixture of lighted and unlighted signs installed at all taxiway and runway intersections.

Critical area signs are located adjacent to the localizer equipment at the northeast end of Runway 23 to service operators against inadvertent entry.

Instrument Approach Lighting: Runway 5 is equipped with a medium intensity approach lighting system with runway alignment indicator lights (MALSR). The MALSR begins at the runway end and extends into the approach for 1,400 feet with stations every 200 feet along the runway centerline. Runway 23 has no approach light system.

Pavement Markings

Pavement markings aid in the movement of aircraft along airport surfaces and identify closed or hazardous areas on the airport. Runway 5 is equipped with precision instrument runway (PIR) markings that identify the runway centerline, threshold, designation, touchdown point, and aircraft holding positions. Runway 23 is equipped with basic markings, which identify the runway centerline, designation, and aircraft holding positions.

Taxiway and apron taxilane centerline markings are provided to assist aircraft using these airport surfaces. Centerline markings assist pilots in maintaining proper clearance from pavement edges and objects near the taxilane/taxiway edges. Pavement markings also identify aircraft parking positions.

Aircraft hold positions are marked at each runway/taxiway intersection. All hold position markings are located 280 feet from the runway centerline and are yellow, glass beaded, highlighted in black, and double-sized in accordance with FAA standards for precision instrument runways.

Weather Reporting

Casa Grande Municipal Airport is equipped with an Automated Weather Observing System (AWOS). The AWOS-III provides automated aviation weather observations 24 hours per day. The system updates weather observations every minute, continuously reporting significant weather changes as they occur. The AWOS system reports cloud ceiling, visibility, temperature, dew point, wind direction, wind speed, altimeter setting (barometric pressure), and density altitude (airfield elevation corrected for temperature). The AWOS is located on the north side of the runway adjacent to the glide slope antenna.

Casa Grande Municipal Airport is equipped with a lighted wind cone and segmented circle. The wind cone provides wind direction and speed information to pilots. The segmented circle provides aircraft traffic pattern information. This equipment is located north of the central part of the runway. Two additional wind cones are located at the approach end of each runway.

Area Airspace and Air Traffic Control

The *Federal Aviation Administration* (FAA) *Act of 1958* established the FAA as the responsible agency for the control and use of navigable airspace within the United States. The FAA has established the National Airspace System (NAS) to protect persons and property on the ground and to establish a safe and efficient airspace environment for civil, commercial, and military aviation. The NAS covers the common network of U.S. airspace, including air navigation facilities; airports and landing areas; aeronautical charts; associated rules, regulations, and procedures; technical information; and personnel and material. The system also includes components shared jointly with the military.

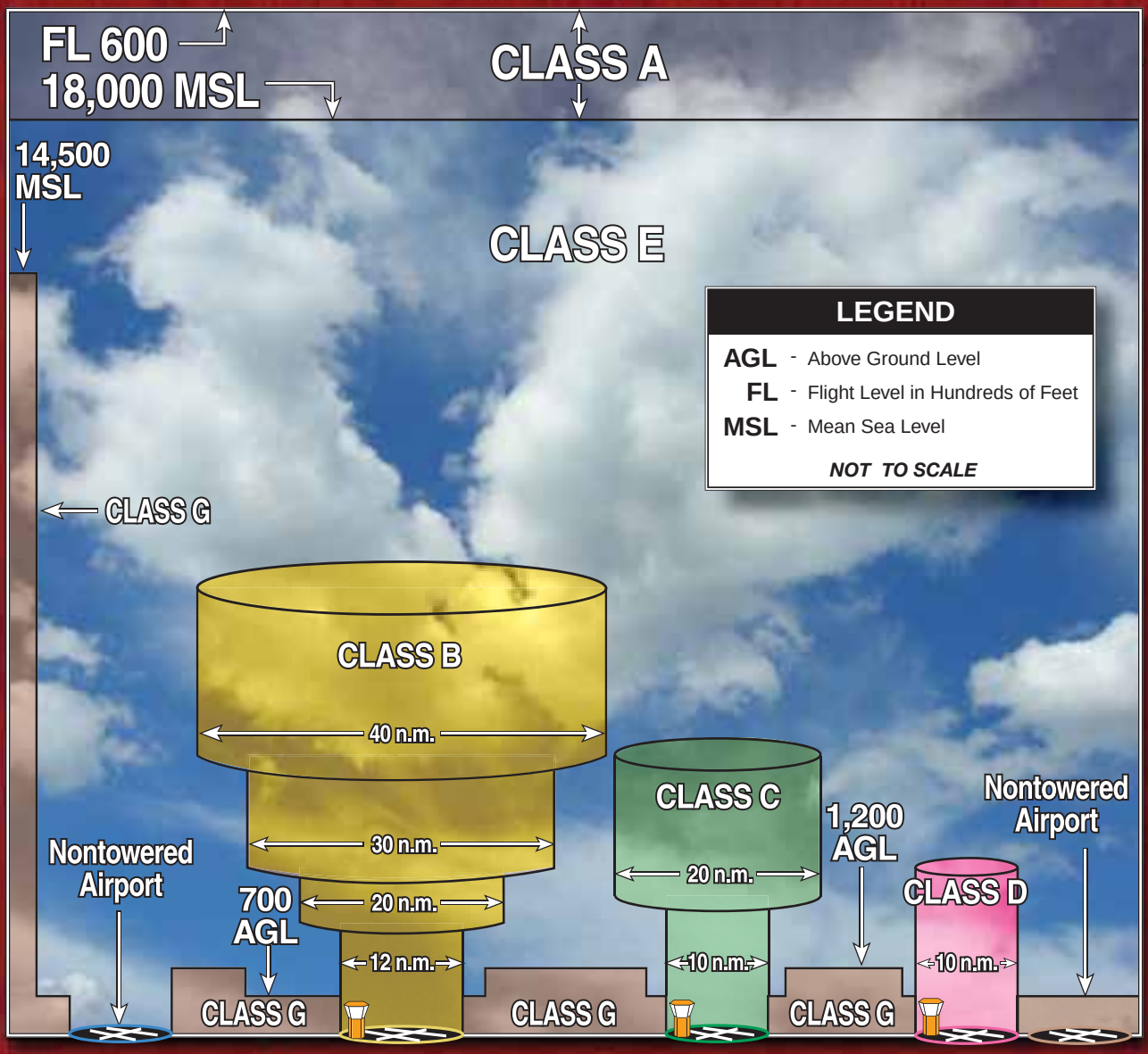
Airspace Structure

Airspace within the United States is broadly classified as either Acontrolled@ or "uncontrolled." The difference between controlled and uncontrolled airspace relates primarily to requirements for pilot qualifications, ground-to-air communications, navigation and air traffic services, and weather conditions. Six classes of airspace have been designated in the United States as shown on **Exhibit 1C**. Airspace designated as Class A, B, C, D, or E is considered controlled airspace. Aircraft operating within controlled airspace are subject to varying requirements for positive air traffic control. Airspace in the vicinity of Casa Grande Municipal Airport is depicted on **Exhibit 1D**.

Class A Airspace: Class A airspace includes all airspace from 18,000 feet mean sea level (MSL) to flight level (FL) 600 (approximately 60,000 feet MSL). This airspace is designated in Federal Aviation Regulation (F.A.R.) Part 71.193 for positive control of aircraft. The Positive Control Area (PCA) allows flights governed only under IFR operations. The aircraft must have special radio and navigation equipment, and the pilot must obtain clearance from an air traffic control (ATC) facility to enter Class A airspace. In addition, the pilot must possess an instrument rating.

Class B Airspace: Class B airspace has been designated around some of the country's major airports to separate arriving and departing aircraft. Class B airspace is designed to regulate the flow of uncontrolled traffic, above, around, and below the arrival and departure airspace required for high-performance, passenger-carrying aircraft at major airports. This airspace is the most restrictive controlled airspace routinely encountered by pilots operating under visual flight rules (VFR) in an uncontrolled environment. The nearest Class B airspace to Casa Grande Municipal Airport is located at Phoenix Sky Harbor International Airport.

In order to fly within Class B airspace, an aircraft must be equipped with special radio and navigational equipment and must obtain clearance from air traffic control. To operate within the Class B airspace of Phoenix Sky Harbor International Airport, a pilot must have at least a private pilot's certificate or be a student pilot who

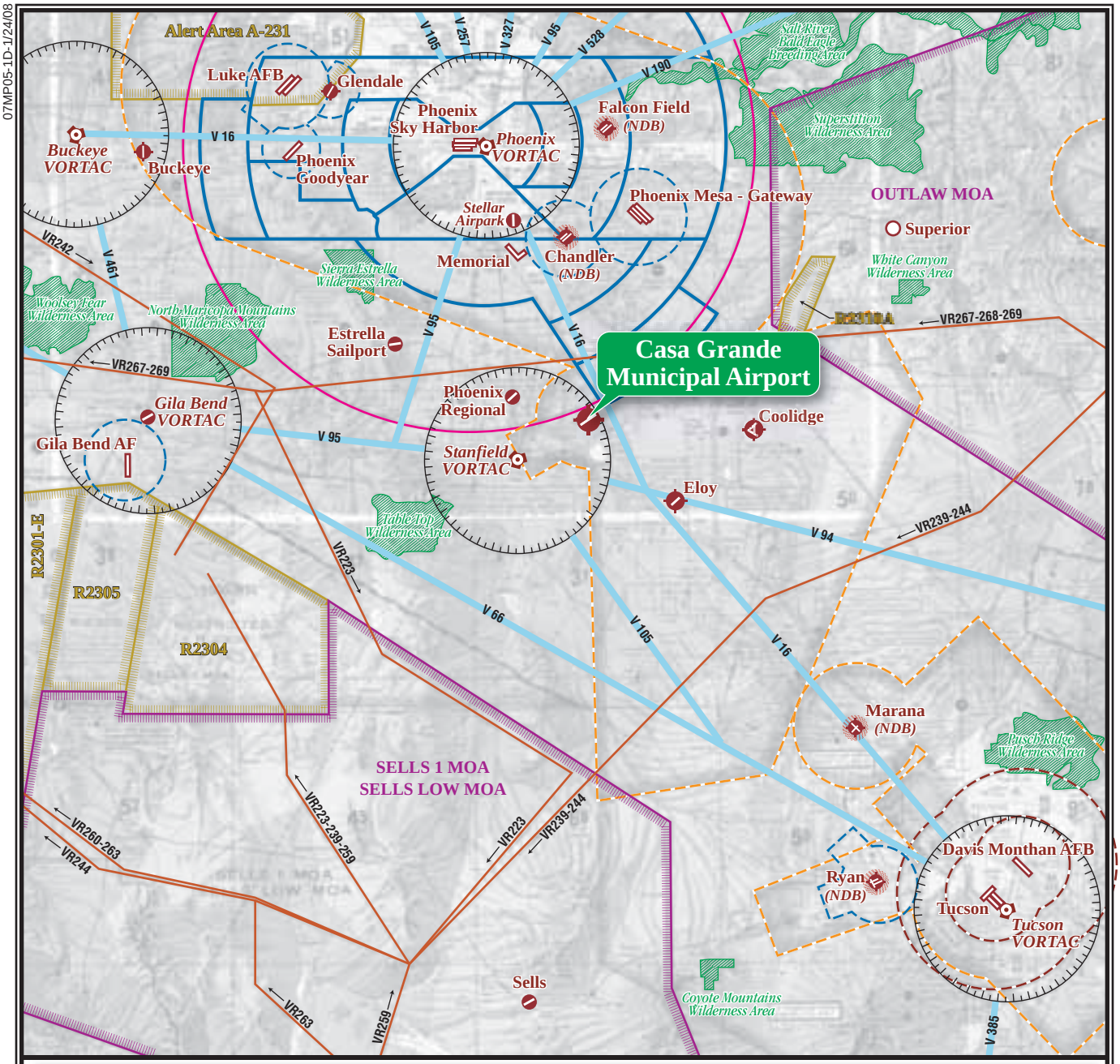


CLASSIFICATION	DEFINITION
CLASS A	Generally airspace above 18,000 feet MSL up to and including FL 600.
CLASS B	Generally multi-layered airspace from the surface up to 10,000 feet MSL surrounding the nation's busiest airports.
CLASS C	Generally airspace from the surface to 4,000 feet AGL surrounding towered airports with service by radar approach control.
CLASS D	Generally airspace from the surface to 2,500 feet AGL surrounding towered airports.
CLASS E	Generally controlled airspace that is not Class A, Class B, Class C, or Class D.
CLASS G	Generally uncontrolled airspace that is not Class A, Class B, Class C, Class D, or Class E.

Source: "Airspace Reclassification and Charting Changes for VFR Products," National Oceanic and Atmospheric Administration, National Ocean Service. Chart adapted by Coffman Associates from AOPA Pilot, January 1993.

Exhibit 1C
AIRSPACE CLASSIFICATION

07MP05-1D-1/24/08



LEGEND

- Airport with other than hard-surfaced runways
- Airport with hard-surfaced runways 1,500' to 8,069' in length
- Airports with hard-surfaced runways greater than 8,069' or some multiple runways less than 8,069'
- VORTAC
- Non-Directional Radiobeacon (NDB)
- Compass Rose
- Military Operations Area (MOA)
- Prohibited, Restricted, Warning and Alert Areas
- Wilderness Areas
- Mode C
- Military Training Routes
- Victor Airways
- Class B Airspace
- Class D Airspace
- Class C Airspace
- Class E Airspace with floor 700' above surface

Source:
Phoenix Sectional Chart,
US Department of Commerce,
National Oceanic and Atmospheric
Administration, January 17, 2008

NORTH

NOT TO SCALE

Exhibit 1D
VICINITY AIRSPACE

has met the requirements of F.A.R. Part 61.95, which requires special ground and flight training for the Class B airspace. Helicopters do not need special navigation equipment or a transponder if they operate at or below 1,000 feet and have made prior arrangements in the form of a Letter of Agreement with the FAA controlling agency. Aircraft are also required to have and utilize a Mode C transponder within a 30-nautical-mile (NM) range of the center of the Class B airspace. A Mode C transponder allows the ATCT to track the location of the aircraft. Casa Grande Municipal Airport lies one nautical mile southeast of this 30 nautical mile radius.

The Phoenix Terminal Radar Approach Control Facility (TRACON) controls all aircraft operating within the Phoenix Class B airspace. The TRACON operates 24 hours per day.

Class C Airspace: The FAA has established Class C airspace at 120 airports around the country as a means of regulating air traffic in these areas. Class C airspace is designed to regulate the flow of uncontrolled traffic above, around, and below the arrival and departure airspace required for high-performance, passenger-carrying aircraft at major airports. In order to fly inside Class C airspace, the aircraft must have a two-way radio, an encoding transponder, and have established communication with ATC. Aircraft may fly below the floor of the Class C airspace or above the Class C airspace ceiling without establishing communication with ATC. There is no Class C airspace in the vicinity of Casa Grande Municipal Airport.

Class D Airspace: Class D airspace is controlled airspace surrounding airports with an airport traffic control tower (ATCT). The Class D airspace typically constitutes a cylinder with a horizontal radius of four or five nautical miles (NM) from the airport, extending from the surface up to a designated vertical limit, typically set at approximately 2,500 feet above the airport elevation. If an airport has an instrument approach or departure, the Class D airspace sometimes extends along the approach or departure path.

The Phoenix metropolitan area has seven public-use airports in Class D airspace including: Chandler Municipal Airport, Phoenix-Mesa Gateway Airport, Mesa-Falcon Field Airport, Scottsdale Municipal Airport, Phoenix Deer Valley Airport, Glendale Municipal Airport, and Phoenix Goodyear Airport. The closest of these airports to Casa Grande Municipal Airport is Chandler Municipal Airport, located 19 nautical miles north of the airport.

Class E Airspace: Class E airspace consists of controlled airspace designed to contain instrument flight rules (IFR) operations near an airport and while aircraft are transitioning between the airport and enroute environments. Unless otherwise specified, Class E airspace terminates at the base of the overlying airspace. Only aircraft operating under IFR are required to be in contact with air traffic control when operating in Class E airspace. While aircraft conducting visual flights in Class E airspace are not required to be in radio communication with air traffic control facilities, visual flight can only be conducted if mini-

mum visibility and cloud ceilings exist.

Casa Grande Municipal Airport is in Class E airspace. This area of controlled airspace has a floor of 700 feet above the surface and extends to Class A airspace. This transition area is intended to provide protection for aircraft transitioning from enroute flights to the airport for landing.

Class G Airspace: Airspace not designated as Class A, B, C, D, or E is considered uncontrolled, or Class G, airspace. Air traffic control does not have the authority or responsibility to exercise control over air traffic within this airspace. Class G airspace lies between the surface and the overlaying Class E airspace (700 to 1,200 feet above ground level [AGL]). Class G airspace extends below the floor of the Class E airspace transition area at Casa Grande Municipal Airport.

While aircraft may technically operate within Class G airspace without any contact with ATC, it is unlikely that many aircraft will operate this low to the ground. Furthermore, federal regulations specify minimum altitudes for flight. F.A.R. Part 91.119*, Minimum Safe Altitudes*, generally states that except when necessary for takeoff or landing, pilots must not operate an aircraft over any congested area of a city, town, or settlement, or over any open air assembly of persons, at an altitude of less than 1,000 feet above the highest obstacle within a horizontal radius of 2,000 feet of the aircraft. Over less congested areas, pilots must maintain an altitude of 500 feet above the surface, except over open water or sparsely populated areas. In those cases, the aircraft may not be operated closer than 500 feet to any person, vessel, vehicle, or structure. Finally, this section states that helicopters may be operated at less than the minimums prescribed above if the operation is conducted without hazard to persons or property on the surface. In addition, each person operating a helicopter shall comply with any routes or altitudes specifically prescribed for helicopters by the FAA.

Special Use Airspace

Special use airspace is defined as airspace where activities must be confined because of their nature or where limitations are imposed on aircraft not taking part in those activities. These areas are depicted on **Exhibit 1D** by yellow and purple-hatched lines, as well as with the use of green shading.

Military Operating Areas: Military Operating Areas (MOAs) are depicted in **Exhibit 1D** with purple-hatched lines. MOAs in the vicinity of Casa Grande Municipal Airport include the Outlaw MOA to the east and the Sells 1 and Sells Low MOAs to the southwest. The Outlaw MOA is used at altitudes of 8,000 feet MSL or 3,000 AGL, whichever is higher. Its scheduled use can fluctuate from 7:00 a.m. to 6:00 p.m., and 6:00 p.m. to 10:00 p.m. (notification by Notice to Airmen [NOTAM] Monday through Friday, with intermittent weekend use (notification by NOTAM). The Sells 1 MOA is used at 10,000 feet MSL from 6:00 a.m. to 7:00 p.m. Monday through Friday. The Sells Low MOA is used at

3,000 feet AGL up to but not including 10,000 feet MSL from 6:00 a.m. to 7:00 p.m. Monday through Friday.

Military Training Routes: Military training routes near Casa Grande Municipal Airport are identified with the letters VR and a four-digit number or with IR and a three-digit number. The arrows on the route show the direction of travel. Military aircraft travel on these routes below 10,000 feet MSL and at speeds in excess of 250 knots.

Wilderness Areas: As depicted on **Exhibit 1D**, several wilderness areas exist around the Casa Grande area. Aircraft are requested to maintain a minimum altitude of 2,000 feet above the surface of designated National Park areas, which includes wilderness areas and designated breeding grounds. FAA Advisory Circular 91-36C defines the "surface" as the highest terrain within 2,000 feet laterally of the route of flight or the uppermost rim of a canyon or valley.

Victor Airways: For aircraft arriving or departing the regional area using very high frequency omnidirectional range (VOR) facilities, a system of Federal Airways, referred to as Victor Airways, has been established. Victor Airways are corridors of airspace eight miles wide that extend upward from 1,200 feet AGL to 18,000 feet MSL and extend between VOR navigational facilities. Victor Airways are shown with solid blue lines on **Exhibit 1D**.

Restricted/Alert Areas: Restricted and alert areas are depicted on **Exhibit 1D** with yellow-hatched lines. Restricted airspace is off-limits for public-use unless granted permission from the controlling agency. The restricted areas in the vicinity of Casa Grande Municipal Airport are used by the military for training purposes. The controlling agency for each of these restricted areas is the Albuquerque Air Route Traffic Control Center (ARTCC).

Restricted area R-2301E, located west of Casa Grande, is used up to flight level (FL) 800 (80,000 feet MSL) from 6:30 a.m. to 10:30 p.m. Monday through Friday. Restricted area R-2305, located west of Casa Grande, is used up to FL 240 (24,000 feet MSL) from 7:00 a.m. to 11:00 p.m. daily. Restricted area R-2304, located west of Casa Grande, is used up to FL 240 from 7:00 a.m. to 10:00 p.m. daily. Restricted area R-2310A, located east of Casa Grande, is used up to 10,000 feet MSL intermittently by NOTAM 48 hours in advance of use. Alert area A-231 is located around Luke Air Force Base northwest of Casa Grande. It is in use from 500 feet AGL to 6,500 feet MSL continuously.

Airspace Control

The FAA is responsible for the control of aircraft within the Class A, Class C, Class D, and Class E airspace described above. The Albuquerque ARTCC controls aircraft operating in Class A airspace. The Albuquerque ARTCC, located in Albuquerque, New Mexico, controls IFR aircraft entering or leaving the Casa Grande Municipal Airport area. The area of jurisdiction

for the Albuquerque center includes most of the states of New Mexico and Arizona, and portions of Texas, Colorado, and Oklahoma.

Navigational Aids

Navigational aids are electronic devices that transmit radio frequencies which pilots of properly equipped aircraft translate into point-to-point guidance and position information. The types of electronic navigational aids available for aircraft flying to or from Casa Grande Municipal Airport include the VOR, Loran-C, and global positioning system (GPS).

The VOR provides azimuth readings to pilots of properly equipped aircraft by transmitting a radio signal at every degree to provide 360 individual navigational courses. Frequently, distance measuring equipment (DME) is combined with a VOR facility to provide distance as well as direction information to the pilot. Military tactical air navigation aids (TACANs) and civil VORs are commonly combined to form a VORTAC. A VORTAC provides distance and direction information to civil and military pilots.

The Stanfield VORTAC, located approximately eight nautical miles southwest of the airfield, serves Casa Grande Municipal Airport. The Stanfield VORTAC is used extensively up to an altitude of 7,500 feet AGL in the vicinity of Casa Grande Municipal Airport for training purposes. This facility is identified on **Exhibit 1D**.

Loran-C is a ground-based enroute navigational aid which utilizes a system of transmitters located in various locations across the continental United States. Loran-C allows pilots to navigate without using a specific facility. With a properly equipped aircraft, pilots can navigate to any airport in the United States using Loran-C.

GPS was initially developed by the United States Department of Defense for military navigation around the world. However, GPS is now used extensively for a wide variety of civilian uses, including the civil aircraft navigation.

GPS uses satellites placed in orbit around the globe to transmit electronic signals, which pilots of properly equipped aircraft use to determine altitude, speed, and navigational information. This provides more freedom in flight planning and allows for more direct routing to the final destination.

Instrument Approach Procedures

Instrument approach procedures are a series of predetermined maneuvers established by the FAA, using electronic navigational aids that assist pilots in locating and landing at an airport, especially during instrument flight conditions. Casa Grande Municipal Airport has one published precision instrument approach, and three published non-precision approaches.

The capability of an instrument approach is defined by the visibility and

cloud ceiling minimums associated with the approach. Visibility minimums define the horizontal distance the pilot must be able to see in order to complete the approach. Cloud ceilings define the lowest level a cloud layer (defined in feet above the ground) can be situated for the pilot to complete the approach. If the observed visibility or cloud ceilings are below the minimums prescribed for the approach, the pilot cannot complete the instrument approach. **Table 1D** summarizes instrument approach minima for Casa Grande Municipal Airport.

TABLE 1D
Instrument Approach Data

	WEATHER MINIMUMS BY AIRCRAFT TYPE							
	Category A		Category B		Category C		Category D	
	CH	VIS	CH	VIS	CH	VIS	CH	VIS
ILS/DME RWY 5								
Straight-In ILS	285	0.5	285	0.5	N/A	N/A	N/A	N/A
Straight-In LOC	384	0.5	384	0.5	N/A	N/A	N/A	N/A
Circling	438	1.0	458	1.0	N/A	N/A	N/A	N/A
GPS RWY 5								
Straight-In	424	0.5	424	0.5	N/A	N/A	N/A	N/A
Circling	418	1.0	518	0.5	N/A	N/A	N/A	N/A
GPS RWY 23								
Straight-In	378	1.0	378	1.0	N/A	N/A	N/A	N/A
Circling	378	1.0	518	1.0	N/A	N/A	N/A	N/A
VOR RWY 5								
Straight-In	504	0.5	504	0.5	N/A	N/A	N/A	N/A
Circling	498	1.0	498	1.0	N/A	N/A	N/A	N/A

Aircraft categories are based on the approach speed of aircraft, which is determined by 1.3 times the stall speed in landing configuration. The approach categories are as follows:
Category A 0-90 knots (Cessna 172)
Category B 91-120 knots (Beechcraft KingAir)
Category C 121-140 knots (Canadair Challenger)
Category D 141-165 knots (Gulfstream IV)

Abbreviations:
CH: Cloud Height (in feet above ground level)
DME: Distance Measuring Equipment
GPS: Global Positioning System
ILS: Instrument Landing System
VIS: Visibility (in statute miles)
VOR: Very-high Frequency Omnidirectional Range

Source: U.S. Terminal Procedures, Southwest Volume 4 of 4, December 20, 2007.

Visual Flight Procedures

Many flights into and out of Casa Grande Municipal Airport are currently conducted under visual flight rules (VFR). Under VFR flight, the pilot is responsible for collision avoidance. Typically, the pilot will make radio calls announcing his/her intentions and the position of the aircraft relative to the airport.

In most situations, under VFR and basic radar services, the pilot is responsible for navigation and choosing the arrival and departure flight paths to

and from the airport. The results of individual pilot navigation for sequencing and collision avoidance are that aircraft do not fly a precise flight path to and from the airport. Therefore, aircraft can be found flying over a wide area around the airport for sequencing and safety reasons.

While aircraft can be expected to operate over most areas of the airport, the density of aircraft operations is higher near the airport. This is the result of aircraft following the established traffic patterns for the airport. The traffic pattern is the traffic flow that is prescribed for aircraft landing or taking off from an airport. The components of a typical traffic pattern are upwind leg, crosswind leg, downwind leg, base leg, and final approach.

a. Upwind Leg - A flight path parallel to the landing runway in the direction of landing.

b. Crosswind Leg - A flight path at right angles to the landing runway off its upwind end.

c. Downwind Leg - A flight path parallel to the landing runway in the direction opposite to landing. The downwind leg normally extends between the crosswind leg and the base leg.

d. Base Leg - A flight path at right angles to the landing runway off its approach end. The base leg normally extends from the downwind leg to the intersection of the extended runway centerline.

e. Final Approach - A flight path in the direction of landing along the extended runway centerline. The final approach normally extends from the base leg to the runway.

Essentially, the traffic pattern defines the side of the runway on which aircraft will operate. For example, at Casa Grande Municipal Airport, Runway 5 has an established left-hand traffic pattern. For this runway, aircraft make a left turn from base leg to final for landing. Runway 23 has an established right-hand traffic pattern. Therefore, aircraft operating to either runway will remain northwest of the runway.

While the traffic pattern defines the direction of turns that an aircraft will follow on landing or departure, it does not define how far from the runway an aircraft will operate. The distance laterally from the runway centerline an aircraft operates or the distance from the end of the runway is at the discretion of the pilot, based on the operating characteristics of the aircraft, number of aircraft in the traffic pattern, and meteorological conditions. The actual ground location of each leg of the traffic pattern varies from operation to operation for the reasons of safety, navigation, and sequencing, as described above. The distance that the downwind leg is located laterally from the runway will vary based mostly on the speed of the aircraft. Slower aircraft can operate closer to the runway as their turn radius is smaller.

The traffic pattern altitude (TPA) for the airport has been established at 2,502 feet MSL. The TPA is the altitude at which aircraft operating in the traffic pattern fly when on the downwind leg. The TPA is established so that aircraft have a predictable descent profile on base leg to final for landing.

Area Airports

A review of public-use airports within the vicinity of Casa Grande Municipal Airport has been made to identify and distinguish the type of air service provided in the area surrounding the airport. Information pertaining to each airport was obtained from FAA records.

Eloy Municipal Airport (E60), located approximately 13 nautical miles southeast of Casa Grande Municipal Airport, is owned and managed by the City of Eloy. E60 is equipped with a single asphalt runway that measures 3,900 feet long and 75 feet wide. E60 experiences approximately 15,350 operations annually and has 18 based aircraft. E60 has both 100LL Avgas and Jet A fuel available for purchase. Other general aviation services offered include transient hangar and tiedown storage.

Coolidge Municipal Airport (P08), located approximately 17 nautical miles east of Casa Grande Municipal Airport, is owned and managed by the City of Coolidge. P08 is equipped with a dual asphalt runway system. The greatest runway length at P08 is provided by Runway 5-23 at a length of 5,528 and a width of 150 feet. P08 currently experiences approximately 6,490 operations annually and has 41 aircraft based at the airport. 100LL Avgas and Jet A fuel are available for purchase at the airport. Transient hangar and tiedown storage is available as well as minor airframe and powerplant services.

Chandler Municipal Airport (CHD), located approximately 19 nautical miles north of Casa Grande Municipal Airport, is owned and managed by the City of Chandler. CHD has a parallel asphalt runway system, the longest of which, Runway 4R-22L, measures 4,870 feet long and 75 feet wide. CHD is also equipped with a concrete helipad. CHD has 449 based aircraft and experiences approximately 223,800 operations annually. A full range of general aviation services are available at CHD including: 100LL Avgas, Jet A, transient tie-downs, major airframe and powerplant services, bottled oxygen, and aircraft charters and rentals.

Estrella Sailport (E68), located approximately 21 nautical miles west of Casa Grande Municipal Airport, is privately owned by Arizona Soaring, Inc. E68 is equipped with a single asphalt runway and three dirt runways. E68 has approximately 42 based aircraft and experiences approximately 20,000 annual operations. General aviation services available are limited to aircraft tie-down positions.

Phoenix-Mesa Gateway Airport (IWA), located approximately 22 nautical miles north of Casa Grande Municipal Airport, is owned and managed

by the Williams Gateway Airport Authority. IWA is equipped with three parallel runways. The concrete Runway 12R-30L is the longest at 10,401 feet long and 150 feet wide. IWA has 111 based aircraft and experiences 280,719 operations annually. General aviation services include: 100LL Avgas, Jet A, transient hangar and tiedown storage, minor airframe service, bottled oxygen, and aircraft charters and rentals.

Stellar Airpark (P19), located approximately 22 nautical miles north of Casa Grande Municipal Airport, is open to public-use but privately owned and operated by the Stellar Runway Utilizers Association, Inc. P19 has a single asphalt runway that measures 3,913 feet in length and 60 feet in width. P19 currently experiences approximately 39,000 annual operations and has 152 based aircraft. 100LL Avgas and Jet A fuel is available for purchase. Other general aviation services available include transient tiedown spaces, minor airframe and powerplant service, and aircraft rentals.

Mesa-Falcon Field Airport (FFZ), located approximately 30 nautical miles north of Casa Grande Municipal Airport, is owned and managed by the City of Mesa. FFZ is equipped with a parallel asphalt runway system. Runway 4R-22L, measuring 5,101 feet in length and 100 feet in width, is the airport's longest runway. FFZ is also equipped with two asphalt helipads. FFZ has 988 based aircraft, and experiences 270,084 operations annually. A full range of general aviation services are available at FFZ including: 100LL Avgas, Jet A, transient tiedown spaces, major airframe and powerplant service, bottled and bulk oxygen, and aircraft charters and rentals.

Phoenix Sky Harbor International Airport (PHX), located approximately 31 nautical miles northwest of Casa Grande Municipal Airport, is owned and managed by the City of Phoenix. PHX is equipped with three parallel concrete runways, the longest, Runway 8-26, measures 11,498 feet long and 150 feet wide. PHX was the 8th busiest airport in the United States in 2006 with 20.6 million enplanements. PHX has 117 based aircraft and experiences 546,398 operations annually. PHX offers a full range of commercial airline services as well as general aviation services.

LANDSIDE FACILITIES

Landside facilities are the ground-based facilities that support the aircraft and pilot/passenger handling functions. These facilities typically include aircraft storage/maintenance hangars, aircraft parking aprons, and support facilities such as fuel storage, automobile parking, and roadway access. Landside facilities are identified on **Exhibit 1E.**

Terminal Building

The terminal building at Casa Grande Municipal Airport was constructed in 2001. It is located adjacent to the terminal apron on the east side of Runway 5-23. The 4,800-square-foot terminal building contains offices, restrooms, showers, a pilot briefing and

07MP05-1E-4/14/08

Exhibit 1E
EXISTING LANDSIDE FACILITIES

flight planning area, a conference room, a fuel service desk, and an open lobby area. Phoenix Area Skydiving currently leases an office in the terminal building. The terminal building is accessible via West Airport Road, which intersects with Arizona Highway 387.

Aircraft Hangar Facilities

Aircraft storage hangar facilities at Casa Grande Municipal Airport are made up of T-hangars, conventional hangars, and shade hangars. There are six separate T-hangar facilities providing a total of 52 storage positions. There are five conventional hangar facilities including one owned by the City of Casa Grande. The remaining four conventional hangars were constructed privately on land leased from the City. The City also owns two shade hangars with 18 aircraft storage positions. All hangars are located to the southeast of the runway adjacent to the terminal area. There is approximately 125,600 square feet of hangar storage area at Casa Grande Municipal Airport.

One existing off-airport business and its associated hangar have "through-the-fence" airport access and pays associated "airport access fees" for each airplane owned by and based at the business facility each month. Additional business/hangar facilities are anticipated to be located within the Airport Industrial Airpark in the future and will have the same opportunity to operate a "through-the-fence" operation. Collectively these facilities provide the airport with a direct economic benefit through the payment of monthly access fees and are not allowed to conduct any business that competes with the operation of the airport.

Fixed Base Operators (FBOs)

The City of Casa Grande currently operates the airport's FBO services. The following is a list of services provided by the City of Casa Grande.

- Self-Service Aviation Fuel (100LL)
- Jet A Fuel
- Line Services
- Aircraft Parking (Ramp or Tiedown)
- Pilots Lounge
- Public Telephone
- Computer Access
- Shower Facilities
- Catering Services

Specialty Operators

There are several specialty operators at the airport that provide a wide variety of services. Each of these specialty operators is located in the terminal area of the airport as shown on **Exhibit 1E**. Each specialty operator and a brief description of the business are listed below:

- **Native Air** – provides emergency air ambulance services throughout the State of Arizona. Native Air operates a single Eurocopter AS 350 Ecureuil helicopter at Casa Grande Municipal Airport. Native Air operates a total of 15 fixed-wing and rotorcraft aircraft, which are based throughout the State.

- **Phoenix Area Skydiving** – provides skydiving services. Phoenix Area Skydiving currently operates a single Cessna 182 fixed-wing aircraft and employs five full-time and two part-time employees.

- **Sunshine Aviation, LLC**. – provides light fixed-wing aircraft airframe and powerplant maintenance services. Sunshine Aviation currently leases the City-owned conventional hangar and employs a single employee.

Apron and Aircraft Parking

Aircraft parking aprons at Casa Grande Municipal Airport consist of a terminal apron, which is located immediately north and west of the terminal building, and a newly constructed apron west of the terminal area along Taxiway B. The 40,110-square-yard terminal apron includes 50 tie-down spaces and a helipad. The newly constructed apron covers approximately 44,433 square yards and provides 31 small aircraft tie-down spaces and 24 large aircraft tie-down spaces. Two helicopter parking positions cover approximately 733 square yards located adjacent to the old terminal building.

Native Air has two helicopter parking positions on 2,600 square yards adjacent to its offices. Sunshine Aviation has an 889-square-yard apron adjacent to its hangar facility. Paved aircraft parking apron on the airport totals approximately 88,765 square yards. A 15,000-square-yard unpaved aircraft parking apron is located to the east of the terminal apron. This apron provides approximately 24 aircraft storage positions.

Fueling Facilities

Fuel storage tanks at Casa Grande Municipal Airport are located above ground adjacent to the terminal apron, as shown on **Exhibit 1E**. The fuel storage facilities are owned by the City of Casa Grande and consist of one self-serve 12,000 gallon Avgas (100LL) storage tank, and one 12,000 gallon Jet A fuel storage tank. The City also owns a 1,200-gallon fuel truck for Avgas (100LL) and a 3,000-gallon truck for Jet A fuel.

Maintenance and Aircraft Rescue and Firefighting

Maintenance at Casa Grande Municipal Airport is performed by the City of Casa Grande Public Works department. City-owned equipment is used to perform maintenance when needed. This equipment is stored at an off-airport location just south of the airport in the Casa Grande Air Park.

There are no aircraft rescue and firefighting (ARFF) facilities located on the airport. However, the Casa Grande firefighting station #3 and training center is located on airport property at the far east end of the airport adjacent to Arizona Highway 387. This firefighting facility is capable of responding to on-airport emergencies in a matter of minutes.

Utilities

The availability of utilities at the airport is an important factor in determining the development potential of the airport property. Of primary concern in the inventory investigation is the availability of water, sanitary sewer, and electricity. Some, if not all, of these utilities will be necessary for any future development. Water is provided by the Arizona Water Company via a 10-inch main line that enters the airport from the south. A six-inch main also serves the airport from the east along the northern boundary of airport property. Sanitary sewer is provided by the City of Casa Grande. Electrical power is supplied to the airport by APS. Telephone service is provided by Qwest.

Security Fencing and Gates

A perimeter fencing project is near completion at the airport. This project involved installation of eight-foot iron bar fencing in the vicinity of the terminal building. Around the remainder of the airport perimeter and in the vicinity of the hangar facilities, eight-foot chain-link fencing with three strands of barbed-wire has been installed. Manual lock access gates are being installed and will be located at various locations around the airport's perimeter.

ACCESS AND CIRCULATION

The airport is located approximately 3.5 statute miles south of Interstate 10 and west of Arizona Highway 387. Interstate 10, which runs east to west, extends 49 statute miles northwest to Phoenix and 68 statute miles southeast to Tucson. The airport is accessible via State Highway 387, which extends south from Interstate 10 to West Airport Road. State Highway 387 is a paved four-lane divided highway, which runs from north to south along the eastern perimeter of the airport. The West Airport Road airport entrance is a non-lighted intersection. West Airport Road is a two-lane paved roadway that extends west from the intersection to the terminal parking lot. A number of on-airport roadways provide access to various landside facilities. Each of these roadways is identified on **Exhibit 1E**.

A paved terminal parking lot provides 32 automobile parking spaces including two handicapped spaces. The Native Air facility provides approximately 10 parking spaces.

SOCIOECONOMIC PROFILE

The socioeconomic profile provides a general look at the socioeconomic makeup of the community that utilizes Casa Grande Municipal Airport. It also provides an understanding of the dynamics for growth and the potential changes that may affect aviation de-

mand. Aviation demand forecasts are often directly related to the population base, economic strength of the region, and the ability of the region to sustain a strong economic base over an extended period of time. Current demographic and economic information was collected from the Central Arizona Association of Governments (CAAG), Maricopa Association of Governments (MAG), Pinal County, Arizona Department of Economic Security, and the United States Department of Commerce.

POPULATION

Population is a basic demographic element to consider when planning for future needs of the airport. The State of Arizona has been one of the fastest growing states in the country in recent history. **Table 1E** shows the total population growth since 1960 for the State of Arizona, Pinal County, and the City of Casa Grande. Since 2000, the population growth rate for both the County and the City has accelerated to its fastest pace during the represented time period. Since 2000, the State of Arizona has grown at a slower annual average rate (3.3 percent) than Pinal County and the City of Casa Grande (8.9 and 7.5 percent respectively). Much of this growth can be attributed to the urban sprawl of the Phoenix metropolitan area and to a lesser extent, the Tucson metropolitan area. Continued growth of these metropolitan areas into Pinal County and the Casa Grande area is expected to continue into the future.

TABLE 1E
Casa Grande Area Population Trends

Year	State of Arizona	Avg. Annual % Change	Pinal County	Avg. Annual% Change	City of Casa Grande	Avg. Annual % Change
1960	1,302,161	--	62,673	--	8,311	--
1970	1,770,900	3.1%	67,916	0.8%	10,536	2.4%
1980	2,718,215	4.4%	90,918	3.0%	14,971	3.6%
1990	3,665,228	3.0%	116,379	2.5%	19,082	2.5%
2000	5,130,632	3.4%	179,727	4.4%	25,224	2.8%
2007	6,432,007	3.3%	326,398	8.9%	41,869	7.5%

Sources: U.S. Census Bureau (1960-2000)
Central Arizona Association of Governments (2007)

Table 1F presents population projections for Pinal County. The County's population is expected to grow at an average annual rate of 10.9 percent through 2025, reaching a total population of nearly two million. According to the *Pinal County Small Area Transportation Study (SATS)*, the areas projected to experience substantial growth include Eloy, Maricopa, Florence, Coolidge, and Casa Grande.

Exhibit 1F was derived from a graphic prepared by MAG. The exhibit shows the anticipated growth of population centers in Maricopa, Pinal, and Pima Counties between 2000 and 2050. It becomes quite evident from this depiction that Pinal County is developing into a metropolitan center between the Phoenix and Tucson metropolitan areas.

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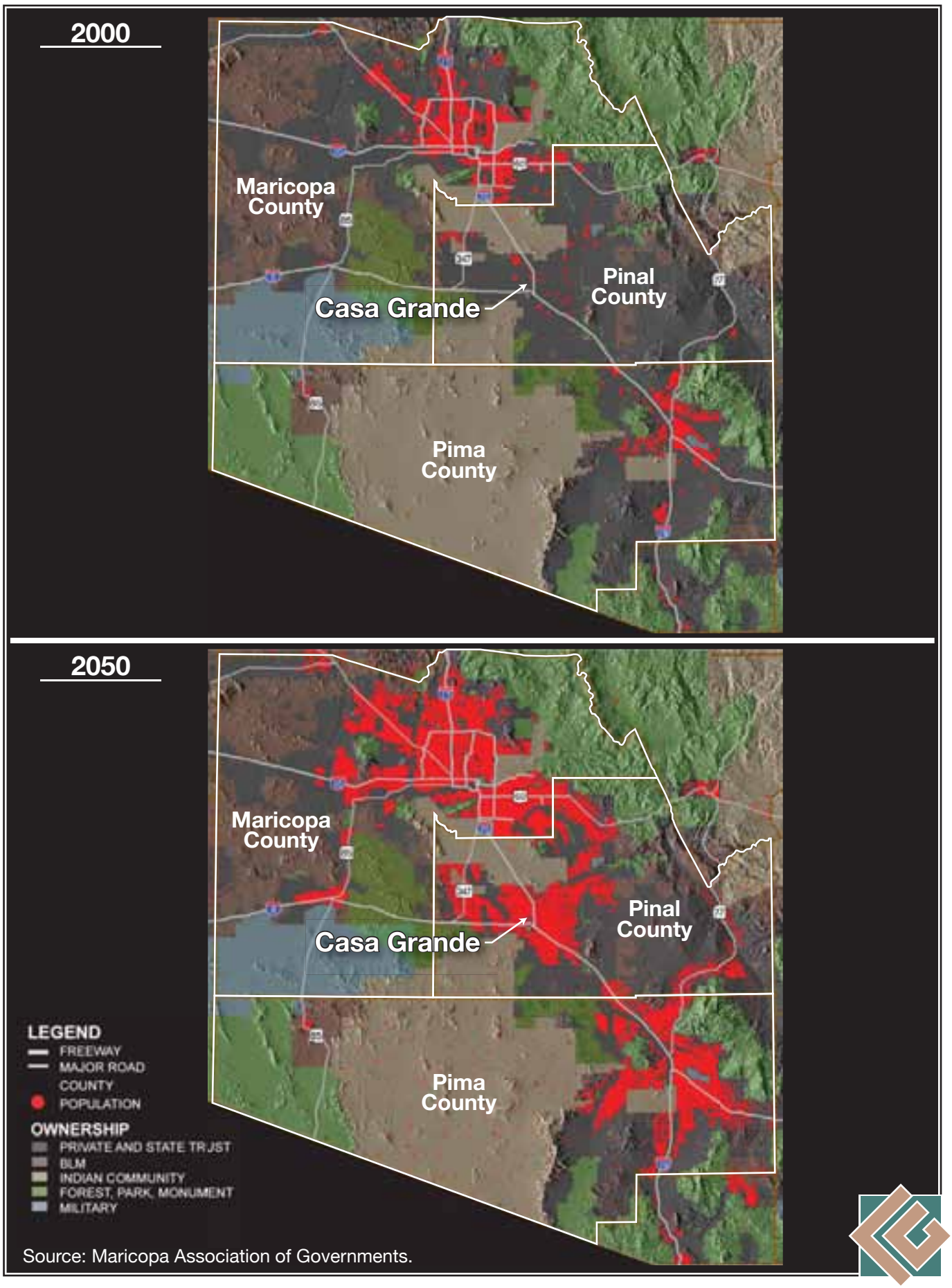

Exhibit 1F
POPULATION GROWTH
SOUTH CENTRAL ARIZONA

TABLE 1F
Population Projections
Pinal County

Study Area	2005 Population	2025 Population	Population Increase	Average Annual Growth
Western	94,000	789,700	695,700	11.2%
North Central	121,900	884,200	762,300	10.4%
Eastern	32,200	280,100	247,800	11.4%
County Total	248,100	1,954,000	1,705,800	10.9%

Source: Pinal County Small Area Transportation Study (August 2006).

EMPLOYMENT

Employment opportunities affect migration to the area and population growth. As shown in **Table 1G**, the City of Casa Grande unemployment rate has been consistently higher than the State and lower than the County unemployment rates. This indicates a stable job market and a healthy local economy which promotes population growth.

TABLE 1G
Historical Unemployment Rate
United States, State of Arizona, Pinal County, City of Casa Grande

Year	United States	State of Arizona	Pinal County	Casa Grande
2000	4.0%	4.0%	4.6%	4.3%
2001	4.7%	4.7%	5.3%	5.0%
2002	5.8%	6.0%	7.2%	6.8%
2003	6.0%	5.7%	7.0%	6.5%
2004	5.5%	4.9%	5.9%	5.5%
2005	5.1%	4.6%	5.5%	5.2%
2006	4.6%	4.1%	5.0%	4.7%
2007	4.6%	3.7%	4.8%	4.5%

Source: Arizona Department of Economic Security

Table 1H summarizes total employment by sector for Pinal County from 1970 to 2007. As shown in the table, total employment in the County has experienced steady growth over this timeframe with an average annual growth rate of 2.4 percent. The sectors that experienced the greatest growth were the "Services" sector (5.0 percent); "Wholesale Trade" sector (5.0 percent); and the "Finance, Insurance and Real Estate" sector (4.8 percent). The "Farm Employment" and "Mining" sectors both experienced negative growth rates at -0.6 and -4.8 percent, respectively.

TABLE 1H
Pinal County Employment by Sector

Sector	1970	1980	1990	2000	2007	Avg. Annual % Growth
Farm Employment	3,430	2,250	2,090	2,110	2,700	-0.6%
Agricultural Services, Other	550	890	1,350	1,070	900	1.3%
Mining	6,090	6,200	4,110	1,410	970	-4.8%
Construction	2,120	790	1,370	2,050	2,830	0.8%
Manufacturing	1,480	2,720	3,680	3,420	4,020	2.7%
Trans., Comm., Util.	590	980	1,520	1,070	1,500	2.6%
Wholesale Trade	210	600	850	1,350	1,290	5.0%
Retail Trade	3,080	4,070	6,100	7,920	11,020	3.5%
Finance, Ins. & Real Estate	680	1,400	1,900	2,480	3,800	4.8%
Services	2,510	3,450	6,790	11,240	15,460	5.0%
Government	5,260	8,560	11,820	16,160	18,260	3.4%
Total	25,980	31,900	41,580	50,260	62,740	2.4%

Source: Woods & Poole CEDDS 2007

PER CAPITA PERSONAL INCOME

Per capita personal income (PCPI) for the United States, the State of Arizona, and Pinal County is summarized in **Table 1J**. PCPI is determined by dividing total income by population. For PCPI to grow significantly, income growth must outpace population growth. As shown in the table, PCPI average annual growth in Pinal County (0.8 percent) has been outpaced by PCPI growth in the state (1.3 percent) and the nation (1.5 percent) since 1970. Historic PCPI figures for Pinal County have also been considerably lower than the state and national levels.

TABLE 1J
Historical Per Capita Personal Income (2004 $)
United States, State of Arizona, Pinal County

Year	United States	Arizona	Pinal County
1970	$19,810	$18,505	$15,238
1980	$23,038	$21,384	$17,622
1990	$28,150	$24,577	$17,621
2000	$32,737	$28,144	$19,382
2005	$33,341	$29,035	$20,152
Average Annual Growth Rate	1.5%	1.3%	0.8%

Source: United States Department of Commerce, Bureau of Economic Analysis

CLIMATE

Weather plays an important role in the operational capabilities of an airport. Temperature is an important factor in determining runway length required for aircraft operations. The percentage of time that VFR weather conditions are in effect is a major fac-

tor in determining the use of instrument approach aids.

Temperatures typically range from 66 to 106 degrees Fahrenheit (F) during the summer months. The hottest month is typically July with an average high of 106.6 degrees. August is the wettest month averaging 1.52 inches of precipitation annually. January is the coldest month with average minimum temperatures around 35.4 degrees.

VFR weather is in effect when cloud ceilings are at 1,000 feet above ground level (AGL) or greater, and when visibility is three statute miles or greater. Casa Grande experiences ideal flying conditions year round averaging 99.8 percent VFR weather conditions annually. **Table 1K** summarizes typical weather conditions for the Casa Grande region.

TABLE 1K
Temperature and Precipitation Data
Casa Grande, Arizona

	Temperature (Fahrenheit)			
	Mean Maximum	Mean Minimum	Precipitation (Inches)	Mean % VFR Weather
January	66.8	35.4	0.73	99.6
February	71.4	39.0	0.82	99.8
March	77.5	43.6	0.77	99.9
April	86.3	49.5	0.29	100.0
May	95.3	57.4	0.12	100.0
June	104.5	66.4	0.16	100.0
July	106.6	75.7	1.01	99.8
August	104.0	74.2	1.52	99.9
September	100.0	67.2	0.78	99.9
October	89.3	53.8	0.51	99.9
November	76.4	41.7	0.70	99.9
December	67.5	35.7	0.95	99.1
Annual	87.1	53.3	8.37	99.8

Source: Western Regional Climate Center

ENVIRONMENTAL INVENTORY

Available information about the existing environmental conditions at Casa Grande Municipal Airport has been derived from internet resources, agency maps, and existing literature. The intent of this task is to inventory potential environmental sensitivities that might affect future improvements at the airport.

Air Quality

The U.S. Environmental Protection Agency (EPA) has adopted air quality standards that specify the maximum permissible short-term and long-term concentrations of various air contaminants. The National Ambient Air Quality Standards (NAAQS) consist of primary and secondary standards for six criteria pollutants which include: Ozone (O_3), Carbon Monoxide (CO),

Sulfur Dioxide (SO_2), Nitrogen Oxide (NO), Particulate matter (PM_{10} and $PM_{2.5}$), and Lead (Pb). Various levels of review apply within both NEPA and permitting requirements. Potentially significant air quality impacts, associated with an FAA project or action, would be demonstrated by the project or action exceeding one or more of the NAAQS for any of the time periods analyzed.

The airport is located in Pinal County which has been classified by the EPA as being in non-attainment for 8-hour ozone, Particulate Matter (PM_{10}), and Sulfur Dioxides (SO_2). A nonattainment classification indicates that the area has pollution levels which consistently exceed the NAAQS.

Fish, Wildlife, and Plants

The Fish and Wildlife Service (FWS) and the National Marine Fisheries Service (NMFS) are charged with overseeing the requirements contained within Section 7 of the *Endangered Species Act*. This Act was put into place to protect animal or plant species whose populations are threatened by human activities. Along with the FAA, the FWS and the NFMS review projects to determine if a significant impact to these protected species will result with implementation of a proposed project. Significant impacts occur when the proposed action could jeopardize the continued existence of a protected species, or would result in the destruction or adverse modification of federally designated critical habitat in the area.

In a similar manner, states are allowed to prepare statewide wildlife conservation plans through authorizations contained within the *Sikes Act*. Airport improvement projects should be checked for consistency with the State or Department of Defense (DOD) Wildlife Conservation Plans where such plans exist.

The native vegetation in the area is described as Lower Colorado Sonoran Desert Scrub. A search of the Arizona Heritage Data Management System on-line environmental review tool did not indicate any occurrences of special status species or critical habitat within three miles of the Airport.

According to the U.S. Fish and Wildlife Service, numerous threatened, endangered, and candidate species have suitable habitat within Pinal County. These species are identified in **Table 1L**.

Floodplains

Floodplains are defined in Executive Order 11988, *Floodplain Management*, as "the lowland and relatively flat areas adjoining inland and coastal waters…including at a minimum, that area subject to a one percent or greater chance of flooding in any given year" (i.e., that area would be inundated by a 100-year flood). Federal agencies, including the FAA, are directed to "reduce the risk of loss, to minimize the impact of floods on human safety, health, and welfare, and to restore and preserve the natural and beneficial values served by floodplains." According to the Federal

Emergency Management System (FEMA) Federal Insurance Rate Map (FIRM) panel number 04021C1175E, the airport is not located within a 100-year floodplain.

TABLE 1L
Federally listed Threatened, Endangered, and Candidate Species with Habitat in Pinal County

COMMON NAME	SCIENTIFIC NAME	HABITAT	STATUS
Arizona Hedgehog	Echinocereus triglochidiatus var. arizonicus	Ecotone between interior chapparal and madrean evergreen woodland.	Endangered
California Brown Pelican	Pelecanus occidentalis californicus	Coastal land and islands; species found around many Arizona lakes and rivers.	Endangered
Desert Pupfish	Cyprinodon macularius	Shallow springs, small streams, and marshes. Tolerates saline and warm water.	Endangered
Gila Chub	Gila intermedia	Pools, springs, cienegas, and streams.	Endangered
Gila Topminnow	Poeciliopsis occidentalis occidentalis	Small streams, springs, and cienegas vegetated shallows.	Endangered
Lesser Long-nosed Bat	Leptonycteris curasoae yerbabuenae	Desert scrub habitat with agave and columnar cacti present as food plants.	Endangered
Loach Minnow	Tiaroga cobitis	Small to large perennial streams with swift shallow water over cobble and gravel.	Threatened
Mexican Spotted Owl	Strix occidentalis lucida	Nests in canyons and dense forests with multilayered foliage structure.	Threatened
Nichol Turk's Head Cactus	Echinocactus horizonthalonius var. nicholii	Sonoran desert scrub.	Endangered
Razorback Sucker	Xyrauchen texanus	Riverine and lacustrine areas, generally not in fast moving water and may use backwaters.	Endangered
Southwestern Willow Flycatcher	Empidonax traillii extimus	Cottonwood/willow and tasmarisk vegetation communities along rivers and streams.	Endangered
Spikedance	Meda fulgida	Moderate to large perennial streams-with gravel substrates and moderate to swift velocities over sand and gravel substitutes.	Threatened
Yuma Clapper Rail	Rallus longirostris yumanensis	Fresh water and brackish marshes	Endangered
Acuna Cactus	Echinomastus erectocentrus var. acunensis	Well drained knolls and gravel ridges in Sonoran desertscrub.	Candidate
Yellow-billed Cuckoo	Coccyzus americanus	Large blocks of riparian woodlands (cottonwood, willow, or tamarisk galleries).	Candidate

Source: U.S. Fish and Wildlife Service, Pinal County Species List. December 2007

Wetlands and Waters of the U.S.

The U.S. Army Corps of Engineers regulates the discharge of dredged and/or fill material into waters of the United States, including adjacent wetlands, under Section 404 of the *Clean Water Act*. Wetlands are defined in Executive Order 11990, *Protection of Wetlands*, as "those areas that are inundated by surface or groundwater with a frequency sufficient to support and under normal circumstances does or would support a prevalence of vegetation or aquatic life that requires saturated or seasonably saturated soil conditions for growth and reproduction." Categories of wetlands include swamps, marshes, bogs, sloughs, potholes, wet meadows, river overflows, mud flats, natural ponds, estuarine areas, tidal overflows, and shallow lakes and ponds with emergent vegetation. Wetlands exhibit three characteristics: hydrology, hydrophytes (plants able to tolerate various degrees of flooding or frequent saturation), and poorly drained soils.

A drainage canal located along the airport's northern boarder collects water flowing from the north and diverts it around the airport to the southwest.

Historical, Architectural, and Cultural Resources

Determination of a project's impact to historical and cultural resources is made in compliance with the *National Historic Preservation Act* (NHPA) *of 1966*, as amended for federal undertakings. Two State acts also require consideration of cultural resources. The NHPA requires that an initial review be made of an undertaking's *Area of Potential Effect* (APE) to determine if any properties in, or eligible for inclusion in, the National Register of Historic Places are present in the area.

It is not known if any cultural or historic resources are located on airport property.

Department of Transportation Act: Section 4(f)

Section 4(f) properties include publicly owned land from a public park, recreational area, or wildlife and waterfowl refuge of national, state, or local significance; or any land from a historic site of national, state, or local significance. There are no Section 4(f) resources located on airport property.

LAND USE

Exhibit 1G depicts the future land use around the airport as derived from the 2005 *Casa Grande General Plan 2010*. The land encompassed by airport property is designated as public/semi-public land while the land immediately adjacent to airport property is designated as employment land use. The majority of land to the north, south, and east is designated as low density residential. Land encompassed by the airport noise exposure contours to the east is designated as office/business park, medium and low density residential. Land to the southwest and west is designated as

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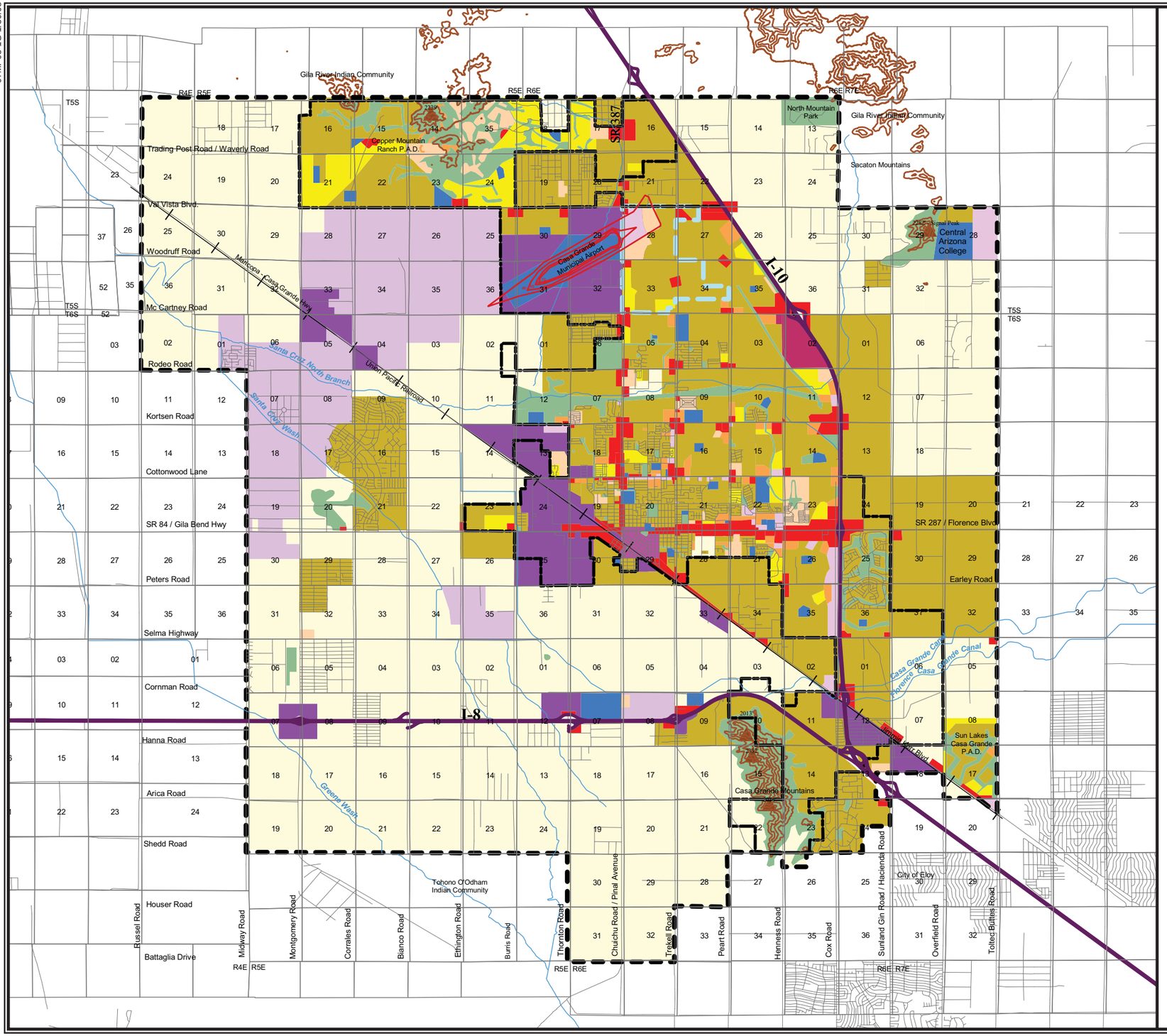

LEGEND

- Rural Residential (0-1 DU / AC*) Target .5 DU / AC
- Low Density Residential (0-4 DU / AC) Target 2.5 DU / AC
- Medium Density Residential #1 (4-8 DU / AC) Target 5.0 DU / AC
- Medium Density Residential #2 (8-12 DU / AC) Target 10.0 DU / AC
- High Density Residential (12-16 DU / AC) Target 14.0 DU / AC
- Commercial
- Regional Commercial
- Office / Business Park
- Employment
- Natural Resource Extraction
- Public / Semi-Public
- Parks / Open Space
- Revitalization Area
- Master Planned Community (MPC)
- City Incorporated
- Planning Area Boundary
- Airport Noise Exposure Contours

* DU / AC = dwelling units per acre

Note: A different target density for and designated Low Density Residential may be allowed depending on location. See Growth Areas and text in the General Plan document.

NORTH

0 2 4

SCALE IN MILES

Source:
City of Casa Grande General Plan 2010
January 2005

Exhibit 1G
FUTURE LAND USE

rural residential and natural resource extraction.

SUMMARY

The information discussed on the previous pages provides a foundation upon which the remaining elements of the planning process will be constructed. Information on current airport facilities and utilization will serve as a basis, with additional analysis and data collection, for the development of forecasts of aviation activity and facility requirement determinations. The inventory of existing conditions is the first step in the process of determining those factors which will meet projected aviation demand in the community and the region.

DOCUMENT SOURCES

A variety of sources were used in the inventory of existing facilities. The following listing presents a partial list of reference documents. The list does not reflect some information collected by airport staff or through interviews with airport personnel.

AirNAV Airport information, website: http://www.airnav.com

Airport/Facility Directory, Southwest U.S., U.S. Department of Transportation, Federal Aviation Administration, National Aeronautical Charting Office, February 14, 2008 Edition

Arizona Department of Economic Security; 2007

Arizona Department of Transportation

Casa Grande Municipal Airport, Airport Master Plan; 1997

Central Arizona Association of Governments; 2007

City of Casa Grande, Arizona

FAA 5010 Form, Airport Master Record; 2007

National Plan of Integrated Airport Systems (NPIAS), U.S. Department of Transportation, Federal Aviation Administration, 2007-2011

U.S. Census Bureau

U.S. Department of Commerce, Bureau of Economic Analysis

U.S. Fish and Wildlife Service, *Pinal County Species List*, December 2007

U.S. *Terminal Procedures*, Volume 4 of 4, Department of Transportation, Federal Aviation Administration, December 20, 2007 Edition.

Western Regional Climate Center; 2007

Woods & Poole Economics, *The Complete Economic and Demographic Data Source; 2007*

Chapter Two

FORECASTS

Forecasts

An important factor in facility planning involves a definition of demand that may reasonably be expected to occur during the useful life of the facility's key components. In airport master planning, this involves projecting potential aviation activity over at least a 20-year timeframe. For general aviation airports such as Casa Grande Municipal Airport, forecasts of based aircraft and general aviation operations (takeoffs and landings) serve as a basis for facility planning.

The Federal Aviation Administration (FAA) has a responsibility to review aviation forecasts that are submitted to the agency in conjunction with airport planning, including master plans, 14 CFR Part 150 Studies, and environmental studies. The FAA reviews such forecasts with the objective of including them in its *Terminal Area Forecasts* (TAF) and the *National Plan of Integrated Airport Systems* (NPIAS). In addition, aviation activity forecasts are an important input to the benefit-cost analyses associated with airport development, and the FAA reviews these analyses when federal funding requests are submitted.

As stated in FAA Order 5090.3C, *Field Formulation of the National Plan of Integrated Airport Systems* (NPIAS), dated December 4, 2004, forecasts should:

- Be realistic.
- Be based on the latest available data.
- Reflect current conditions at the airport.
- Be supported by information in the study.

- Provide adequate justification for airport planning and development.

The forecast process for an airport master plan consists of a series of basic steps that can vary depending upon the issues to be addressed and the level of effort required to develop the forecast. The steps include a review of previous forecasts, determination of data needs, identification of data sources, collection of data, selection of forecast methods, preparation of the forecasts, and evaluation and documentation of the results.

The following forecast analysis for Casa Grande Municipal Airport was produced following these basic guidelines. Other forecasts dating back to the previous master plan were examined and compared against current and historic activity. The historical aviation activity was then examined along with other factors and trends that could affect demand. The intent is to provide an updated set of aviation demand projections for Casa Grande Municipal Airport that will permit the City of Casa Grande to make planning adjustments as necessary to maintain a viable, efficient, and cost-effective facility.

NATIONAL AVIATION TRENDS

Each year, the FAA updates and publishes a national aviation forecast. Included in this publication are forecasts for passengers, airlines, air cargo, general aviation, and FAA workload measures. The forecasts are prepared to meet the budget and planning needs of the constituent units of the FAA and to provide information that can be used by state and local authorities, the aviation industry, and the general public.

The current edition when this chapter was prepared was FAA *Aerospace Forecasts - Fiscal Years 2008-2025*, published in March 2008. The forecasts use the economic performance of the United States as an indicator of future aviation industry growth. Similar economic analyses are applied to the outlook for aviation growth in international markets.

In the seven years prior to the events of September 11, 2001, the U.S. civil aviation industry experienced unprecedented growth in demand and profits. The impacts to the economy and aviation industry from the events of 9/11 were immediate and significant. The economic climate and aviation industry, however, has been on the recovery.

The Office of Management and Budget (OMB) expects the U.S. economy to continue to grow moderately in terms of Gross Domestic Product (GDP) at an average annual rate of 2.7 percent through 2025. The world GDP is forecast to grow at an even faster rate of 3.2 percent over the same period. This will positively influence the aviation industry, leading to passenger, air cargo, and general aviation growth throughout the forecast period (assuming there will be no new successful terrorist incidents against either U.S. or world aviation).

Following more than a decade of decline, the general aviation industry was revitalized with the passage of the *General Aviation Revitalization Act* in 1994, which limits the liability on general aviation aircraft to 18 years from the date of manufacture. This legislation sparked an interest to renew the manufacture of general aviation aircraft due to the reduction in product liability, as well as renewed optimism for the industry. The high cost of product liability insurance had been a major factor in the decision by many American aircraft manufacturers to slow or discontinue the production of general aviation aircraft.

The sustained growth in the general aviation industry slowed considerably in 2001, negatively impacted by the events of 9/11. Thousands of general aviation aircraft were grounded for weeks due to no-fly zone restrictions imposed on operations of aircraft in security-sensitive areas. This, in addition to the economic recession that began in early 2001, had a negative impact on the general aviation industry. General aviation shipments by U.S. manufacturers declined for three straight years from 2001 through 2003.

Stimulated by an expanding U.S. economy as well as accelerated depreciation allowances for operators of new aircraft, general aviation staged a relatively strong recovery with over ten percent growth in each of the last three years.

Resilience being demonstrated in the piston aircraft market offers hope that the new aircraft models are attracting interest in the low-end market of general aviation. The introduction of new, light sport aircraft is expected to provide further stimulation in the coming years.

New models of business jets are also stimulating interest for the high-end market. The FAA still expects the business segment to expand at a faster rate than personal/sport flying. Safety and security concerns combined with increased processing time at commercial terminals make business/corporate flying an attractive alternative. In addition, the bonus depreciation provision of the President's economic stimulation package began to help business jet sales late in 2004.

In 2007, there were an estimated 225,007 active general aviation aircraft in the United States. **Exhibit 2A** depicts the FAA forecast for active general aviation aircraft. The FAA projects an average annual increase of 1.4 percent through 2025, resulting in 286,500 active aircraft. Piston-powered aircraft are expected to grow at an average annual rate of 0.3 percent. This is driven primarily by a 4.7 percent annual increase in piston-powered rotorcraft and growth in experimental and sport aircraft, as single engine fixed-wing piston aircraft are projected to increase at just 0.5 percent annually, and multi-engine fixed-wing piston aircraft are projected to decrease by 0.9 percent per year. This is due, in part, to declining numbers of multi-engine piston aircraft and the attrition of approximately 1,500 older piston aircraft annually. In addition, it is expected that the new, light sport aircraft and the relatively inexpensive microjets will dilute or weaken the replacement market for piston aircraft.

Owners of ultralight aircraft began registering their aircraft as "light sport" aircraft in 2005. At the end of 2006 a total of 1,273 aircraft were estimated to be in this category. The FAA estimates there will be a registration of 5,600 aircraft by 2010, and it will grow to 14,700 aircraft by 2025.

Turbine-powered aircraft (turboprop and jet) are expected to grow at an average annual rate of 4.2 percent over the forecast period. Even more significantly, the jet portion of this fleet is expected to almost double in size in 10 years, with an average annual growth rate of 5.6 percent. The total number of jets in the general aviation fleet is projected to grow from 10,997 in 2007, to 29,515 by 2025.

At the October 2006 workshop sponsored by the FAA and the Transportation Research Board, industry experts suggested that the market for the new very light jet (VLJ), or microjet aircraft, could add 500 more aircraft a year to the fleet by 2010. These twin-engine jets are expected to be priced between $1 million and $2 million and are believed to have the potential to redefine business jet flying with the capability to support a true on-demand air taxi business service. Microjets entered the active fleet in 2007, with the delivery of 143 new aircraft. They are forecast to grow by 400 to 500 aircraft per year, contributing a total of 8,145 aircraft to the jet forecast by 2025.

BASED AIRCRAFT

The number of aircraft based at an airport is, to some degree, dependent upon the nature and magnitude of aircraft ownership in the local service area. Therefore, the process of developing forecasts of based aircraft for Casa Grande Municipal Airport begins with a review of historical aircraft registrations in the area.

REGISTERED AIRCRAFT FORECASTS

Historical records of aircraft ownership in Pinal County, presented on **Table 2A**, were obtained from the U.S. Census of Civil Aircraft for the years 1987 through 1992, Aviation Goldmine for the years 1993 through 2000, and Avantext, Inc., Aircraft & Airmen for the years 2001 to 2007. Since 1987, registered general aviation aircraft in the county have grown from 215 to 407, for an annual average growth rate of 3.2 percent.

Table 2A also compares registered aircraft to active general aviation aircraft in the United States. The method used by the FAA to tabulate active general aviation aircraft changed in 1992, which is why annual counts before this time were not included in this study. The Pinal County share of the U.S. market of general aviation aircraft has grown from 0.127 percent in 1992 to 0.176 percent in 2007.

Socioeconomic Trends

Pinal County historical trends for key socioeconomic variables provide an indicator of the potential for creating growth in aviation activities at an airport. Typical variables used in evaluating potential for traffic growth in-

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U.S. ACTIVE GENERAL AVIATION AIRCRAFT

U.S. ACTIVE GENERAL AVIATION AIRCRAFT (in thousands)

Year	FIXED WING				ROTORCRAFT		Experimental	Sport Aircraft	Other	Total
	PISTON		TURBINE							
	Single Engine	Multi-Engine	Turboprop	Turbojet	Piston	Turbine				
2007 (Est.)	144.6	18.5	8.2	11.0	3.6	6.0	23.9	2.7	6.4	225.0
2015	145.6	17.2	9.3	19.8	6.2	7.3	29.7	10.5	6.5	252.3
2020	150.0	16.5	10.1	24.9	7.3	7.9	32.6	13.2	6.4	268.9
2025	157.4	15.6	10.8	29.5	8.3	8.6	35.2	14.7	6.4	286.5

Source: FAA Aerospace Forecasts, Fiscal Years 2008-2025.

Notes: An active aircraft is one that has a current registration and was flown at least one hour during the calendar year.

Exhibit 2A
U.S. ACTIVE GENERAL AVIATION AIRCRAFT FORECASTS

clude population and per capita personal income (PCPI). This data is readily available on an annual historic basis at the county level.

Table 2A presents historical population data for Pinal County from 1987 to 2007. Population growth has been strong over the past 20 years with an increase of 219,198 residents and an average annual percentage increase of 5.7 percent. Much of the recent growth can be attributed to the urban sprawl of the Phoenix metropolitan area.

Pinal County population forecasts were interpolated and extrapolated from the *Pinal County Small Area Transportation Study*, which was prepared in August 2006. These population forecasts, shown in **Table 2A**, increase the County's total population by more than 1.8 million residents. This is an average annual increase of 9.9 percent over the next 20 years. A substantial portion of this County population growth is anticipated to be experienced in the City of Casa Grande. This large population growth will have a profound impact on aviation activity at the Casa Grande Municipal Airport.

Historical and projected PCPI for the County is also presented on **Table 2A** and are inflation-adjusted to year 2004 dollars. Inflation-adjusted PCPI for the County has been growing slowly at an annual average of 0.3 percent over the last 20 years. Projected numbers through 2027 show PCPI growing at an increased average annual rate of 1.8 percent.

Registered Aircraft Projections

Based on the historical registered aircraft, U.S. active aircraft, population, and PCPI data, projections of registered aircraft in Pinal County have been prepared and are shown in **Table 2B**. Several analytical techniques were examined for their applicability to projecting registered aircraft in Pinal County. These included time-series extrapolation, regression analyses, and market share analyses.

First, a market share analysis was developed, which keeps Pinal County's share of U.S. active aircraft constant through 2027, resulting in a 1.4 percent annual growth rate. This constant market share projection yields 537 registered aircraft in Pinal County by 2027.

The population of Pinal County was also used as a comparison with registered aircraft in the County. The forecast examines the history of registered aircraft as a ratio of residents in Pinal County. The 2007 estimated population for the County was 326,398, resulting in a ratio of 1.25 registered aircraft per 1,000 residents. Maintaining the current ratio would yield a projection of 2,708 registered aircraft in Pinal County by 2027.

However, the ratio has been on the decline since 1987, when there were 2.01 registered aircraft per 1,000 residents in the County. Because of this declining ratio in Pinal County over the past 20 years, another forecast was prepared, which continues this historical trend. The decreasing registrations per capita forecast yields 2,134 registered aircraft in Pinal County by 2027.

TABLE 2A
Registered Aircraft and Independent Variables
Pinal County

Year	Registered Aircraft	U.S. Active Aircraft	% of U.S. Market	Population	PCPI (2004 $)	AC Per 1,000 Residents
1987	215	N/A	N/A	107,200	17,980	2.01
1988	228	N/A	N/A	110,300	18,533	2.07
1989	236	N/A	N/A	112,200	18,503	2.10
1990	245	N/A	N/A	116,800	17,621	2.10
1991	228	N/A	N/A	119,650	17,849	1.91
1992	235	185,650	0.127%	122,600	17,601	1.92
1993	231	177,120	0.130%	127,225	17,739	1.82
1994	243	172,935	0.141%	132,225	17,659	1.84
1995	251	182,605	0.137%	139,050	17,488	1.81
1996	259	187,312	0.138%	144,150	17,739	1.80
1997	277	189,328	0.146%	150,375	17,962	1.84
1998	268	205,700	0.130%	157,675	18,706	1.70
1999	293	219,500	0.133%	165,400	19,198	1.77
2000	310	217,533	0.143%	185,525	19,382	1.67
2001	305	211,446	0.144%	190,181	20,331	1.60
2002	307	211,244	0.145%	199,687	20,171	1.54
2003	305	209,606	0.146%	210,493	20,226	1.45
2004	327	219,319	0.149%	230,355	20,941	1.42
2005	335	224,262	0.149%	258,256	20,152	1.30
2006	356	221,942	0.160%	297,310	18,520	1.20
2007	407	225,007	0.181%	326,398	18,814	1.25
Constant Share of U.S. Active Aircraft						
2012	437	241,625	0.181%	510,905	20,637	0.86
2017	469	259,160	0.181%	855,879	22,612	0.55
2027	537	296,708	0.181%	2,166,420	26,644	0.25
Constant Registrations Per Capita						
2012	639	241,625	0.264%	510,905	20,637	1.25
2017	1,070	259,160	0.413%	855,879	22,612	1.25
2027	2,708	296,708	0.913%	2,166,420	26,644	1.25
Decreasing Registrations Per Capita (Selected Forecast)						
2012	600	241,625	0.248%	510,905	20,637	1.17
2017	946	259,160	0.365%	855,879	22,612	1.11
2027	2,134	296,708	0.718%	2,166,420	26,644	0.99

Sources:
Registered Aircraft – U.S. Census of Civil Aircraft (1987-1992), Aviation Goldmine (1993-2000), Avantext, Inc., Aircraft & Airmen (2001-2007).
U.S. Active Aircraft – *FAA Aerospace Forecasts 2008-2025*
Population – Arizona Department of Economic Security (1987-1999), Central Arizona Association of Governments (2000-2007), Pinal County Small Area Transportation Study 2006 (2012-2027)
PCPI – U.S. Department of Commerce, Bureau of Economic Analysis (1987-2005), Woods & Poole *CEDDS*, 2007 (2006-2007, 2012-2027).

A time-series extrapolation of registered aircraft was developed based upon the period from 1987 to 2007. The correlation coefficient, (r^2), was determined to be 0.885 for this time-series extrapolation. The correlation coefficient (Pearson's "r") measures the association between changes in the dependent variable (registered aircraft) and the independent variable(s). An r^2 greater than 0.900 generally indicates good predictive reliability. A lower value may be used with the understanding that the predictive reliability is lower.

Several regression analyses were prepared to determine the association between U.S. active aircraft, socioeconomic indicators (population and PCPI), and registered aircraft growth. This association is represented by the correlation coefficient. **Table 2B** and **Exhibit 2B** present the resulting projections for comparison with the market share projections.

The results of the regression analysis indicate that the socioeconomic factor that associates closest with registered aircraft change is population. The time-series analysis resulted in a projection that was considerably lower than the other three regressions and actually projects a decrease in registered aircraft through 2012. The multiple regression that analyzed independent variables population and U.S. active aircraft since 1992 produced the highest r^2 at 0.963.

The decreasing registrations per capita projection was found to be most relative to the anticipated socioeconomic growth in Pinal County over the next 20 years and historical trends. Population growth in Pinal County will remain stronger than aircraft demand. Thus, the aircraft ownership per capita will continue to decline over time. The selected forecast yields 600 registered aircraft by 2012, 946 registered aircraft by 2017, and 2,134 registered aircraft by 2027. This represents an 8.6 percent average annual growth rate. **Table 2B** summarizes the registered aircraft forecasts developed for Pinal County as well as the selected forecast.

TABLE 2B
Registered Aircraft Projections
Pinal County

	r^2	2007	2012	2017	2027	Avg. Annual Growth Rate
Market Share Projection						
U.S. Active Aircraft		225,007	241,625	259,160	297,136	1.4%
Constant Share of U.S. Active Aircraft		407	437	469	537	1.4%
Constant Registrations Per Capita		407	639	1,070	2,708	9.9%
Decreasing Registrations Per Capita (Selected Forecast)		**407**	**600**	**946**	**2,134**	**8.6%**
Regression Analysis Projections						
Time-Series 1987-2007	0.885	407	393	431	507	1.1%
Population & PCPI 1987-2007	0.957	407	543	811	1,826	7.8%
Population 1987-2007	0.951	407	509	716	1,479	6.7%
U.S. Active Aircraft & Population 1992-2007	0.963	407	537	799	1,782	7.7%

BASED AIRCRAFT FORECAST

Before preparing new forecasts for based aircraft, previous based aircraft projections were reviewed for current validity. These included the FAA *Terminal Area Forecast* (TAF) 2007, Arizona *State Aviation Needs Study* (SANS) 2000, and the previous *Casa Grande Municipal Airport Master Plan* from 1997. Each of the previous forecasts use different base years as well as projection years. For comparison, these were interpolated and extrapolated to correlate with this Master Plan's projection years. Each of these previous based aircraft forecasts are presented in **Table 2C**.

TABLE 2C
Previous Based Aircraft Projections
Casa Grande Municipal Airport

	Base Year	2007	2012	2017	2027
Airport Master Record	114				
FAA TAF 2007		101	101	101	101
Arizona SANS 2000		64	68	72	80
Previous Master Plan 1997		65	72	80	N/A

Since each of these previous studies was prepared at different times, it is expected that they will be different from each other and may not match recent historical counts. According to airport records, the current based aircraft count is 114. The interpolated 2007 projections for each of these previous studies are well below this number. The FAA TAF projection has based aircraft at Casa Grande Municipal Airport remaining constant at 101 through the planning period. The long-range projections of the SANS and the previous master plan both fall short of existing based aircraft.

Having forecast the aircraft ownership demand in Pinal County, the historic based aircraft figures at Casa Grande Municipal Airport were reviewed to examine the change in market share over the years. **Table 2D** examines Casa Grande Municipal Airport's historical share of County registered aircraft.

Between 1987 and 2007, Casa Grande Municipal Airport based aircraft grew from 41 to 114 at a rate of 5.2 percent annually. Casa Grande Municipal Airport's share of registered aircraft in the County has grown steadily from 19.1 percent in 1987 to 28.0 percent in 2007. Three market share projections were generated based from historical trends. The first projection keeps the current market share static at 28.0 percent, resulting in 598 based aircraft by 2027 and an annual average growth rate of 8.6 percent.

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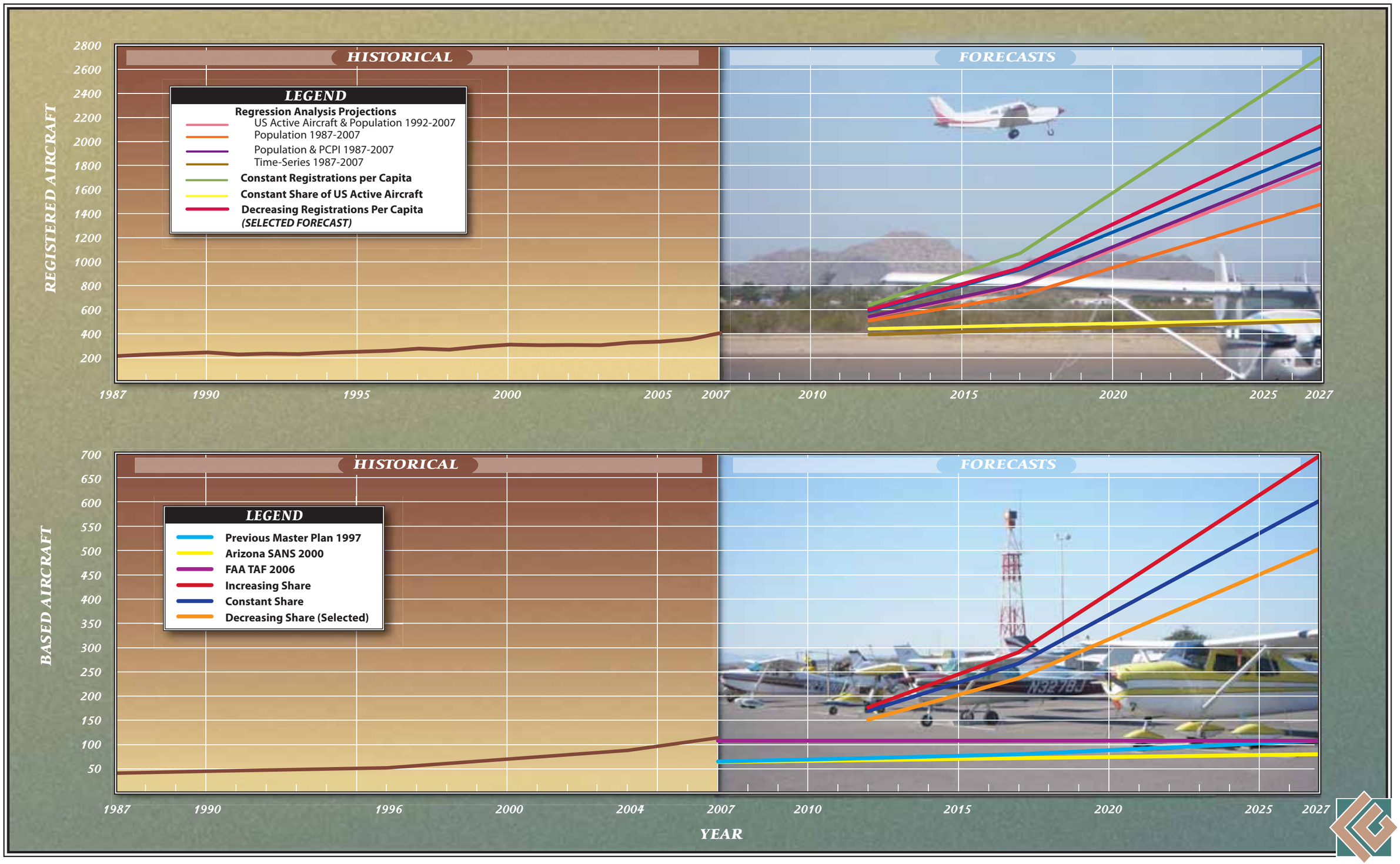


Exhibit 2B
REGISTERED AND BASED
AIRCRAFT FORECASTS

TABLE 2D
Updated Based Aircraft Projections
Casa Grande Municipal Airport

Year	County Registered Aircraft	Casa Grande Based Aircraft	% of Registered
1987	215	41	19.1%
1990	245	45	18.4%
1996	259	52	20.1%
2004	327	88	26.9%
2007	407	114	28.0%
Average Annual Increase		5.2%	
Constant Share Projection			
2012	600	168	28.0%
2017	946	265	28.0%
2027	2,134	598	28.0%
Average Annual Increase		8.6%	
Increasing Share Projection			
2012	600	175	29.2%
2017	946	288	30.4%
2027	2,134	690	32.3%
Average Annual Increase		9.5%	
Decreasing Share Projection (Selected Forecast)			
2012	600	150	25.0%
2017	946	235	24.8%
2027	2,134	500	23.4%
Average Annual Increase		7.7%	

Source: Based Aircraft – FAA TAF, 2006 (1987); Casa Grande Municipal Airport Master Plan, 1997 (1990, 1996); Airport Records, (2004); Airport Master Record, (2007)

A second forecast was prepared, which maintains the trend of an increasing market share. This forecast represents a high end projection based on great socioeconomic growth in the region and that other regional general aviation airports do not absorb as much of the market growth. This forecast results in 690 based aircraft by 2027.

A third forecast was prepared, which decreases Casa Grande Municipal Airport's market share of registered aircraft. This decreasing share projection results in a healthy 7.7 percent annual growth rate while taking into consideration the potential for an additional general aviation airport in Pinal County. The State of Arizona has recognized potential airport capacity issues in Pinal County based on the amount of growth the County is forecast to experience. A new airport in Pinal County is being considered to increase capacity. If another regional airport is constructed, it is reasonable to assume some market share will be lost. For this reason, the decreasing share projection was selected to represent based aircraft growth for this master plan

The selected based aircraft forecast is shown on **Exhibit 2B** compared to the previous projections as well as the updated projections. The selected forecast has based aircraft growing to 150 by 2012, 235 by 2017, and 500 by 2027 at an average annual growth rate of 7.7 percent.

BASED AIRCRAFT FLEET MIX

The based aircraft fleet mix at Casa Grande Municipal Airport, as shown on **Table 2E**, was compared to the existing and forecast U.S. general aviation fleet mix trends as presented in FAA *Aerospace Forecasts Fiscal Years 2008-2025*. The FAA expects business jets will continue to be the fastest growing general aviation aircraft type in the future. The number of business jets in the industry fleet is expected to almost double in the next 10 years. The influx of microjets on the market will also have a boosting affect on turbine aircraft sales. The affordability and versatility of this aircraft will make them an attractive aircraft to corporations and small business owners. Single engine piston aircraft (including sport aviation and experimental aircraft), helicopter, and turboprop aircraft are expected to grow at slower rates. The number of multi-engine piston aircraft in the U.S. will actually decline slightly as older aircraft are retired, according to FAA forecasts.

TABLE 2E
Based Aircraft Mix Forecast
Casa Grande Municipal Airport

	Base Year		2012		2017		2027	
	Number	%	Number	%	Number	%	Number	%
Casa Grande Municipal Airport Based Aircraft								
Single Engine Piston	101	88.6%	126	84.3%	191	81.1%	400	80.0%
Multi-Engine Piston	5	4.4%	7	4.7%	12	5.1%	20	4.0%
Turboprop	0	0.0%	3	2.0%	6	2.6%	20	4.0%
Jet	0	0.0%	3	2.0%	10	4.3%	25	5.0%
Rotorcraft	5	4.4%	7	4.4%	10	4.3%	22	4.4%
Other	3	2.6%	4	2.6%	6	2.6%	13	2.6%
Totals	**114**	**100.0%**	**150**	**100.0%**	**235**	**100.0%**	**500**	**100.0%**
U.S. Active Aircraft (from FAA Aerospace Fiscal Years [2008-2025])								
Single Engine Piston	171,200	76.1%	179,680	74.4%	190,010	73.3%	212,893	71.8%
Multi-Engine Piston	18,555	8.3%	17,725	7.3%	16,935	6.5%	15,370	5.2%
Turboprop	8,190	3.6%	8,855	3.7%	9,635	3.7%	11,191	3.8%
Jet	10,997	4.9%	16,590	6.9%	21,895	8.5%	33,038	11.1%
Rotorcraft	9,685	4.3%	12,270	5.1%	14,250	5.5%	17,881	6.0%
Other	6,380	2.8%	6,505	2.7%	6,435	2.5%	6,335	2.1%
Totals	**225,007**	**100.0%**	**241,625**	**100.0%**	**259,160**	**100.0%**	**296,708**	**100.0%**

Note: Experimental and sport aircraft are included under single engine piston.

GENERAL AVIATION OPERATIONS

General aviation (GA) operations are classified as either local or itinerant. A local operation is a take-off or landing performed by an aircraft that operates within sight of the airport, or which executes simulated approaches or touch-and-go operations at the airport. Itinerant operations are those performed by aircraft with a specific

origin or destination away from the airport. Generally, local operations are characterized by training operations. Typically, itinerant operations increase with business and commercial use, since business aircraft are operated on a higher frequency.

Casa Grande Municipal Airport operations are comprised mainly of GA operations. Since Casa Grande Municipal Airport is not a towered airport, precise operations records are not available. However, an observational traffic count was conducted by members of the Experimental Aircraft Association (EAA) Chapter 1445 and other volunteers during the month of June in 2008 from 6:30 a.m. to 7:00 p.m. daily. The results of this traffic count are included in **Appendix C**. From this traffic count, annual estimates of activity were extrapolated resulting in an estimated 93,504 annual general aviation operations. To account for night time operations an estimated ten percent was added to the annual total. It was also noted that June typically is a slower month than most during the year. To determine an appropriate figure to account for busier months, operational activity reported from the airport traffic control tower at Chandler Municipal Airport was analyzed. It was determined that the month of June experiences ten percent fewer operations than the average month during the year. Therefore an additional ten percent was added to the annual estimate for Casa Grande Municipal Airport. Casa Grande is also host to two annual fly-in events that generate an average of 6,000 itinerant general aviation operations each year. Using this data, a base year general aviation operational level was established at 117,282.

ITINERANT OPERATIONS

Table 2F depicts estimated GA itinerant operations at Casa Grande Municipal Airport for 2007. This data shows a market share of 0.563 percent of all general aviation itinerant operations reported at airports with an airport traffic control tower. This also equates to 917 itinerant operations per based aircraft, which is considerably higher than other general aviation airports in the region such as Ryan Airfield (249), Chandler Municipal Airport (235), and Marana Regional Airport (101).

TABLE 2F
General Aviation Itinerant Operations Forecast
Casa Grande Municipal Airport

Year	Itinerant Operations	U.S. ATCT GA Itinerant (millions)	Casa Grande Market Share	Casa Grande Based Aircraft	Itinerant Ops Per Based Aircraft
2007	104,562	18.58	0.563%	114	917
Constant Market Share Projection					
2012	112,206	19.94	0.563%	150	748
2017	121,818	21.64	0.563%	235	518
2027	145,255	25.81	0.563%	500	291
Operations Per Based Aircraft Projection					
2012	137,581	19.94	0.690%	150	917
2017	215,544	21.64	0.996%	235	917
2027	458,604	25.81	1.777%	500	917
FAA-TAF Projection					
2012	8,700	19.94	0.044%	108	81
2017	8,700	21.64	0.040%	108	81
2027	8,700	25.81	0.034%	108	81
Master Plan Forecast					
2012	114,750	19.94	0.576%	150	765
2017	159,500	21.64	0.737%	235	679
2027	250,000	25.81	0.969%	500	500

In FAA *Aerospace Forecasts Fiscal Years 2008-2025*, the FAA projects itinerant GA operations at towered airports. **Table 2F** presents this forecast, as well as a projection for Casa Grande Municipal Airport, based upon maintaining its current share of the itinerant GA operations market. This forecast has itinerant operations exceeding 145,200 by 2027.

The table also displays the findings of an analysis that examined the relationship of annual operations to based aircraft. The second projection in **Table 2F** reflects the itinerant operational levels that could be expected if the operations per based aircraft ratio were to remain constant into the future. This forecast results in over 458,600 itinerant GA operations by 2027.

The selected master plan itinerant GA operations forecast takes into account the growth potential associated with the expansion of the Phoenix metropolitan area. As the Casa Grande community and economy grows, Casa Grande Municipal Airport's market share of itinerant GA operations should also grow. Also, as the airport facilities and services improve over the planning period, it can be expected that more itinerant GA aircraft will choose to utilize Casa Grande Municipal Airport over other airports in the region. In addition, as the based aircraft level rises, the ratio of itinerant GA operations to based aircraft should lower to a level more relative to GA airports in the region. The selected master plan forecast, shown at the bottom of **Table 2F**, has itinerant GA operations at Casa Grande Municipal Airport growing to 114,750 by 2012, 159,500 by 2017, and 250,000 by 2027.

LOCAL OPERATIONS

A similar methodology was utilized to forecast local GA operations. **Table 2G** depicts estimated local operations at Casa Grande Municipal Airport in 2007 and examines its market share of GA local operations at towered airports in the United States. In 2007, Casa Grande Municipal Airport experienced 0.087 percent of all local GA operations at towered airports. This also equates to 112 local GA operations per based aircraft, which is significantly lower than regional GA airports such as Ryan Airfield (245), Chandler Municipal Airport (484), and Marana Regional Airport (576)

Table 2G presents a market share projection based upon carrying forward a constant share of 0.087 percent. This projection results in 14,916 local GA operations by 2027.

The second projection in **Table 2G** examines local operations based on the operations per based aircraft remaining static at 112 through the planning period. This projection results in 55,789 local operations by 2027.

TABLE 2G
General Aviation Local Operations Forecast
Casa Grande Municipal Airport

Year	Local Operations	U.S. ATCT GA Local (millions)	Casa Grande Market Share	Casa Grande Based Aircraft	Local Ops Per Based Aircraft
2007	12,720	14.56	0.087%	114	112
Constant Market Share Projection					
2012	13,318	15.24	0.087%	150	89
2017	13,553	15.51	0.087%	235	58
2027	14,916	17.07	0.087%	500	30
Operations Per Based Aircraft Projection					
2012	16,737	15.24	0.110%	150	112
2017	26,221	15.51	0.169%	235	112
2027	55,789	17.07	0.327%	500	112
FAA-TAF Projection					
2012	87,000	15.24	0.571%	108	806
2017	87,000	15.51	0.561%	108	806
2027	87,000	17.07	0.510%	108	806
Master Plan Forecast					
2012	18,630	15.24	0.122%	150	124
2017	33,440	15.51	0.216%	235	142
2027	75,000	17.07	0.439%	500	150

It is anticipated that Casa Grande Municipal Airport will continue to be used extensively by Phoenix area flight training operators. This is due to its ILS approach system and its location away from the busy Class B airspace surrounding Phoenix Sky Harbor Airport. Based on the airport's continued training use, Casa Grande Municipal Airport's market share of local operations and local GA operations per based aircraft should increase through the planning period. The selected master plan local GA operations forecast, shown at the bottom of **Table 2G**, has local GA operations growing to 18,630 by 2012, 33,440 by 2017, and 75,000 by 2027.

GENERAL AVIATION OPERATIONS SUMMARY

Table 2H depicts estimated 2007 GA operations at Casa Grande Municipal Airport, as well as the updated Master Plan projections. Total GA operations are projected to reach 325,000 annually by 2027. This is a growth rate of 5.2 percent over the planning period.

TABLE 2H
General Aviation Operations Forecast Summary
Casa Grande Municipal Airport

Year	Total Operations	Itinerant Operations	Local Operations	Based Aircraft	Itinerant Ops/BA	Local Ops/BA
2007	117,282	104,562	12,720	114	917	112
Forecast						
2012	133,380	114,750	18,630	150	765	124
2017	192,940	159,500	33,440	235	679	142
2027	325,000	250,000	75,000	500	500	150

MILITARY

Military operations account for the smallest portion of the operational traffic at Casa Grande Municipal Airport. Military activity has been estimated at approximately 1,900 operations annually. Unless there is an unforeseen mission change in the area, a significant change from these military operational levels is not anticipated. Therefore, annual military operations have been projected at 1,900 throughout the planning period. This is consistent with typical industry practices for projecting military operations.

ANNUAL INSTRUMENT APPROACHES (AIAs)

Forecasts of annual instrument approaches provide guidance in determining an airport's requirements for navigational aid facilities. An instrument approach as defined by the FAA is "an approach to an airport with 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."

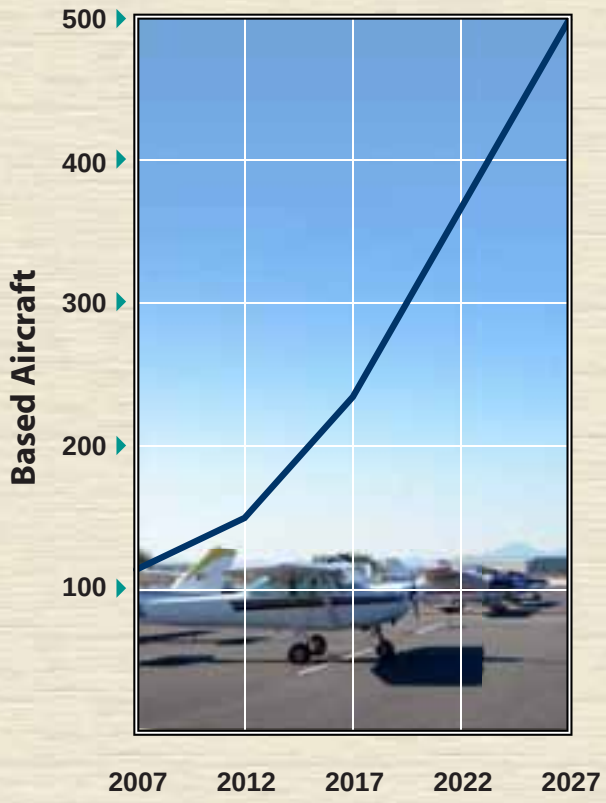
Data on instrument approaches to Casa Grande Municipal Airport since 1997 were examined. True instrument weather conditions are not a common occurrence at Casa Grande Municipal Airport. In fact, most years conclude with no AIAs being reported. The highest AIAs reported occurred in 1998 with 37. Based on this historical data, AIAs are forecast to remain below 100 operations annually through the planning period.

SUMMARY

This chapter has outlined the various activity levels that might reasonably be anticipated over the planning period. **Exhibit 2C** is a summary of the aviation forecasts prepared in this chapter. Actual activity is included for 2007, which was the base year for these forecasts.

07MP05-2C-12/3/09

	Base Year 2007	2012	2017	2027
BASED AIRCRAFT				
Single Engine	101	126	191	400
Multi-Engine	5	7	12	20
Turboprop	0	3	6	20
Jet	0	3	10	25
Rotorcraft	5	7	10	22
Other	3	4	6	13
Total Based Aircraft	**114**	**150**	**235**	**500**
OPERATIONS				
Itinerant General Aviation	104,562	114,750	159,500	250,000
Local General Aviation	12,720	18,630	33,440	75,000
Total General Aviation	**117,282**	**133,380**	**192,940**	**325,000**
Military	1,900	1,900	1,900	1,900
Total Operations	**119,182**	**135,280**	**194,840**	**326,900**



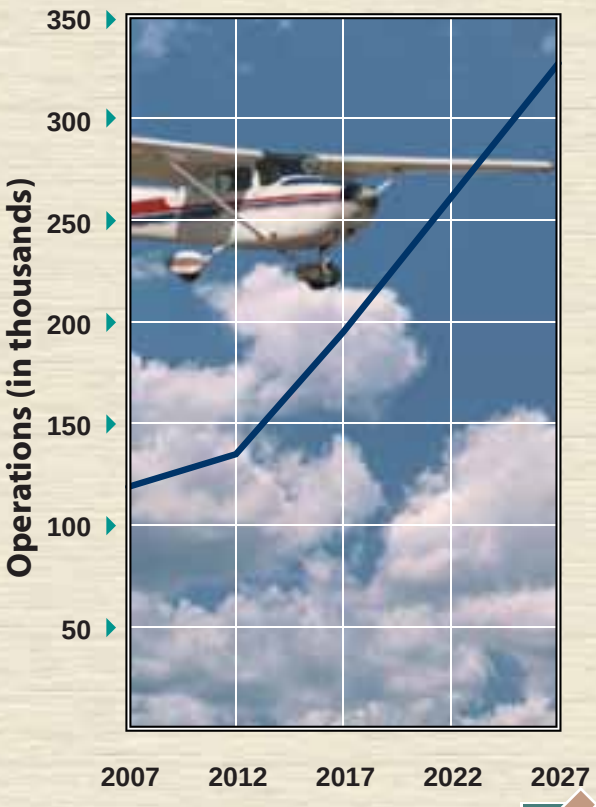


Exhibit 2C
FORECAST SUMMARY

Based aircraft at Casa Grande Municipal Airport are expected to see strong growth over the planning period, but the extent of that growth will be dependent upon the availability of services and facilities (especially hangars) in the future.

The next step in the planning process is to assess the capabilities of the existing facilities to determine what upgrades may be necessary to meet future demands. The forecasts developed here will be taken forward in the next chapter as planning horizon activity levels that will serve as milestones or activity benchmarks in evaluating facility requirements. Peak activity characteristics will also be determined for the various activity levels for use in determining facility needs.

Chapter Three

FACILITY REQUIREMENTS

Facility Requirements

To properly plan for the future of Casa Grande Municipal Airport, it is necessary to translate forecast aviation demand into the specific types and quantities of facilities that can adequately serve projected demand levels. This chapter uses the results of the forecasts prepared in Chapter Two, as well as established planning criteria, to determine the airfield (i.e., runways, taxiways, navigational aids, marking and lighting) and landside (i.e., hangars, general aviation terminal, aircraft parking apron, fueling, automobile parking and access) facility requirements.

The objective of this effort is to identify, in general terms, the adequacy of the existing airport facilities and outline what new facilities may be needed as well as when they may be needed to accommodate forecast demands. Having established these facility requirements, alternatives for providing these facilities will be evaluated in Chapter Four to determine the most cost-effective and efficient means for implementation.

PLANNING HORIZONS

The cost-effective, safe, efficient, and orderly development of an airport should rely more upon actual demand at an airport than a time-based forecast figure. Thus, in order to develop a master plan that is demand-based rather than time-based, a series of planning horizon milestones have been established that take into consideration the reasonable range of aviation demand projections. Over time, the actual activity at the airport may be higher or lower than the an-

nualized forecast portrays. By planning according to activity milestones, the resultant plan can accommodate unexpected shifts or changes in the aviation demand in a timely fashion. The demand-based schedule provides flexibility in development, as the schedule can be slowed or expedited according to actual demand at any given time over the planning period. The resultant plan provides airport officials with a financially responsible and needs-based program. **Table 3A** presents the planning horizon milestones for each activity demand category.

TABLE 3A
Aviation Demand Planning Horizons
Casa Grande Municipal Airport

	2007	Short Term (± 5 Years)	Intermediate Term (± 10 Years)	Long Term (± 20 Years)
ANNUAL OPERATIONS				
General Aviation				
Itinerant	104,562	114,750	159,500	250,000
Local	12,720	18,630	33,440	75,000
Military	1,900	1,900	1,900	1,900
TOTAL OPERATIONS	119,182	133,380	192,940	326,900
Based Aircraft	114	150	235	500

PEAKING CHARACTERISTICS

Airport capacity and facility needs analyses typically relate to the levels of activity during a peak or design period. The periods used in developing the capacity analyses and facility requirements in this study are as follows:

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

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

- **Busy Day** - The busy day of a typical week in the peak month. This descriptor is used primarily to determine general aviation transient ramp space requirements.

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

It is important to note that only the peak month is an absolute peak within a given year. All other peak periods will be exceeded at various times during the year. However, they do represent reasonable planning standards that can be applied without overbuilding or being too restrictive.

General Aviation Itinerant Operations Peak Periods

General aviation itinerant peak operational characteristics were also included in this analysis. Based on activity at towered general aviation airports in the region, it has been deter-

mined that the peak month typically ranges between 10 and 15 percent of annual operations. Therefore, the current peak month for itinerant operations was estimated to be 12 percent of the annual itinerant operations. This ratio was kept constant through the planning period. Busy day operations were calculated at 1.3 times design day operations. This ratio can be expected to decline as activity increases and becomes more balanced throughout the week. Design hour operations were calculated at 18 percent of design day operations in 2007. This percentage can also be expected to decline slightly as activity increases over the long term. **Table 3B** summarizes the peak operations forecast for the airport.

TABLE 3B
Peaking Characteristics
Casa Grande Municipal Airport

	2007	Short Term (± 5 Years)	Intermediate Term (± 10 Years)	Long Term (± 20 Years)
OPERATIONS				
Total Operations				
Annual	119,182	135,280	194,840	326,900
Peak Month	14,302	16,234	23,381	39,228
Design Day	461	524	754	1,265
Busy Day	600	670	950	1,556
Design Hour	83	84	106	165
Itinerant General Aviation Operations				
Annual	104,562	114,750	159,500	250,000
Peak Month	12,547	13,770	19,140	30,000
Design Day	405	444	617	968
Busy Day	526	569	778	1,190
Design Hour	73	71	86	126

AIRFIELD CAPACITY

Airfield capacity is measured in a variety of different ways. The **hourly capacity** measures the maximum number of aircraft operations that can take place in an hour. The **annual service volume (ASV)** is an annual level of service that may be used to define airfield capacity needs. **Aircraft delay** is the total delay incurred by aircraft using the airfield during a given timeframe. FAA Advisory Circular 150/5060-5, *Airport Capacity and Delay*, provides a methodology for examining the operational capacity of an airfield for planning purposes. This analysis takes into account specific factors about the airfield. These various factors are depicted in **Exhibit 3A**. The following describes the input factors as they relate to Casa Grande Municipal Airport:

- **Runway Configuration** – The existing airfield layout consists of a single runway (5-23) aligned northeast-southwest with a length of 5,200 feet. Each runway end is equipped with taxiway access, and Runway 5 is equipped for precision instrument approaches. Runway 23 has a non-precision instrument approach.

- **Runway Use** – Runway 5 is used considerably more than Runway 23 due to a large number of training operations that utilize Runway 5's instrument landing system (ILS) for practice instrument approaches.

- **Exit Taxiways** - Based upon mix, taxiways located between 2,000 and 4,000 feet from the landing threshold count in the exit rating for each runway. There is currently one exit available within this range for Runway 5-23.

- **Weather Conditions** – The airport operates under visual meteorological conditions (VMC) 99.8 percent of the time. Instrument meteorological conditions (IMC) occur when cloud ceilings are between 500 and 1,000 feet and visibility is between one and three statute miles. Poor visibility conditions (PVC) apply for minimums below 500 feet and one mile. IMC and PVC are negligible for this analysis.

- **Aircraft Mix** - Descriptions of the classifications and the percentage mix for each planning horizon are presented in **Table 3C**.

- **Percent Arrivals** - Generally follows the typical 50-50 percent split with departures.

- **Touch-and-Go Activity** - Percentages of touch-and-go activity are presented in **Table 3C**.

- **Operational Levels -** Operational planning horizons were outlined in the previous section of this chapter. The peak month averages 12 percent of the year. The design hour currently averages 18 percent of the operations in a day.

TABLE 3C
Aircraft Operational Mix – Capacity Analysis
Casa Grande Municipal Airport

Aircraft Classification	Base Year 2007	Short Term (± 5 Years)	Intermediate Term (± 10 Years)	Long Term (± 20 Years)
Classes A & B	99.4%	99.0%	98.6%	97.5%
Class C	0.5%	0.8%	1.1%	1.6%
Class D	0.1%	0.2%	0.3%	0.5%
Touch-and-Go's	8.1%	10.5%	15.0%	17.3%

Definitions:
Class A: Small single-engine aircraft with gross weight of 12,500 pounds or less.
Class B: Small twin-engine aircraft with gross weight of 12,500 pounds or less.
Class C: Large aircraft with gross weights over 12,500 pounds up to 300,000 pounds.
Class D: Large aircraft with gross weights over 300,000 pounds.

HOURLY RUNWAY CAPACITY

The first step in determining overall airfield capacity involves the computation of the hourly capacity of each runway use configuration. Wind direction; the percentage use of each runway configuration in VFR, IFR,

AIRFIELD LAYOUT

Runway Configuration

Runway Use

Number of Exits

WEATHER CONDITIONS

VMC

IMC

PVC

AIRCRAFT MIX

A&B

C

D

OPERATIONS

Arrivals and Departures

Total Annual Operations

Touch-and-Go Operations

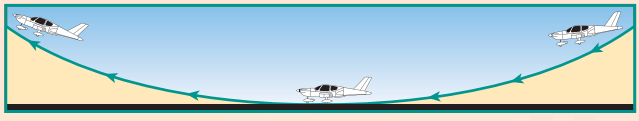


Exhibit 3A
AIRFIELD CAPACITY FACTORS

and PVC weather conditions; the amount of touch-and-go training activity; and the number and locations of runway exits become important factors in determining the hourly capacity of each runway configuration.

Considering the existing airfield configuration, the current aircraft mix, percentage of touch-and-go operations, and the exit taxiway ratings of each existing runway, the existing hourly capacity of each potential runway use configuration was computed. The existing maximum hourly capacity during VFR conditions totaled 96.8 operations per hour.

As indicated on **Table 3C**, the percentage of Class C and D aircraft can be expected to increase slightly through the long range planning horizon. This contributes to a slight decline in the hourly capacity over the long term planning horizon.

The weighted hourly capacity reflects the average capacity of the airfield taking into account VMC, IMC, and PVC conditions. The current and future weighted hourly capacities are depicted in **Table 3D**. At Casa Grande Municipal Airport, the current weighted hourly capacity is 96.8 operations. This is expected to increase slightly to 98.2 operations in the long term. This falls well below the design hour demand of 165 operations expected in the long term.

TABLE 3D
Aircraft Operational Mix – Capacity Analysis
Casa Grande Municipal Airport

	Base Year 2007	Short Term (± 5 Years)	Intermediate Term (± 10 Years)	Long Term (± 20 Years)
Operational Demand				
Annual	119,182	135,280	194,840	326,900
Design Hour	83	84	106	165
Capacity				
Annual Service Volume	139,000	164,000	185,000	195,000
Weighted Hourly Capacity	96.8	101.3	100.3	98.2
Percent Capacity	85.7%	82.5%	105.3%	167.6%
Delay				
Per Operation (Min.)	1.15	1.05	3.10	14.60
Total Annual (Hrs.)	2,300	2,400	10,100	79,500

ANNUAL SERVICE VOLUME

The weighted hourly capacity is utilized to determine the annual service volume in the following equation:

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

C = weighted hourly capacity;
D = ratio of annual demand to the average daily demand during the peak month; and
H = ratio of average daily demand to the design hour demand during the peak month.

The ratio of annual demand to average daily demand (D) at Casa Grande Municipal Airport was determined to remain relatively constant in the future at 258. The ratio of average daily demand to average peak hour demand (H) was determined to currently be 5.56. This ratio will grow to 7.69 over the long term as peaks spread slightly with increased operations.

The current ASV was determined to be 139,000 operations. Slight changes in the weighted hourly capacity and in the daily and hourly demand ratios result in a slight increase in the ASV as activity increases. The ASV for the long term was calculated to be 195,000.

Annual operations for the long term planning horizon are forecast to reach 326,900, which would be 167.6 percent of the airport's ASV. **Table 3D** and **Exhibit 3B** summarize and compare the airport's ASV and projected annual operations over the planning horizons.

AIRCRAFT DELAY

As the number of annual aircraft operations approaches the airfield's capacity, increasing amounts of delay to aircraft operations begin to occur. Delays occur to arriving and departing aircraft in all weather conditions. Arriving aircraft delays result in aircraft holding outside the airport traffic area. Departing aircraft delays result in aircraft holding at the runway end until the runway is clear.

Table 3D summarizes the aircraft delay analysis conducted for Casa Grande Municipal Airport. The delay per operation represents an average delay per aircraft. It should be noted that delays of five to ten times the average could be experienced by individual aircraft during peak periods. Current total annual aircraft delay is 2,300 hours. As an airport's operations increase toward the annual service volume, delay increases exponentially. Analysis of delay factors for the long term planning horizon indicates that annual delay could potentially reach 79,500 hours.

CAPACITY ANALYSIS CONCLUSIONS

Exhibit 3B compares annual service volume to existing and forecast operational levels at Casa Grande Municipal Airport. The current operational level represents 85.7 percent of the airfield's annual service volume. By the long term planning horizon, total annual operations are expected to represent 167.6 percent of annual service volume.

FAA Order 5090.3C, *Field Formulation of the National Plan of Integrated Airport Systems* (NPIAS), indicates that improvements for airfield capacity purposes should begin to be considered once operations reach 60 to 75 percent of the annual service volume. Casa Grande Municipal Airport is currently beyond this range and will exceed 100 percent in the intermediate term planning horizon. Since the in-

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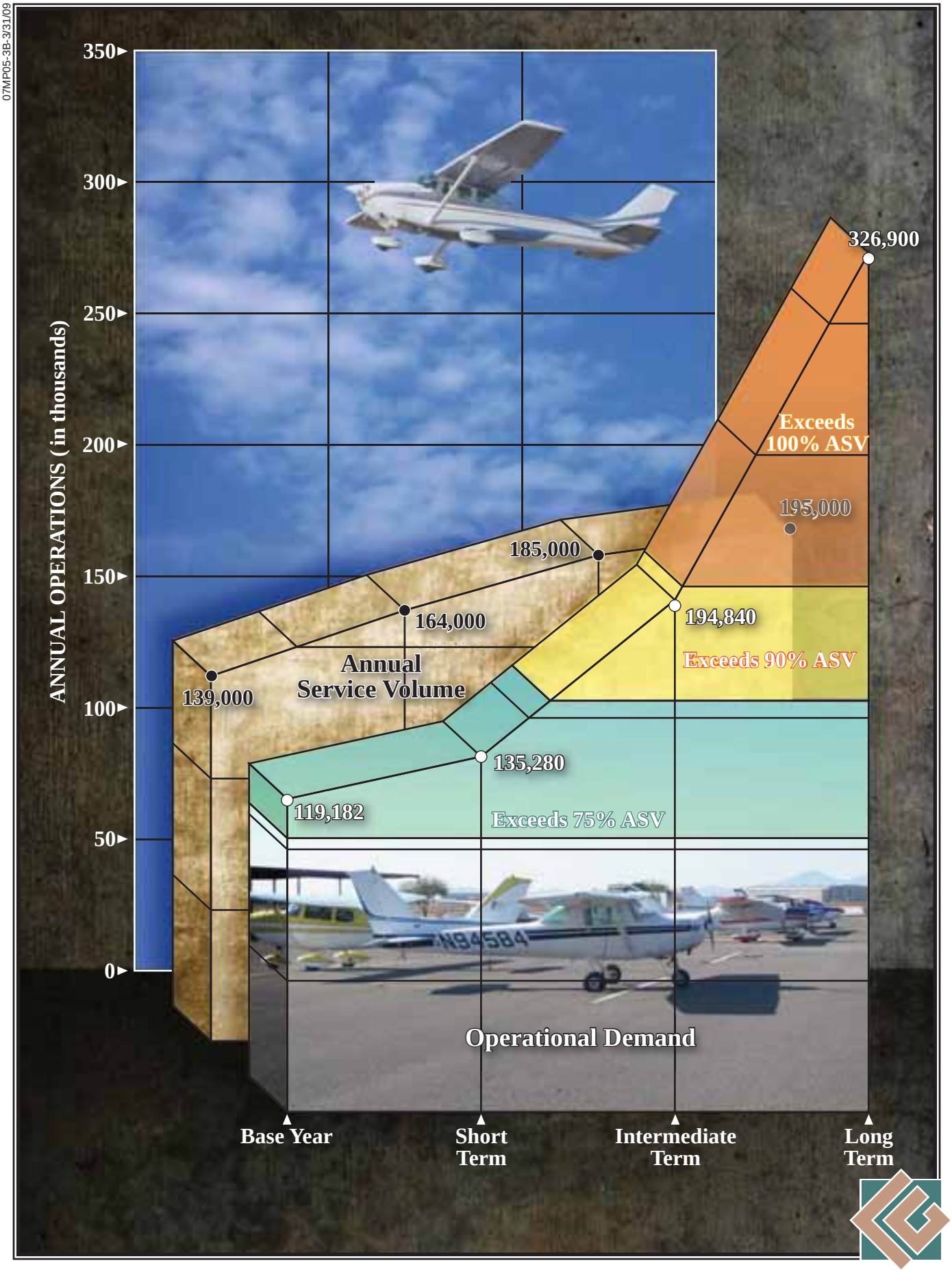

Exhibit 3B
AIRFIELD DEMAND
VS. CAPACITY

termediate and long-range operational forecasts surpass the annual service volume level, capacity improvements such as the construction of a second runway and additional taxiway exits will need to be considered to mitigate aircraft delays and other congestion issues through the planning period.

CRITICAL AIRCRAFT

The selection of appropriate FAA design standards for the development and location of airport facilities is based primarily upon the characteristics of the aircraft which are currently using or are expected to use the airport. The critical design aircraft is defined as the most demanding category of aircraft, or family of aircraft, which conducts at least 500 itinerant operations per year at the airport. Planning for future aircraft use is of particular importance since design standards are used to plan separation distances between facilities. These future standards must be considered now to ensure that short term development does not preclude the long term potential needs of the airport.

The FAA has established a coding system to relate airport design criteria to the operational and physical characteristics of aircraft expected to use the airport. This airport reference code (ARC) has two components. The first component, depicted by a letter, is the aircraft approach category and relates to aircraft approach speed (operational characteristic); the second component, depicted by a Roman numeral, is the airplane design group and relates to aircraft wingspan (physical characteristic). Generally, aircraft approach speed applies to runways and runway-related facilities, while airplane wingspan primarily relates to separation criteria involving taxiways, taxilanes, and landside facilities.

According to FAA Advisory Circular (AC) 150/5300-13, *Airport Design*, an aircraft's approach category is based upon 1.3 times its stall speed in landing configuration at that aircraft's maximum certificated weight. The five approach categories used in airport planning are as follows:

Category A: Speed less than 91 knots.

Category B: Speed 91 knots or more, but less than 121 knots.

Category C: Speed 121 knots or more, but less than 141 knots.

Category D: Speed 141 knots or more, but less than 166 knots.

Category E: Speed greater than 166 knots.

The airplane design group (ADG) is based upon the aircraft's wingspan. The six ADGs used in airport planning are as follows:

Group I: Up to but not including 49 feet.

Group II: 49 feet up to but not including 79 feet.

Group III: 79 feet up to but not including 118 feet.

Group IV: 118 feet up to but not including 171 feet.

Group V: 171 feet up to but not including 214 feet.

Group VI: 214 feet or greater.

Exhibit 3C summarizes representative aircraft by ARC.

The FAA advises designing airfield facilities to meet the requirements of the airport's most demanding aircraft, or critical aircraft. An aircraft or group of aircraft within a particular Approach Category or ADG must conduct more than 500 itinerant operations annually to be considered the critical design aircraft. In order to determine facility requirements, an ARC should first be determined, and then appropriate airport design criteria can be applied. This begins with a review of aircraft currently using the airport and those expected to use the airport through the planning period.

Casa Grande Municipal Airport is currently used by a variety of general aviation aircraft. General aviation aircraft using the airport include single and multi-engine aircraft less than 12,500 pounds, which fall within Approach Categories A and B and ADG I and II. Occasionally, aircraft in Approach Categories C and D use the airport (such as the Cessna Citation X, and the Gulfstream IV). A review of completed instrument flight plans for calendar years 2004, 2005, 2006, and 2007, reveal that turbojet aircraft averaged 110 operations annually during this period. However, airport staff estimates over 1,000 annual operations by turbojet aircraft.

All based aircraft currently fall within ARC A-I and B-I. Representative based aircraft include single-engine Cessna aircraft, although numerous other aircraft makes and models are based at the airport.

The aviation demand forecasts projected the mix of aircraft to use the airport to consist of mainly the single-engine and multi-engine piston-powered aircraft, which fall within Approach Categories A and B and ADGs I and II. The turboprop aircraft projected to base at the airport in the future would fall within similar categories up to Approach Category C. While 25 turbojet aircraft are projected to base at the airport by the end of the planning period, business jet aircraft can include a wide range of Approach Categories and ADGs. The newest microjets being developed fall within ARC B-I. The most common business jet in use today, the Cessna Citation, falls within Approach Categories B and C in ADG II. Some larger, faster business jets fall within ARCs C-I, C-II, D-I, and D-II.

As the Phoenix metropolitan area expands towards Casa Grande Municipal Airport, business jet use of the airport is expected to increase. It can be anticipated that business jet aircraft in Approach Categories C and D will conduct 500 or more annual itinerant operations at the airport. The previous master plan established ultimate ARC D-II design standards for the airport to accommodate this poten-

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A-I

- Beech Baron 55
- Beech Bonanza
- Cessna 150
- Cessna 172
- Cessna Citation Mustang
- **Eclipse 500**
- Piper Archer
- Piper Seneca

B-I *less than 12,500 lbs.*

- Beech Baron 58
- Beech King Air 100
- Cessna 402
- **Cessna 421**
- Piper Navajo
- Piper Cheyenne
- Swearingen Metroliner
- Cessna Citation I

B-II *less than 12,500 lbs.*

- **Super King Air 200**
- Cessna 441
- DHC Twin Otter

B-I, B-II *over 12,500 lbs*

- Super King Air 300
- Beech 1900
- Jetstream 31
- Falcon 10, 20, 50
- Falcon 200, 900
- **Citation II**, III, IV, V
- Saab 340
- Embraer 120

A-III, B-III

- DHC Dash 7
- **DHC Dash 8**
- DC-3
- Convair 580
- Fairchild F-27
- ATR 72
- ATP

C-I, D-I

- Beech 400
- **Lear** 25, 31, **35**, 45, 55, 60
- Israeli Westwind
- HS 125-400, 700

C-II, D-II

- Cessna Citation III, VI, VIII, X
- **Gulfstream** II, III, **IV**
- Canadair 600
- ERJ-135, 140, 145
- CRJ-200, 700, 900
- Embraer Regional Jet
- Lockheed JetStar
- Super King Air 350

C-III, D-III

- ERJ-170, 190
- Boeing Business Jet
- B 727-200
- **B 737-300 Series**
- MD-80, DC-9
- Fokker 70, 100
- A319, A320
- Gulfstream V
- Global Express

C-IV, D-IV

- **B-757**
- B-767
- C-130
- DC-8-70
- DC-10
- MD-11
- L1011

D-V

- **B-747** Series
- B-777

Note: Aircraft pictured is identified in bold type.

tial business jet activity. The current airfield is designed to ARC B-II standards. This Master Plan recognizes the potential for growth in business jet operations during the period of this Master Plan. Therefore, even though the majority of based aircraft are expected to fall within ARC B-II or below in the future, Casa Grande Municipal Airport should establish and maintain ARC D-II design standards through the planning period.

AIRFIELD REQUIREMENTS

The analyses of the operational capacity and the critical design aircraft are used to determine airfield needs. This includes runway configuration, dimensional standards, and pavement strength, as well as navigational aids and lighting.

RUNWAY CONFIGURATION

Key considerations in the runway configuration of an airport involve the orientation for wind coverage and the operational capacity of the runway system. The airfield capacity analysis indicated that additional airfield capacity will need to be considered through the long-term planning horizon. If a second runway is to be built, its orientation (crosswind or parallel) on the airfield should be based on the wind coverage.

FAA Advisory Circular 150/5300-13, Change 12, *Airport Design,* recommends that a crosswind runway should be made available when the primary runway orientation provides less than 95 percent wind coverage for any aircraft forecast to use the airport on a regular basis. The 95 percent wind coverage is computed on the basis of the crosswind component not exceeding 10.5 knots (12 mph) for ARC A-I and B-I; 13 knots (15 mph) for ARC A-II and B-II; 16 knots (18 mph) for ARC A-III, B-III, and C-I through D-II; and 20 knots (23 mph) for ARC C-III through D-IV.

Ten years (1998-2007) of accumulated wind data was collected from the Casa Grande Automated Weather Observation System (AWOS) was used to produce a wind rose for Casa Grande Municipal Airport. This data is graphically depicted on the wind rose in **Exhibit 3D**.

Runway 5-23 provides 97.9 percent coverage for 10.5 knot crosswinds, 99.1 percent coverage for 13 knot crosswinds, 99.8 percent coverage for 16 knot crosswinds, and 99.9 percent coverage for 20 knot crosswinds. Based on this data, Runway 5-23 meets the 95 percent wind coverage standard for all aircraft using the airport. Thus, the existing runway configuration has adequate wind coverage for all sizes and speeds of aircraft. As a result, a potential second runway should be oriented in the same manner (parallel) as the existing Runway 5-23.

RUNWAY DIMENSIONAL REQUIREMENTS

Runway dimensional standards include the length and width of the runway, as well as the dimensions as-

sociated with runway safety areas and other clearances. These requirements are based upon the design aircraft, or group of aircraft. The runway length must consider the performance characteristics of individual aircraft types, while the other dimensional standards are generally based upon the most critical airport reference code expected to use the runway. Dimensional standards are outlined for the planning period for Runway 5-23 and a potential second runway.

Runway Length

The aircraft performance capability is a key factor in determining the runway length needed for takeoff and landing. The performance capability and, subsequently, the runway length requirement of a given aircraft type can be affected by the elevation of the airport, the air temperature, the gradient of the runway, and the operating weight of the aircraft.

The airport elevation at Casa Grande Municipal Airport is 1,464 feet above mean sea level (MSL). The mean maximum daily temperature during the hottest month is 106.6 degrees Fahrenheit. The gradient for the primary runway is 0.3 percent.

Table 3E outlines the runway length requirements for various classifications of general aviation aircraft specific to Casa Grande Municipal Airport. These were derived utilizing the FAA Airport Design Computer Program. This program uses performance figures provided in AC 150/5325-4B, *Runway Length Requirements for Airport Design*. These runway lengths are based upon groupings or "families" of aircraft. As discussed earlier, the runway design required should be based upon the most critical family of aircraft with at least 500 annual itinerant operations.

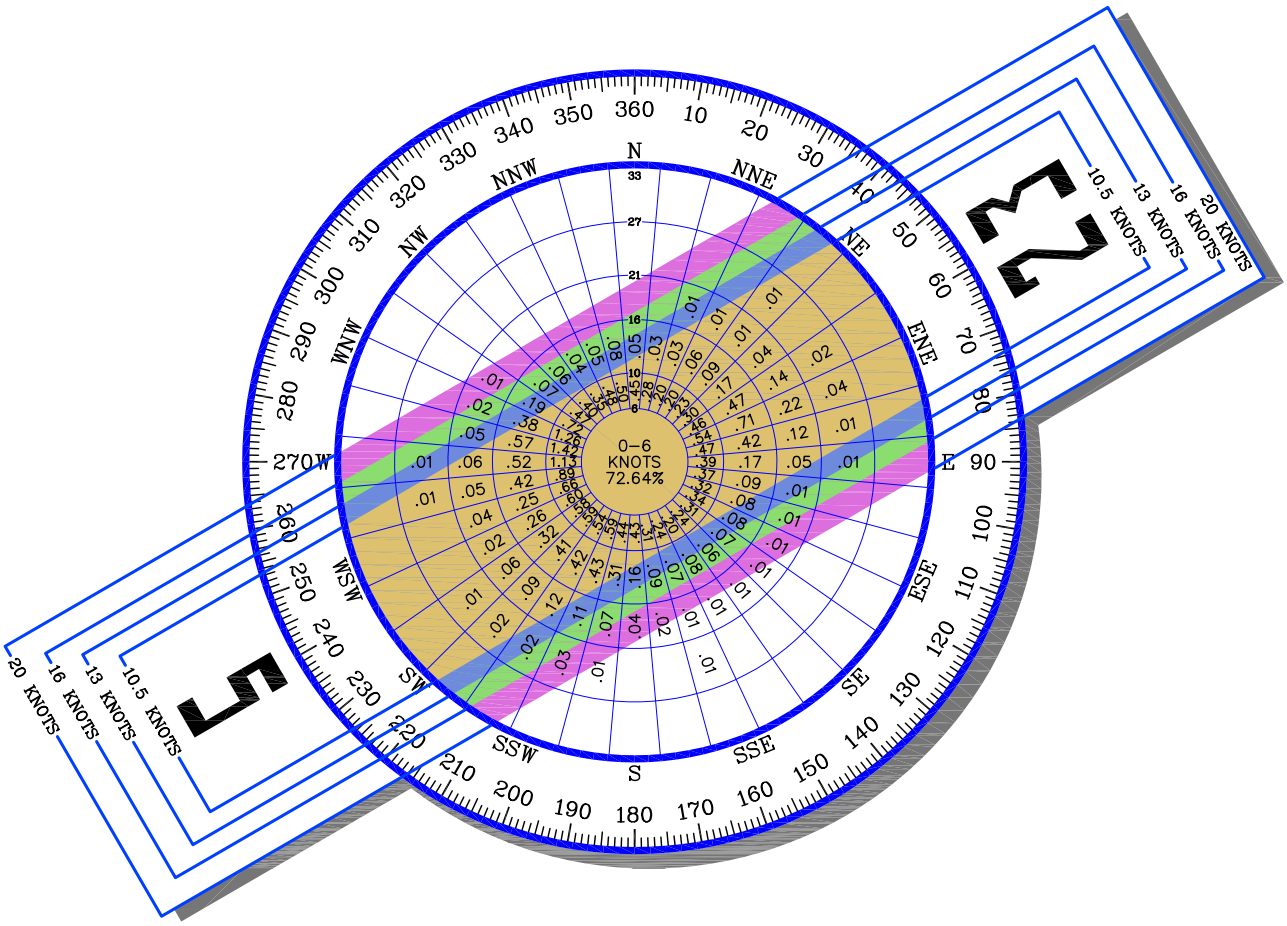
TABLE 3E
General Aviation Runway Length Requirements
Casa Grande Municipal Airport

AIRPORT AND RUNWAY DATA	
Airport elevation	1,464 feet
Mean daily maximum temperature of the hottest month	106.6 F
Maximum difference in runway centerline elevation	17 feet
RUNWAY LENGTHS RECOMMENDED FOR AIRPORT DESIGN	
Small airplanes with less than 10 passenger seats	
75 percent of these small airplanes	3,200 feet
95 percent of these small airplanes	**3,800 feet**
100 percent of these small airplanes	4,500 feet
Small airplanes with 10 or more passenger seats	4,900 feet
Large airplanes of 60,000 pounds or less	
75 percent of these large airplanes at 60 percent useful load	5,400 feet
100 percent of these large airplanes at 60 percent useful load	7,300 feet
75 percent of these large airplanes at 90 percent useful load	**8,400 feet**
100 percent of these large airplanes at 90 percent useful load	11,200 feet

Chapter Two of AC 150/5325-4B, *Runway Length Requirements for Airport Design*, no changes included.

ALL WEATHER WIND COVERAGE

Runways	10.5 Knots	13 Knots	16 Knots	20 Knots
Runway 5-23	*97.93%*	*99.10%*	*99.77%*	*99.95%*



NORTH

Magnetic Variance
11° 08' East (March 2008)
Annual Rate of Change
00° 06' West (March 2008)

SOURCE:
NOAA National Climatic Center
Asheville, North Carolina
Casa Grande Municipal Airport (CGZ)
Casa Grande, Arizona

OBSERVATIONS:
81,239 All Weather Observations
1998-2007

Exhibit 3D
WIND ROSE

Small aircraft are defined as aircraft weighing 12,500 pounds or less. Small airplanes make up the vast majority of general aviation activity at Casa Grande Municipal Airport and most other general aviation airports. In particular, piston-powered aircraft make up the majority of the small airplane operations.

According to the table, the present primary runway length of 5,200 feet is adequate to accommodate all small airplanes. This includes all small aircraft in the ARC B-II category and some business jet aircraft. Future fleet mix is anticipated to include more business jets that fall in the large airplane category. To accommodate 100 percent of the business jet fleet at 60 percent useful load, a runway length of 7,300 feet is needed. Longer haul business jet operations to the east coast would require business jets to carry larger fuel loads. A runway length of 8,400 feet is recommended for 75 percent of large airplanes at 90 percent useful load. Based on the demand of the future critical aircraft to be able to conduct operations to any part of the country from Casa Grande Municipal Airport, the primary runway length should be planned to an ultimate length of 8,400 feet.

A potential parallel runway should be considered to provide the airfield with additional capacity. To do this effectively, the parallel runway should be capable of serving at least 90 percent of the operational fleet mix at the airport. The critical aircraft anticipated to use a parallel runway would be included in the small airplane category. According to **Table 3E**, a runway length of 3,800 feet would be adequate to serve 95 percent of small airplanes. At this length, a potential parallel runway would provide adequate capacity relief to the existing runway to meet long term operational demands. Therefore, a potential parallel runway should be planned to at least 3,800 feet.

Pavement Strength

An important feature of airfield pavement is the ability to withstand repeated use by aircraft of significant weight. Runway 5-23 is strength-rated at 18,500 pounds single wheel loading (SWL) and 65,000 pounds dual wheel loading (DWL). The heaviest aircraft regularly operating on Runway 5-23 are the Cessna Citation jet aircraft. The maximum takeoff weights of these aircraft range from 10,400 pounds SWL to 36,100 pounds DWL. The current pavement strength is almost capable of accommodating a fully loaded Gulfstream 200 business jet, which has a maximum takeoff weight of 65,300 pounds DWL. Based on the anticipated design aircraft (Gulfstream 450), Runway 5-23's pavement strength should ultimately be planned to 74,000 pounds DWL in the long term.

The potential parallel runway should be planned to accommodate at least 90 percent of the airport's operational fleet mix. A pavement strength of 12,500 pounds SWL should be planned for the parallel runway to serve small aircraft.

Dimensional Design Standards

Runway dimensional design standards define the widths and clearances required to optimize safe operations in the landing and takeoff areas. These dimensional standards vary depending upon the ARC for the runway. **Table 3F** outlines key dimensional standards for the airport reference codes most applicable to Casa Grande Municipal Airport, both now and in the future.

TABLE 3F
Airfield Design Standards
Casa Grande Municipal Airport

Airport Reference Code	Current Runway 5-23 (ft.)	ARC B-II (ft.)	ARC B-I (Small Airplane Exclusive) (ft.)	ARC D-II (ft.)
Runway Width	100	75	60	100
Runway Safety Area				
Width	300	150	120	500
Length Beyond End	300	300	240	1,000
Runway Object Free Area				
Width	500	500	250	800
Length Beyond End	300	300	240	1,000
Runway Centerline to:				
Holding Position	280	200	125	265
Parallel Taxiway	300	300	150	415
Parallel Runway	N/A	700	700	700
Taxiway Width	40	35	25	35
Taxiway Centerline to:				
Fixed or Movable Object	93	65.5	44.5	65.5
Parallel Taxilane	152	105	69	105
Taxilane Centerline to:				
Fixed or Movable Object	57.5	57.5	39.5	57.5
Parallel Taxilane	97	97	64	97
Runway Protection Zones -				
One mile or greater visibility				
Inner Width	500	500	250	500
Length	1,000	1,000	1,000	1,700
Outer Width	700	700	450	1,010
Not Lower than ¾-Mile				
Inner Width	1,000	1,000	1,000	1,000
Length	1,700	1,700	1,700	1,700
Outer Width	1,510	1,510	1,510	1,510
Lower than ½-Mile				
Inner Width	N/A	1,000	1,000	1,000
Length	N/A	2,500	2,500	2,500
Outer Width	N/A	1,750	1,750	1,750

Runway 5-23 currently meets most ARC B-II design requirements and should be planned to meet and maintain its critical ARC (D-II) through the long-range planning horizon. The potential parallel runway should be planned to meet ARC B-I (small airplane exclusive) design requirements. The following considers those areas where standards will need to be met:

Runway Width – The current width of Runway 5-23 (100 feet) meets the ARC D-II design requirement. A potential parallel runway would need to be constructed to a width of 60 feet to

meet ARC B-I (small airplane exclusive) design requirements.

Runway Safety Area – The runway safety area (RSA) is defined in FAA Advisory Circular 150/5300-13, *Airport Design*, as a surface surrounding the runway, prepared or suitable for reducing the risk of damage to airplanes in the event of an overshoot, undershoot, or excursion from the runway. The RSA is centered on the runway and extends beyond either end. The FAA requires the RSA to be cleared and graded, drained by grading or storm sewers, capable of accommodating fire and rescue vehicles, and free of obstacles not fixed by navigational purposes.

The RSA standard for Category D-II aircraft is 500 feet wide and extends 1,000 feet beyond each runway end. Land beyond each runway end will need to be graded to meet the extended RSA design standards. A drainage canal off the end of Runway 5 encroaches into the area that would need to be graded for the upgraded RSA.

Runway Object Free Area – The object free area (OFA) is an area centered on the runway to enhance the safety of aircraft operations by having an area free of objects, except for objects that need to be located in the OFA for air navigation or ground maneuvering purposes. The OFA must provide clearance of all ground-based objects protruding above the RSA edge elevation, unless the object is fixed by a function serving air or ground navigation.

OFA design standards for ARC D-II extend 1,000 feet beyond the runway end and 800 feet in width. Runway 5-23 will need to extend this safety area to the full ARC D-II design standards in the future. As with the RSA, the drainage canal off the end of Runway 5 will need to be relocated outside of the extended OFA boundary.

Aircraft Holding Positions – The current hold positions for Runway 5-23 are marked 280 feet from the runway centerline on all connecting taxiways. This 280-foot separation exceeds the standard for ARC D-II runways (265 feet). The holding positions for the potential parallel runway would need to be marked 200 feet from the runway centerline.

Runway Protection Zone – The runway protection zone (RPZ) is an area off the runway end that enhances the protection of people and property on the ground. This is best achieved through airport owner control over the RPZs. Such control includes maintaining RPZ areas clear of incompatible objects and activities.

The RPZ is trapezoidal in shape and is centered on the extended runway centerline. The dimensions of the RPZ are a function of the critical aircraft and the approach visibility minimums associated with the runway. Runway 5 is currently equipped with an instrument landing system (ILS) approach with approach visibility minimums that are not lower than ½ mile. The existing RPZ on the Runway 5 end currently meets design requirements for this type of instrument approach.

The RPZ on the Runway 23 end meets ARC B-II one mile or greater visibility design standards. Currently, State Highway 387 extends through the Runway 23 RPZ. While the FAA design standards do not specifically prohibit roadways from extending through RPZs, the FAA generally desires that roadways remain clear of RPZs. In this case, due to developments to the east, the relocation of State Highway 387 is unlikely. To combat incompatible developments in the approach path for Runway 23, the airport has acquired an avigation easement on land adjacent to State Highway 387 that is within the Runway 23 RPZ. Should instrument approach minimums be upgraded to lower than one mile visibility, Runway 23's RPZ would increase in size. **Table 3F** depicts the RPZ requirements for runway ends equipped with low-visibility instrument approach procedures. Any future expansion of the RPZ could necessitate property acquisitions or additional avigation easements.

TAXIWAY REQUIREMENTS

Taxiways are constructed primarily to facilitate aircraft movements to and from the runway system. Some taxiways are necessary simply to provide access between the aprons and runways, whereas other taxiways become necessary as activity increases at an airport to provide safe and efficient use of the airfield.

As detailed in Chapter One, Runway 5-23 is served by a full-length parallel taxiway. **Table 3F** outlines the runway-to-taxiway centerline separation standards for ARCs B-II and D-II. Taxiway B's width of 40 feet exceeds ARC D-II design standards, and its 300-foot separation from the runway centerline is adequate up to ARC C-II design standards. Once D-II design standards are implemented, the taxiway separation standard extends to 415 feet. Considerations for meeting this design requirement will need to be analyzed.

The ARC B-I (small airplane exclusive) design standard for taxiway width is 25 feet. Ultimately, it will be more beneficial to plan for a uniform taxiway system width. Therefore, taxiways serving a parallel runway should be designed to a width of 35 feet to match the ultimate taxiway system width.

Taxiway circulation can become an issue at airports with a high amount of training activity such as Casa Grande Municipal Airport. Holding bays provide flexibility in ground circulation by permitting departing aircraft to maneuver around an aircraft that is not ready to depart and are recommended when runway operations exceed 30 per hour. Holding bays are currently available at each end of Taxiway B. Constructing additional holding bays should be considered as the runway and taxiway system is expanded.

Exit taxiways provide a means to enter and exit the runways at various points on the airfield. The type and number of exit taxiways can have a direct impact on the capacity and efficiency of the airport as a whole. Runway 5-23 has a total of four exit taxi-

ways. Exit taxiways are effective when planned at least 800 feet apart. Each of Runway 5-23's four exit taxiways are spaced by greater than 800 feet. Right-angled exits require an aircraft to be nearly stopped before it can safely exit the runway. Angled exits (high-speed exits) allow aircraft to use a higher safe exit speed while exiting the runway. Potential locations for new exit taxiways that may improve capacity or efficiency will be examined in Chapter Four, Alternatives.

Dimensional and clearance standards for the taxiways are depicted on **Table 3F**. Taxiway width and clearance standards are based upon the ADG for a particular runway or taxiway.

NAVIGATIONAL AIDS AND INSTRUMENT APPROACH PROCEDURES

Navigational Aids

Navigational aids are electronic devices that transmit radio frequencies which properly equipped aircraft and pilots translate into point-to-point guidance and position information. The very high frequency omnidirectional range (VOR), Global Positioning System (GPS), and LORAN-C are available for pilots to navigate to and from Casa Grande Municipal Airport. These systems are sufficient for navigation to and from the airport; therefore, no other navigational aids are needed at the airport.

Instrument Approach Procedures

Instrument approach procedures consist of a series of predetermined maneuvers established by the FAA for navigation during inclement weather conditions. Currently, there are four established instrument approach procedures for Casa Grande Municipal Airport. Due to 99.8 percent VFR weather, the demand for instrument approaches is based primarily on training activity. The best minimums to Casa Grande Municipal Airport are provided by the instrument landing system (ILS) approach to Runway 5. This approach provides weather minimums down to 285-foot above ground level (AGL) cloud ceilings and 1/2 mile visibility for Approach Categories A and B. When the airport upgrades to ARC D-II design standards, the ILS approach will be available to aircraft in Approach Categories C and D.

A global positioning system (GPS) modernization effort is underway by the FAA and focuses on augmenting the GPS signal to satisfy requirements for accuracy, coverage, availability, and integrity. For civil aviation use, this includes the continued development of the Wide Area Augmentation System (WAAS), which was initially launched in 2003. The WAAS uses a system of reference stations to correct signals from the GPS satellites for improved navigation and approach capabilities. Where the non-WAAS GPS

signal provides for enroute navigation and limited instrument approach (lateral navigation) capabilities, WAAS provides for approaches with both course and vertical navigation. This capability was historically only provided by an ILS, which requires extensive on-airport facilities. The WAAS upgrades are expected to allow the development of approaches to most airports with cloud ceilings as low as 200 feet above the ground and visibilities restricted to 1/2 mile, after 2015.

Nearly all new instrument approach procedures developed in the United States are being developed with GPS. GPS approaches are currently categorized as to whether they provide only lateral (course) guidance or a combination of lateral and vertical (descent) guidance. An approach procedure with vertical guidance (APV), GPS approach provides both course and descent guidance. Casa Grande Municipal Airport is currently equipped with a GPS instrument approach to both runway ends that provide only lateral guidance. In the future, as WAAS is upgraded, precision approaches similar in capability to the existing ILS will become available. These approaches are currently categorized as the Global Navigation Satellite System Landing System (GLS). A GLS approach may be able to provide for approaches with 1/2 mile visibility and 200-foot cloud ceilings. A GLS would be implemented in lieu of an ILS approach.

Since both course guidance and descent information is desirable for an additional instrument approach to Casa Grande Municipal Airport and GPS does not require the installation of costly navigation equipment at the airport, a GLS should be planned to the Runway 23 end. APV approaches may be considered for the potential parallel runway to provide one mile visibility minimums.

AIRFIELD LIGHTING, MARKING, AND SIGNAGE

There are a number of lighting and pavement marking aids serving pilots using Casa Grande Municipal Airport. These lighting and marking aids assist pilots in locating the airport during night or poor weather conditions, as well as assist in the ground movement of aircraft.

Identification Lighting

The location of an airport at night is universally indicated by a rotating beacon. The rotating beacon at the airport is located to the west of the terminal aircraft parking apron. This is sufficient and should be maintained through the planning period.

Runway and Taxiway Lighting

The medium intensity runway edge lighting (MIRL) currently available on Runway 5-23 will be adequate for the planning period. MIRL should be planned for a potential parallel runway. The taxiway system is equipped with medium intensity taxiway lighting (MITL), which should be adequate through the planning period. MITL should be planned for any future taxiways.

Airfield Signs

Airfield signage assists pilots in identifying their location on the airport. Signs located at intersections of taxiways provide crucial information to avoid conflicts between moving aircraft and potential runway incursions. Directional signage also instructs pilots as to the location of taxiways and apron areas. Several of the existing directional signs were found to be in poor condition and in some cases were illegible. Damaged or illegible directional signs should be repaired or replaced, while the signage system as a whole should be maintained through the planning period.

Visual Approach Lighting

In most instances, the landing phase of any flight must be conducted in visual conditions. To provide pilots with visual guidance information during landings to the runway, electronic visual approach aids are commonly provided at airports. Both runway ends are currently equipped with precision approach path indicators (PAPI-2s). These lighting systems should be maintained through the planning period. Precision approach path indicators (PAPI-4s) should be planned for any future runway ends.

Approach and Runway End Identification Lighting

Runway end identifier lights (REILs) are flashing lights located at each runway end that facilitate identification of the runway end at night and during poor visibility conditions. REILs provide pilots with the ability to identify runway ends and distinguish the runway end lighting from other lighting on the airport and in the approach areas. REILs are not installed at either end of Runway 5-23; however, since Runway 5 is equipped with an approach lighting system (ALS), REILs are not necessary. REILs should be planned at the end of Runway 23 and at each end of the potential parallel runway.

Runway 5 is currently equipped with a medium intensity approach lighting system with runway alignment indicator lights (MALSR). The MALSR extends into the approach end of Runway 5 enhancing the ILS approach. The MALSR will need to be relocated for any extension to the Runway 5 end.

Distance Remaining Signs

Distance remaining signs are lighted signs placed at 1,000-foot increments along the runway to notify pilots of the length of runway remaining during takeoff or landing operations. These signs should be added to the pilot-controlled lighting system. Distance remaining signage should be planned for Runway 5-23.

Pilot-Controlled Lighting

Casa Grande Municipal Airport is equipped with pilot-controlled lighting (PCL). PCL allows pilots to control the intensity of the runway lighting using the radio transmitter in the aircraft. PCL also provides for more efficient use of airfield lighting energy. A

PCL system turns the airfield lights off or to a lower intensity when not in use. Similar to changing the intensity of the lights, pilots can turn up the lights using the radio transmitter in the aircraft. The Runway 5 MALSR is also connected to the PCL system. This system should be maintained through the planning period. Any future taxiway lighting, visual approach lighting, and distance remaining signs should be added to the PCL system.

Pavement Markings

In order to facilitate the safe movement of aircraft about the field, airports use pavement markings, lighting, and signage to direct pilots to their destinations. Runway markings are designed according to the type of instrument approach available on the runway. FAA Advisory Circular 150/5340-1H, *Marking of Paved Areas on Airports*, provides the guidance necessary to design airport markings.

Runway 5 currently has precision markings, and Runway 23 has basic markings. Precision runway markings identify the runway centerline, threshold, designation, touchdown point, aircraft holding positions, and provide side strips. The basic markings identify the runway centerline and designation. Non-precision markings should be planned for Runway 23 when a GLS approach is implemented and for a future parallel runway. Non-precision markings identify the runway centerline, threshold, aiming point, and designation.

Holdlines need to be marked on all taxiways connecting to the runway. The holdlines for Runway 5-23 are currently placed 280 feet from the runway centerline, which exceeds the requirement for precision instrument runways. A parallel runway should have holdline markings placed 200 feet from the runway centerline to meet non-precision instrument ARC B-II design standards. These markings assist in reducing runway incursions as aircraft must remain behind the holdline until taking the active runway for departure.

Taxiway and apron areas also require marking to assure that aircraft remain on the pavement and clear of any objects located along the taxiway/taxilane. Yellow centerline stripes are currently painted on all taxiway and apron surfaces at the airport to provide assistance to pilots in taxiing along these surfaces at the airport. Besides routine maintenance, these markings will be sufficient through the planning period.

HELIPADS

The airport has a helipad at the northwest corner of the terminal parking apron and three other designated helicopter parking spaces. These helicopter spaces will be adequate in the short and intermediate term horizons, but as helicopter traffic increases at Casa Grande Municipal Airport, the expansion of helicopter facilities will need to be considered.

WEATHER REPORTING

The airport has a lighted wind cone that provides pilots with information about wind conditions. A segmented circle provides traffic pattern information to pilots. These facilities are sufficient and should be maintained in the future.

The airport is equipped with an AWOS-3. The AWOS-3 provides automated weather observations 24 hours per day. The system updates weather observations every minute, continuously reporting significant weather changes as they occur. The AWOS reports cloud ceiling, visibility, temperature, dew point, wind direction, wind speed, altimeter setting (barometric pressure), and density altitude (airfield elevation corrected for temperature). The AWOS is sufficient and should be maintained through the planning period.

AIRPORT TRAFFIC CONTROL

Casa Grande Municipal Airport does not have an operational airport traffic control tower (ATCT); therefore, no formal terminal air traffic control services are available at the airport. Establishment of an ATCT is governed by Title 14 of the Code of Federal Regulation (CFR) Part 170, *Establishment and Discontinuance Criteria for Air Traffic Control Services and Navigational Facilities*.

14 CFR Part 170.13 *Airport Traffic Control Tower (ATCT) Establishment Criteria,* provides the general criteria along with general facility establishment standards that must be met before an airport can qualify for an ATCT. These are as follows:

1. The airport, whether publicly or privately owned, must be open to and available for use by the public as defined in the Airport and Airway Improvement Act of 1982;

2. The airport must be recognized by and contained within the National Plan of Integrated Airport Systems;

3. The airport owners/authorities must have entered into appropriate assurances and covenants to guarantee that the airport will continue in operation for a long enough period to permit the amortization of the ATCT investment;

4. The FAA must be furnished appropriate land without cost for construction of the ATCT; and;

5. The airport must meet the benefit-cost ratio criteria utilizing three consecutive FAA annual counts and projections of future traffic during the expected life of the tower facility. (An FAA annual count is a fiscal year or a calendar year activity summary. Where actual traffic counts are unavailable or not recorded, adequately documented FAA estimates of the scheduled and nonscheduled activity may be used.)

An airport meets the establishment criteria when it satisfies the criterion above and its benefit-cost ratio equals or exceeds one. The benefit-cost ratio

is the ratio of the present value of the ATCT life cycle benefits (BPV) to the present value of ATCT life cycle costs (CPV).

The benefits of establishing an ATCT result from the prevention of aircraft collisions, the prevention of other types of preventable accidents, reduced flying time, emergency response notification, and general security oversight. Benefits from preventable collisions are further broken down into mid-air collisions, airborne-ground collisions, and ground collisions. Data collected for analyzing the establishment of an ATCT include scheduled and nonscheduled commercial service, and non-commercial traffic which includes military operations.

With an estimated 90,000 annual operations, the airport is approaching the level where airports often undertake a benefit-cost analysis (BCA) to qualify for a contract tower. A preliminary ATCT benefit/cost analysis was recently (2006) prepared for the Marana Regional Airport (AVQ), which is a general aviation reliever airport located northwest of Tucson. Based on this benefit/cost analysis, the FAA concluded that AVQ would qualify for a "Contract Tower" program (CTP). The CTP reduces the cost of providing air traffic control services so that airports, which might not otherwise benefit from these services, can establish their own ATCT facility. Casa Grande Municipal Airport's long term forecast operations and based aircraft levels reach or exceed AVQ's forecasts presented in its BCA. While this is not evidence that Casa Grande Municipal Airport would qualify for the CTP program, for planning purposes, the alternatives analysis will examine potential locations for an ATCT.

LANDSIDE FACILITIES

Landside facilities are those necessary for handling general aviation aircraft and passengers while on the ground. This section is devoted to identifying future landside facility needs during the planning period for the following types of facilities normally associated with general aviation terminal areas:

- Hangars
- Aircraft Parking Apron
- General Aviation Terminal Services
- Support Requirements

HANGARS

The demand for hangar facilities typically depends on the number and type of aircraft expected to be based at the airport. Hangar facilities are generally classified as T-hangars or conventional hangars. Conventional hangars can include individual hangars or multi-aircraft hangars. These different types of hangars offer varying levels of privacy, security, and protection from the elements.

Demand for hangars varies with the number of aircraft based at the airport. Another important factor is the type of based aircraft. Owner of smaller single-engine aircraft usually prefer T-hangars, while owners of larger, more expensive and sophisticated aircraft will prefer conventional hangars. The weather also plays a

role in the demand for hangar facilities. The hot summers that are experienced in the Casa Grande area create a high demand for enclosed or shaded parking spaces. Rental costs will also be a factor in the choice.

Casa Grande Municipal Airport has six T-hangar storage facilities, providing 52 storage units. T-hangar space available at the airport totals approximately 78,400 square feet for aircraft storage. A planning standard of 1,200 square feet per based aircraft stored in T-hangars was used. Analysis of future T-hangar requirements, as depicted on **Table 3G**, indicates that additional T-hangar positions will be needed throughout each of the planning periods.

TABLE 3G
Hangar Storage Requirements
Casa Grande Municipal Airport

	Available	Current Need	Short Term	Intermediate Term	Long Term
BASED AIRCRAFT					
Piston		106	133	203	420
Turbine		0	6	16	45
Rotor		5	7	10	22
Other		3	4	6	13
Total		114	150	235	500
AIRCRAFT TO BE HANGARED					
Piston		75	96	148	325
Turbine		0	6	16	45
Rotor		4	6	9	21
Other		0	2	3	6
Total		79	110	176	397
HANGAR POSITIONS					
T-Hangar	52	58	76	116	268
Shade Hangar	18	16	28	44	84
Conventional	5	5	6	16	45
Total Hangar Positions	75	79	110	176	397
HANGAR AREA REQUIREMENTS (s.f.)					
T-Hangar	78,400	69,600	91,200	139,200	321,600
Shade Hangar	27,000	9,440	16,520	25,960	49,560
Conventional	20,200	7,500	12,000	35,500	103,500
Total Storage Hangar Area	125,600	86,540	119,720	200,660	474,660
Maintenance Area	4,200	19,950	26,250	41,125	87,500

There are currently two shade hangar facilities providing 18 storage units and encompassing approximately 27,000 square feet. It can be anticipated that many based aircraft owners that do not wish to rent a more expensive T-hangar unit will choose instead to rent a cheaper shade unit. Based on this anticipated demand, additional shade units will need to be added throughout the planning period.

Casa Grande Municipal Airport currently has five conventional hangar facilities on the airport totaling approximately 20,200 square feet. This

type of hangar is typically used to store multiple single-engine aircraft or one or more corporate aircraft. Currently, only a very small percentage of based aircraft are stored in conventional hangars. The demand for conventional hangars should increase as larger, more expensive aircraft base at Casa Grande Municipal Airport. Conventional hangar space will need to be planned to at least accommodate the turbine aircraft forecast to base at Casa Grande Municipal Airport. For conventional hangars, a planning standard of 1,500 square feet for piston and rotary aircraft was used, while 2,500 square feet per turbine aircraft was used.

Requirements for maintenance area were estimated at 175 square feet per based aircraft. **Table 3G** compares the existing hangar space to the future hangar requirements. It is evident from the table that there is a need for additional enclosed hangar storage units throughout the planning period.

AIRCRAFT PARKING APRON

A parking apron should be provided for at least the number of locally based aircraft that are not stored in hangars, as well as be capable of accommodating transient aircraft during the busy day of the peak month. The terminal apron, the west apron, and the helicopter parking spaces currently provide approximately 88,765 square yards of total paved apron and 109 spaces. The number of local tie-downs and apron space for the planning period is presented in **Table 3H**.

TABLE 3H
General Aviation Apron Requirements
Casa Grande Municipal Airport

	Available	Current Need	Short Term	Intermediate Term	Long Term
Based Aircraft in Tie-downs		35	40	59	103
Busy Day Itinerant Operations		526	569	778	1,190
Local Ramp Positions	--	35	40	59	103
Transient Ramp Positions	--	92	99	136	208
Total Ramp Positions	109	127	139	195	311
Apron Area (s.y.)	88,765	58,650	64,150	89,300	141,233

FAA Advisory Circular 150/5300-13, *Airport Design*, suggests a methodology by which transient apron requirements can be determined from knowledge of busy-day itinerant operations. At Casa Grande Municipal Airport, the number of transient spaces required was determined to be approximately 17.5 percent of busy-day itinerant operations. A planning criterion of 360 square yards per local parking space and 500 square yards per transient parking space was used to determine future apron requirements. The number of local and itinerant tie-downs and apron space for the planning period is presented in **Table 3H**. While this analysis indicates that Casa Grande Municipal Airport has adequate apron area currently, additional ramp positions are needed. Additional apron square yardage and positions

will be needed in each of the subsequent planning periods.

TERMINAL FACILITIES

Terminal facilities are often the first impression of the community that air travelers or tourists will encounter. Terminal facilities at an airport provide space for passenger waiting, a pilots' lounge and flight planning, concessions, management, storage, and various other needs. At Casa Grande Municipal Airport, much of this is accommodated in the 4,800 square-foot general aviation terminal building.

The methodology used in estimating terminal facility needs was based upon the number of airport users expected to utilize the terminal facilities during the design hour, as well as FAA guidelines. Space requirements for terminal facilities were based on providing 90 square feet per design hour itinerant passenger. **Table 3J** outlines the space requirements for terminal services at Casa Grande Municipal Airport through the long term planning horizon.

TABLE 3J
General Aviation Terminal Area Facilities
Casa Grande Municipal Airport

	Available	Existing Need	Short Term	Intermediate Term	Long Term
General Aviation Terminal Building Area (s.f.)	4,800	11,800	11,500	14,000	20,400
Design Hour Itinerant Passengers	--	131	128	156	226
Auto Parking Spaces	42	265	280	358	575

SUPPORT REQUIREMENTS

Various facilities that do not logically fall within classifications of airfield, terminal building, or general aviation facilities have been identified for inclusion in this Master Plan. Facility requirements have been identified for these remaining facilities:

- Automobile Parking
- Airport Access
- Interior Access
- Aviation Fuel Storage
- Aircraft Wash Facility
- Perimeter Fencing
- Security
- Aircraft Rescue and Firefighting

Automobile Parking

Vehicle parking requirements were examined based on an evaluation of the existing airport use, as well as industry standards. Vehicle parking spaces were calculated at 25 percent of based aircraft plus the product of design hour itinerant passengers and the industry standard of 1.8. Automobile parking requirements are summarized in **Table 3J**.

Airport Access

In airport facility planning, both on- and off-airport vehicle access is important. For the convenience of the user (and to provide maximum capacity), access to the airport should include (to the extent practical) connections to the major arterial roadways near the airport.

Access to Casa Grande Municipal Airport is available from State Route 387. State Route 387 is a four-lane divided highway with turn lanes in the vicinity of the airport. State Route 387 runs parallel to the airport's eastern border. The unsignaled intersection of West Airport Road and State Route 387 provides access to the terminal building and the airport's landside facilities.

The capacity of a roadway is the maximum number of vehicles that can pass over a given section of roadway during a given time period. It is normally preferred that a roadway operate below capacity to provide reasonable flow and minimize delay to the vehicles using it.

As with the airfield, the means of describing the operational efficiency of a given roadway segment is defined in terms of six descriptive service levels. These various levels of service (LOS) range from A to F and are defined as follows:

- **LOS A** – Free flowing traffic with minimal delays.

- **LOS B** - A stable flow of traffic, with occasional delays due to the noticeable presence of others in the traffic stream.

- **LOS C** – Still stable flow, but operations become more significantly affected by the traffic stream. Periodic delays are experienced.

- **LOS D** – Flow becomes more high density, and speed and freedom to maneuver become severely restricted. Regular delays are experienced.

- **LOS E** – Maximum capacity operating conditions. Delays are extended and speeds are reduced to a low, relatively uniform level.
- **LOS F** – Forced flow with excessive delays. A condition where more traffic is approaching a point than can traverse the point.

Level of Service "D" is generally considered as the threshold of acceptable traffic conditions during peak periods in an urban area, and is commonly used by Pinal County in transportation planning.

According to information included in the *Pinal County Small Area Transportation Study*, State Route 387 from Interstate 10 south of Casa Grande Municipal Airport will ultimately reach LOS F by 2025. The long-range recommended development plan for State Route 387 includes widening it from four to six lanes to accommodate anticipated traffic increases.

The on-airport access roads stem from West Airport Road providing access to the landside facilities. North Piper Avenue intersects West Airport Road

and extends south to the Casa Grande Airpark where it intersects with West Centennial Avenue. These access roads should be adequate to accommodate on-airport traffic in the future.

Interior Access

Occasionally, private vehicles use the apron and taxilanes for movement as there is no dedicated interior access road. The segregation of vehicle and aircraft operational areas is supported by FAA guidance established in June 2002. FAA AC 50/5210-20, *Ground Vehicle Operations on Airports*, states, "The control of vehicular activity on the airside of an airport is of the highest importance." The AC further states, "An airport operator should limit vehicle operations on the movement areas of the airport to only those vehicles necessary to support the operational activity of the airport."

Service roads are typically used to segregate vehicles from the aircraft operational areas. The alternatives analysis will examine options for interior access roads to serve hangar facilities as well as a service road extending around the runway and airport perimeter for airport maintenance vehicles.

Aviation Fuel Storage

The City of Casa Grande operates the fueling concession and has the only fuel storage facilities at Casa Grande Municipal Airport. These storage facilities consist of a 12,000-gallon 100LL Avgas storage tank and a 12,000-gallon Jet A fuel storage tank.

Fuel storage requirements are typically based upon keeping a one-month supply of fuel during an average month; however, more frequent deliveries can reduce the fuel storage capacity requirement. Based on historical fuel sales from Casa Grande Municipal Airport and similar general aviation airports, an average of two gallons per piston operation was used to project Avgas fuel storage requirements.

Turbine aircraft operations at Casa Grande Municipal Airport have been comprised of turboprop fixed wing aircraft, turbine-powered helicopters, and turbojet aircraft. Business jet operations have been infrequent with an average of 110 operations annually since 2004. As the Phoenix metropolitan area continues to develop towards Casa Grande Municipal Airport, additional activity from jet aircraft can be expected. The recent entry of the very light jet (VLJ) into the market is also expected to contribute to an increase in demand.

Projections of future Jet A fuel storage requirements were based upon a ratio of 150 gallons per turbine operation. Turbine operations were estimated at one percent of annual operations currently, increasing to 1.5 percent of the annual operations in the long term planning horizon.

100LL Avgas and Jet A fuel storage requirements are summarized in **Table 3K**. Available fuel storage meets

closely to the current demand at Casa Grande Municipal Airport, but ultimately will need to be expanded over the planning horizon.

TABLE 3K
Fuel Storage Requirements
Casa Grande Municipal Airport

	Available	Current Need	Short Term	Intermediate Term	Long Term
Two-Week Fuel Storage Requirements					
100LL Avgas (gal)	12,000	12,800	14,500	20,900	34,900
Jet A (gal)	12,000	9,700	12,100	19,000	39,900

Aircraft Wash Facility

Presently, there is not a designated aircraft wash facility on the airport. As aircraft basing grows, consideration should be given to ultimately establishing an aircraft wash facility at the airport to collect aircraft cleaning fluids used during the cleaning process.

Perimeter Fencing

Perimeter fencing is used at airports to primarily secure the aircraft operations area. The physical barrier of perimeter fencing provides the following functions:

- Gives notice of the legal boundary of the outermost limits of a facility or security-sensitive area.
- Assists in controlling and screening authorized entries into a secured area by deterring entry elsewhere along the boundary.
- Supports surveillance, detection, assessment, and other security functions by providing a zone for installing intrusion-detection equipment and closed-circuit television (CCTV).
- Deters casual intruders from penetrating a secured area by presenting a barrier that requires an overt action to enter.
- Demonstrates the intent of an intruder by their overt action of gaining entry.
- Causes a delay to obtain access to a facility, thereby increasing the possibility of detection.
- Creates a psychological deterrent.
- Optimizes the use of security personnel while enhancing the capabilities for detection and apprehension of unauthorized individuals.
- Demonstrates a corporate concern for facility security.
- Provides a cost-effective method of protecting facilities.
- Limits inadvertent access to the aircraft operations area by wildlife.

The airport perimeter is equipped with 8-foot chain-link fencing with three-strand barbed wire on top. In the vicinity of the terminal building, an 8-foot iron bar fence is in place. Automated access gates are located at various locations in the terminal area which require a security access code to gain entry. There are several manual access gates around the perimeter of the airport. The existing perimeter fence is adequate and should be maintained through the planning period.

Aircraft Rescue and Firefighting (ARFF)

The requirements for Aircraft Rescue and Firefighting (ARFF) equipment and services at an airport are determined by whether the airport is required to be certificated under 14 CFR Part 139 and the size of the aircraft. Casa Grande Municipal Airport is presently not required to be certificated under 14 CFR Part 139; therefore, there is no requirement now for ARFF equipment or facilities. The fire training facility is located on the airport and is fully capable of responding to on-airport emergencies.

SUMMARY

The intent of this chapter has been to outline the facilities required to meet aviation demands projected for Casa Grande Municipal Airport through the long term planning horizon. A summary of the airfield and general aviation facility requirements are presented on **Exhibits 3E** and **3F**.

Following the facility requirements determination, the next step is to develop a direction for development to best meet these projected needs. The remainder of the Master Plan will be devoted to outlining this direction, its schedule, and its costs.

07MP05-3E-4/7/09

RUNWAYS

Existing	Short Term	Long Term
Runway 5-23 5,200' x 100' 18,500 #SWL 65,000 #DWL ARC - B-II	Runway 5-23 5,200' x 100' 18,500 #SWL 65,000 #DWL ARC B-II	Runway 5-23 8,400' x 100' 74,000 #DWL ARC - D-II Parallel Runway 3,800'x 60' 12,500 #SWL ARC B-I Small Airplane Exclusive

TAXIWAYS

Existing	Short Term	Long Term
Runway 5-23 40' Wide Full Length Parallel Holding Aprons	Runway 5-23 40' Wide Full Length Parallel Holding Aprons	Runway 5-23 35' Wide Full Length Parallel Holding Aprons High Speed Exits Parallel Runway 35' Wide Full Length Parallel Holding Aprons

NAVIGATIONAL AIDS

Existing	Short Term	Long Term
AWOS GPS VORTAC Runway 5-23 ILS (5) GPS (5,23) VOR (5)	AWOS GPS VORTAC Runway 5-23 ILS (5) GPS (5,23) VOR (5)	Airport Traffic Control Tower AWOS GPS, VORTAC Runway 5-23 ILS (5), GPS (5,23) VOR (5) Parallel Runway GPS - APV

LIGHTING & MARKINGS

Existing	Short Term	Long Term
Airport Beacon, Wind Cones Medium Intensity Taxiway Lights Runway 5-23 Medium Intensity Runway Lights PAPI-2 (5,23) Precision / Basic Markings MALSR (5)	Airport Beacon, Wind Cones Medium Intensity Taxiway Lights Runway 5-23 Medium Intensity Runway Lights PAPI-2 (5,23) Precision / Basic Markings MALSR (5,23) Runway End Identifier Lights	Airport Beacon, Wind Cones Medium Intensity Taxiway Lights Runway 5-23 Medium Intensity Runway Lights PAPI-2 (5,23) Precision / Non-Precision Markings MALSR (5) Parallel Runway Medium Intensity Runway Lights PAPI-4 Non-Precision Markings Runway End Identifier Lights

Aircraft Storage Requirements

	Available	Short Term	Intermediate Term	Long Term
Aircraft to be Hangared	64	110	176	397
T-Hangar Positions	52	76	116	268
Shade Hangar Positions	18	28	44	84
Conventional Hangar Positions	5	6	16	45
T-Hangar Area (s.f.)	78,400	91,200	139,200	321,600
Shade Hangar Area (s.f.)	27,000	16,520	25,960	49,560
Conventional Hangar Area (s.f.)	20,200	12,000	35,500	103,500
Total Hangar Area (s.f.)	125,600	119,720	200,660	474,660
Maintenance Area (s.f.)	4,200	26,250	41,125	87,500

Aircraft Parking Apron Requirements

Single, Multi-Engine Transient Positions	--	99	136	208
Locally-Based Aircraft Positions	--	40	59	103
Total Positions	109	139	195	311
Total Apron Area (s.y.)	88,765	64,150	89,300	141,233

Terminal Facilities

General Aviation Terminal Building (s.f.)	4,800	11,500	14,000	20,400
Total Airport Automobile Parking Spaces	42	280	358	575

Support Facilities

	Helipad	Helipad Wash Rack	Helipad Wash Rack	Helipad Wash Rack

Fuel Storage Requirements

100LL Avgas (gal.)	12,000	14,500	20,900	34,900
Jet A (gal.)	12,000	12,100	19,000	39,900

Chapter Four

AIRPORT DEVELOPMENT ALTERNATIVES

Airport Development Alternatives

Prior to formulating a development program for Casa Grande Municipal Airport, it is important to consider development potential and constraints at the airport. The purpose of this chapter is to consider the actual physical facilities which are needed to accommodate projected demand and meet the program requirements as previously defined in Chapter Three, Aviation Facility Requirements.

In this chapter, a number of airport development alternatives are considered for the airport. For each alternative, different physical facility layouts are presented for the purposes of evaluation. The ultimate goal is to develop the underlying rationale which supports the final recommended master plan development concept. Through this process, an evaluation of the highest and best uses of airport property is made while considering local development goals, physical and environmental constraints, and appropriate federal airport design standards.

Any development proposed by a master plan evolves from an analysis of projected needs. Though the needs were determined by the best methodology available, it cannot be assumed that future events will not change these needs. Therefore, to ensure flexibility in planning and development to respond to unforeseen needs, the landside alternatives consider the maximum development potential of airport property.

The alternatives presented in this chapter have been developed to meet

the overall program objectives for the airport in a balanced manner. Through coordination with the City of Casa Grande, the Planning Advisory Committee (PAC), and the public, the alternatives (or combination thereof) will be refined and modified as necessary to develop the recommended development concept. Therefore, the alternatives presented in this chapter can be considered a beginning point in the development of the recommended concept for the future development of Casa Grande Municipal Airport.

REVIEW OF PREVIOUS PLANNING DOCUMENTS

The most recent planning document prepared for Casa Grande Municipal Airport was the *Casa Grande Municipal Airport Airport Master Plan* completed in March 1997. The master plan study recommended the continued development of the existing airport into the long-term horizon.

Recommended airfield developments included upgrading the primary runway design standards to serve ARC D-II aircraft, extending Runway 5-23 3,340 feet to the southwest for an ultimate runway length of 8,540 feet, construction of new taxiways, apron, fuel storage facilities, hangar facilities, a new administration/terminal building, and the relocation of the drainage canal. Since the time of these recommendations, the City of Casa Grande has constructed new apron areas, a new terminal building, fuel storage facilities, and new hangar facilities.

The airport layout plan (ALP) drawing shown on **Exhibit 4A** depicts the airside and landside improvements recommended in the previous master plan.

NON-DEVELOPMENT ALTERNATIVES

Non-development alternatives include the "No Action" or "Do Nothing" alternative, transferring service to an existing airport, or developing an airport at a new location. Several previous planning efforts have also considered these alternatives. All have resulted in the same conclusion: continue to develop the existing airport site to meet the general aviation needs of the Casa Grande community.

NO ACTION

In analyzing and comparing the advantages and disadvantages of various development alternatives, it is important to consider the consequences of no future development at Casa Grande Municipal Airport. The "no-build" or "Do Nothing" alternative essentially considers keeping the airport in its present condition and not providing for any type of expansion or improvement to the existing facilities (other than general airfield, pavement, and administration building maintenance projects). The primary result of this alternative, as with any growing air transportation market, would be the eventual inability of the airport to satisfy the increasing demands of the airport service area. The growth of

07MP05-4A-5/23/08

AIRPORT DATA		EXISTING	ULTIMATE
AIRPORT CATEGORY		GENERAL UTILITY	BASIC TRANSPORT
DESIGN AIRCRAFT		KING AIR	GULF STREAM IV
AIRPORT REFERENCE CODE (ARC); RUNWAY CATEGORY/DESIGN GROUP		B-II	D-II
AIRPORT ELEVATION (ABOVE MEAN SEA LEVEL)		1462	1462
MEAN MAXIMUM TEMPERATURE OF HOTTEST MONTH (JULY)		106° F	106° F
AIRPORT REFERENCE POINT (ARP) COORDINATES (NAD 83)	Latitude	N 32° 57' 17.63"	N 32° 57' 10.11"
	Longitude	W 111° 46' 00.54"	W 111° 46' 16.24"
AIRPORT and TERMINAL NAVIGATIONAL AIDS		DME VOR (S) VORTAC ILS (S) GPS (S)	DME VOR (S) VORTAC ILS (S) GPS
GPS APPROACH		YES	YES
RUNWAY END COORDINATES (NAD 83)		--	--
RUNWAY 05		N 32° 57' 04.73" W 111° 46' 26.97"	N 32° 56' 49.83" W 111° 47' 57.60"
RUNWAY 23		N 32° 57' 30.53" W 111° 45' 34.15"	N 32° 57' 30.53" W 111° 45' 34.15"

RUNWAY DATA	RUNWAY 5-23	
	EXISTING	ULTIMATE
RUNWAY CATEGORY	GENERAL UTILITY	GENERAL TRANSPORT
AIRCRAFT DESIGN GROUP/APPROACH SPEED CATEGORY	B-II	D-II
RUNWAY DIMENSIONS	5200' x 100'	8540' x 100'
RUNWAY BEARING	N 59° 56' 15" E	N 59° 56' 15" E
RUNWAY INSTRUMENTATION	PRECISION	PRECISION
RUNWAY SAFETY AREA (RSA)	6400' x 300'	10,540' x 500'
RUNWAY SAFETY AREA LENGTH BEYOND RWY END	600'	1000'
OBJECT FREE AREA (OFA)	6400' x 800'	10,540' x 800'
OBSTACLE FREE ZONE (OFZ)	5600' x 400'	8940' x 400'
RUNWAY WIND COVERAGE	15 MPH = 99.6%	18 MPH = 99.9%
TOUCHDOWN ZONE ELEVATION (RWY 23)	1462	1462
TOUCHDOWN ZONE ELEVATION (RWY 5)	1448	1436
RUNWAY MAX ELEVATION (ABOVE MEAN SEA LEVEL)	1462	1462
RUNWAY APPROACH SURFACES	50:1/40:1, 20:1	50:1/40:1, 34:1
RUNWAY LIGHTING	MIRL	HIRL
RUNWAY MARKING	PRECISION	PRECISION
TAXIWAY LIGHTING	MITL	MITL
TAXIWAY MARKING (in %)	Centerline	Centerline
TAXIWAY SAFETY AREA WIDTH	79'	79'
TAXIWAY OBJECT FREE AREA WIDTH	131'	131'
EFFECTIVE RUNWAY GRADIENT	.33	.37
RUNWAY SURFACE MATERIAL	ASPHALT	ASPHALT
TAXIWAY SURFACE MATERIAL	ASPHALT	ASPHALT
PAVEMENT STRENGTH (in thousand lbs.) [1]	18.5(S) 65(D)	20(S) 72(D)
FAR PART 77 CATEGORY RWY 5	PRECISION/UTILITY	PRECISION/>UTILITY
FAR PART 77 CATEGORY RWY 23	VISUAL/UTILITY	NON-PRECISION/>UTILITY
NAVIGATIONAL AIDS	DME ILS (S) VOR VORTAC GPS (S)	DME ILS (S) VOR VORTAC GPS
VISUAL AIDS	MIRL VASI-2 MALSR (S)	HIRL PAPI-4 MALSR (S) REILS (23)

[1] Pavement strengths are expressed in single (S), dual (D), dual tandem (DT), and/or double dual tandem (DDT) wheel loading capacities.

GENERAL NOTES:

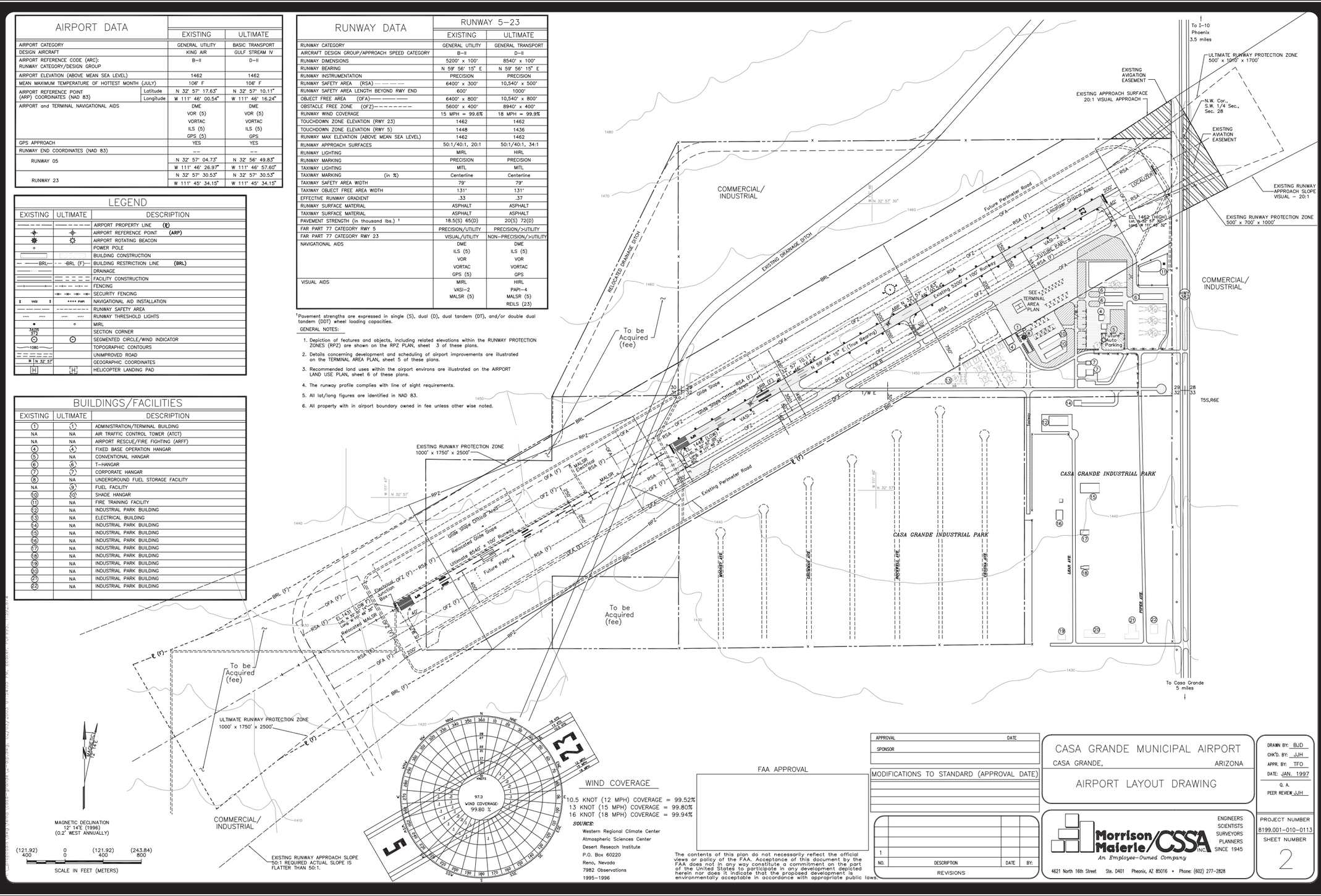
1. Depiction of features and objects, including related elevations within the RUNWAY PROTECTION ZONES (RPZ) are shown on the RPZ PLAN, sheet 3 of these plans.
2. Details concerning development and scheduling of airport improvements are illustrated on the TERMINAL AREA PLAN, sheet 5 of these plans.
3. Recommended land uses within the airport environs are illustrated on the AIRPORT LAND USE PLAN, sheet 6 of these plans.
4. The runway profile complies with line of sight requirements.
5. All lat/long figures are identified in NAD 83.
6. All property with in airport boundary owned in fee unless other wise noted.

LEGEND

EXISTING	ULTIMATE	DESCRIPTION
		AIRPORT PROPERTY LINE (P)
		AIRPORT REFERENCE POINT (ARP)
		AIRPORT ROTATING BEACON
		POWER POLE
		BUILDING CONSTRUCTION
BRL	BRL (F)	BUILDING RESTRICTION LINE (BRL)
		DRAINAGE
		FACILITY CONSTRUCTION
		FENCING
		SECURITY FENCING
VAS	**** PAR	NAVIGATIONAL AID INSTALLATION
		RUNWAY SAFETY AREA
		RUNWAY THRESHOLD LIGHTS
		MIRL
34/16 / 21/3		SECTION CORNER
		SEGMENTED CIRCLE/WIND INDICATOR
1080		TOPOGRAPHIC CONTOURS
		UNIMPROVED ROAD
N 32° 57'		GEOGRAPHIC COORDINATES
H	H	HELICOPTER LANDING PAD

BUILDINGS/FACILITIES

EXISTING	ULTIMATE	DESCRIPTION
1	1	ADMINISTRATION/TERMINAL BUILDING
NA	NA	AIR TRAFFIC CONTROL TOWER (ATCT)
NA	NA	AIRPORT RESCUE/FIRE FIGHTING (ARFF)
4	4	FIXED BASE OPERATION HANGAR
5	NA	CONVENTIONAL HANGAR
6	6	T-HANGAR
7	7	CORPORATE HANGAR
8	NA	UNDERGROUND FUEL STORAGE FACILITY
NA	9	FUEL FACILITY
10	10	SHADE HANGAR
11	NA	FIRE TRAINING FACILITY
12	NA	INDUSTRIAL PARK BUILDING
13	NA	ELECTRICAL BUILDING
14	NA	INDUSTRIAL PARK BUILDING
15	NA	INDUSTRIAL PARK BUILDING
16	NA	INDUSTRIAL PARK BUILDING
17	NA	INDUSTRIAL PARK BUILDING
18	NA	INDUSTRIAL PARK BUILDING
19	NA	INDUSTRIAL PARK BUILDING
20	NA	INDUSTRIAL PARK BUILDING
21	NA	INDUSTRIAL PARK BUILDING
22	NA	INDUSTRIAL PARK BUILDING



MAGNETIC DECLINATION 12° 14'E (1996) (0.2' WEST ANNUALLY)

(121.92) 400 0 0 (121.92) 400 (243.84) 800
SCALE IN FEET (METERS)

WIND COVERAGE

10.5 KNOT (12 MPH) COVERAGE = 99.52%
13 KNOT (15 MPH) COVERAGE = 99.80%
16 KNOT (18 MPH) COVERAGE = 99.94%

SOURCE:
Western Regional Climate Center
Atmospheric Sciences Center
Desert Reseach Institute
P.O. Box 60220
Reno, Nevada
7982 Observations
1995-1996

FAA APPROVAL

The contents of this plan do not necessarily reflect the official views or policy of the FAA. Acceptance of this document by the FAA does not in any way constitute a commitment on the part of the United States to participate in any development depicted herein nor does it indicate that the proposed development is environmentally acceptable in accordance with appropriate public laws.

APPROVAL	DATE
SPONSOR	

MODIFICATIONS TO STANDARD (APPROVAL DATE)

NO.	DESCRIPTION	DATE	BY:
1			

REVISIONS

CASA GRANDE MUNICIPAL AIRPORT

CASA GRANDE, ARIZONA

AIRPORT LAYOUT DRAWING

DRAWN BY: BJD
CHK'D. BY: JJH
APPR. BY: TFO
DATE: JAN. 1997
Q. A.
PEER REVIEW JJH

PROJECT NUMBER
8199.001-010-0113
SHEET NUMBER
2

Morrison Maierle/CSSA INC.
An Employee-Owned Company
ENGINEERS
SCIENTISTS
SURVEYORS
PLANNERS
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4621 North 16th Street Ste. D401 Phoenix, AZ 85016 • Phone: (602) 277-2828

Exhibit 4A
1997 ALP

activity at Casa Grande Municipal Airport is primarily a result of the growing economy and population of the Phoenix metropolitan area, as well as growth within the general aviation industry as a whole. Air travel is the fastest means to cover long distances, and it provides businesses the capability to expand their markets nationally and globally. It provides tourists the means to maximize their vacation experience within the time available. It can be argued that the airlines provide the most successful form of mass transportation in the United States today.

Casa Grande Municipal Airport's role as a general aviation airport in the Phoenix metropolitan area will become increasingly more important to the area transportation system as the metropolitan area spreads to the southeast. The airport's forecasts and analysis indicate future needs for improvements throughout the facility. The airport's runway system will need to be upgraded to accommodate future use by an expanding corporate aircraft fleet that includes larger Gulfstream business jets and very light jet aircraft. Hangar development at Casa Grande Municipal Airport will also be crucial as the demand for aircraft storage units will continue to be strong into the future.

Faced with continual growth in air traffic activity, the runway system may not be able to efficiently accommodate air traffic, and delays would increase. Following the no-build alternative would not allow for airfield capacity improvements or improvements which are needed to meet new Federal Aviation Administration (FAA) design standards for instrument approaches and safety areas.

Following the no-build alternative would also not support the private businesses that have made investments at Casa Grande Municipal Airport. As these businesses grow, the airport will need to be able to accommodate the infrastructure needs of new hangars, expanded apron areas, and automobile parking needs. Each of the businesses on the field provides jobs for local residents, interjects economic revenues into the community, and pays taxes for local government operations.

By owning and operating Casa Grande Municipal Airport, the City of Casa Grande is charged with the responsibility of developing aviation facilities necessary to accommodate aviation demand and to minimize operational constraints. Flexibility must be programmed into airport development to assure adequate capacity should market conditions change unexpectedly. While these objectives may not be all-inclusive, they should provide a point of reference in the alternatives evaluation process.

In essence, the no-build alternative is inconsistent with the long-term goals of the Arizona Department of Transportation (ADOT) – Aeronautics Division and the FAA, which are to enhance local and interstate commerce. This alternative, if pursued, would affect the long-term viability of the airport and its services to the local area.

TRANSFERRING AVIATION SERVICES

Transferring services to another airport, existing or new, is one that will typically be favored by many residing close to an existing airport. Relocating an airport, however, is very complex and expensive.

In addition to the major financial investment, the development of a new general aviation reliever airport also takes a commitment of extensive land area. The location for a new site is usually undeveloped. As a result, the potential for impacts to wildlife habitat and cultural resources is higher than at an existing site, which still has development capability.

A new airport also requires the duplication of investment in airport facilities, supporting access, and infrastructure that are already available at the existing airport site. A new airport site would require the construction of an entirely new airfield, landside support facilities, as well as ground access. In addition, utilities such as water, sewer, electricity, and gas would have to be extended to a new site.

The economic realities of relocating to a new airport must also be considered. The construction of a new general aviation airport can require a financial commitment of several million dollars. Virtually the entire cost of this development is financed by taxes, rates, and charges that are being paid by air travelers and the aviation industry as a whole. While it is appropriate that the airport user pay for aviation facilities and its operation, the airport proprietor still has a duty to be fiscally responsible.

The costs associated with new airport development will continue to limit the number of new major facilities that the aviation industry and the public can absorb. Therefore, it is prudent to maximize existing public investment to meet future needs before abandoning that investment simply to duplicate it elsewhere.

The alternative of relocating services to another airport in the region has also been considered. The closest general aviation airport with similar capabilities is Coolidge Municipal Airport (P08) in Coolidge, Arizona, located approximately 17 nautical miles east of Casa Grande Municipal Airport. According to the Pinal County *Small Area Transportation Study*, the City of Coolidge is anticipated to experience similar population and economic growth patterns to the City of Casa Grande over the planning period. This growth will undoubtedly result in increased general aviation activity at P08. To accommodate this growth, P08 has developed its own plan for airfield and landside development. Taking on Casa Grande's projected demand of 326,900 annual operations and 500 based aircraft by 2027 would tax the capabilities of P08's plan. In addition, P08 is located at a relatively greater distance from the Casa Grande Municipal Airport service area, which encompasses the City of Casa Grande and the immediately surrounding regional area.

Trends in Pinal County have shown overall growth in general aviation ac-

tivity and it is anticipated that these trends will continue into the future. This has caused the State of Arizona to examine the possibility of constructing a new general aviation airport in the western portion of the County. This new airport would improve the County's capacity to handle increased aviation activity. If Casa Grande were to transfer its services to another regional airport, the County-wide system would be negatively impacted.

Due to these factors, it is concluded that transferring aviation services from Casa Grande Municipal Airport to P08 or any other airport in the region is not feasible.

In summary, the development of a new airport or upgrade of an existing airport to replace Casa Grande Municipal Airport would be more expensive, more time-consuming, provide less convenient service, could potentially create a direct cost burden on the local tax base, and would decrease the County's capacity to handle increasing aviation activity. The size and magnitude of the facilities required for a full replacement of Casa Grande Municipal Airport would dictate extensive airfield, landside, and building construction, as well as infrastructure development. The distance from Casa Grande to any other general aviation airport would result in higher costs and inconvenience to existing airport users.

Given the major investment in the existing facilities at Casa Grande Municipal Airport, relocation to another location is not prudent or feasible at this time since the existing airport has the capability to accommodate future demands with far less additional capital.

AIRSIDE DEVELOPMENT CONSIDERATIONS

The purpose of this section is to identify and evaluate various airside development considerations at Casa Grande Municipal Airport to meet program requirements set forth in Chapter Three. Airfield facilities are, by nature, the focal point of an airport complex. Because of their primary role and the fact that they physically dominate airport land use, airfield facility needs are often the most critical factor in the determination of viable airport development alternatives. In particular, the runway system requires the greatest commitment of land area and defines minimum building set-back distances from the runways and object clearance standards. These criteria, depending upon the areas around the airport, must be defined first in order to ensure that the fundamental needs of the airport are met. Therefore, airside requirements will be considered prior to detailing land use development alternatives.

The issues to be considered in this analysis are summarized on **Exhibit 4B**. These issues are the result of the findings of the Aviation Demand Forecasts and Aviation Facility Requirements evaluations, and they include input from the PAC and City of Casa Grande staff.

AIRFIELD CAPACITY

A finding in the aviation facility requirements chapter indicated that the forecast operational demand would reach levels over 160 percent of the Casa Grande Municipal Airport annual service volume (ASV) in the long-term planning horizon. This would generate an estimated 79,500 hours of total annual delay assuming the long-term planning horizon operational levels are achieved.

Two potential methods of improving airfield capacity were analyzed: improving taxiway circulation by adding exit taxiways, and constructing a parallel runway for small (less than 12,500 pounds) aircraft.

The capacity analysis revealed that high-speed exit taxiways on Runway 5-23 are needed to maximize capacity on that runway. The primary advantage of high-speed exit taxiways is that they allow aircraft to exit a runway at higher speeds compared to right-angled exit taxiways. This reduces runway occupancy time, allowing more aircraft to operate on the runway in a given period of time. The alternatives to follow will consider optimum locations for high-speed exits.

Since the long-term forecast operational levels exceed the forecast ASV for Casa Grande Municipal Airport, in addition to taxiway improvements, the construction of a parallel runway should be considered. The construction of a parallel runway to serve the majority of aircraft operating at Casa Grande Municipal Airport (small aircraft weighing less than 12,500 pounds single wheel loading) would ensure that the airfield capacity would be adequate to meet the expected operational levels. The potential parallel runway (Runway 5L-23R) would be aligned north of the existing Runway 5-23 (ultimately 5R-23L), partially on airport property. Thus, land north of existing airport property would need to be acquired. The airfield alternatives to follow will analyze different layouts for the parallel runway.

RUNWAY LENGTH

The facility requirements indicated the primary runway should be planned with a runway length of 8,400 feet to accommodate 75 percent of large aircraft at 90 percent useful load. This recommended runway length is consistent with the FAA runway length requirements contained in FAA AC 150/5325-4A, *Runway Length Requirements for Airport Design*.

Due to the location of State Highway 387 to the east of the runway and the likeliness that it could not be realigned, extending Runway 5-23 to the east is considered impractical. There is, however, land available for development to the southwest of Runway 5-23. Therefore, runway extension alternatives will be considered to the southwest.

The potential parallel runway would primarily serve capacity relief exclusively for small aircraft. The recommended runway length for this type of use is 3,800 feet. The airfield alterna-

AIRSIDE CONSIDERATIONS

- Extend Runway 5-23 to 8,400 feet.
- Meet ARC D-II design standards for Runway 5-23.
- A parallel runway to increase airport capacity.
- Meet ARC B-I (small airplane exclusive) design standards for parallel runway.
- Establish and improve instrument approaches to each runway end utilizing GPS technology.
- Taxiway circulation and runway exits.
- Protection of runway approaches.
- Future land acquisition needs.
- Construct airport perimeter service road.
- Realign drainage canal.
- Locations for an Airport Traffic Control Tower (ATCT).

LANDSIDE CONSIDERATIONS

- Locations for aircraft storage hangar development.
- Apron expansion.
- Vehicle parking locations.
- Road circulation.

Exhibit 4B
KEY PLANNING ISSUES

tives analysis will propose locations for this 3,800-foot parallel runway.

AIRPORT REFERENCE CODE (ARC) DESIGNATION

The design of airfield facilities is based, in part, on the physical and operational characteristics of aircraft using the airport. The FAA utilizes the Airport Reference Code (ARC) system to relate airport design requirements to the physical (wingspan) and operational (approach speed) characteristics of the largest and fastest aircraft conducting 500 or more itinerant operations annually at the airport. While this can at times be represented by one specific make and model of aircraft, most often the airport's ARC is represented by several different aircraft, which collectively conduct more than 500 annual itinerant operations at the airport.

It was determined in Chapter Three, Facility Requirements, that Casa Grande Municipal Airport is currently designed to ARC B-II standards. Ultimately, as business jet activity at Casa Grande Municipal Airport increases the airport's critical aircraft will be in the ARC D-II category. To accommodate these larger and faster business jet aircraft the airport will need to meet ARC D-II design standards.

One of the most notable effects of the ARC D-II design standards is that the Runway 5-23 runway safety area (RSA) and object free area (OFA) will widen and extend 1,000 feet beyond the runway end. Having this extra length and width will make operations safer for aircraft with faster landing and takeoff speeds.

The parallel runway will be planned to be used by small aircraft (ARC B-I small aircraft exclusively) through the planning period.

Table 4A summarizes the ultimate (ARC D-II) design standards for Runway 5-23 and the potential parallel runway (ARC B-I small aircraft). Each of these design standards are met in the proposed airfield alternatives.

PRECISION INSTRUMENT APPROACH

The facility requirements analysis indicated a need for improved instrument approach capabilities at Casa Grande Municipal Airport. Runway 5 is currently equipped with an instrument landing system (ILS) approach, which provides both vertical and course guidance to pilots. This precision instrument approach is available for use in visibility conditions down to a minimum of ½-mile. A medium intensity approach lighting system with runway alignment indicator lights (MALSR) is currently installed at the approach end of Runway 5. This approach lighting system is sufficient; however, should Runway 5 be extended to the southwest, this MALSR will need to be relocated accordingly. The ILS approach to Runway 5 will be sufficient and should be maintained through the planning period.

TABLE 4A
Airfield Safety and Facility Dimensions (in feet)

	Ultimate Runway 5R-23L		Existing Runway 5-23		Potential Parallel Runway 5L-23R
Airport Reference Code (ARC)	D-II		B-II		B-I (small aircraft)
Runway					
Length	8,400		5,200		3,800
Width	100		100		60
Runway Safety Area (RSA)					
Width	500		150		120
Length Beyond Runway End	1,000		300		240
Object Free Area (OFA)					
Width	800		500		250
Length Beyond Runway End	1,000		300		240
Obstacle Free Zone (OFZ)					
Width	400		400		250
Length Beyond Runway End	200		200		200
Precision Obstacle Free Zone (POFZ)					
Width	800		N/A		N/A
Length Beyond Runway End	200		N/A		N/A
Runway Centerline To:					
Hold Line	265		200		125
Parallel Taxiway Centerline	415		240		240
Edge of Aircraft Parking Apron	500		250		125
Parallel Runway	700		N/A		700
Runway Protection Zone (RPZ)					
One mile or greater visibility					
Inner Width	500		500		250
Outer Width	1,010		700		450
Length	1,700		1,000		1,000
Not Lower than ¾-Mile					
Inner Width	1,000		N/A		1,000
Outer Width	1,510		N/A		1,510
Length	1,700		N/A		1,700
Lower than ½-Mile					
Inner Width	1,000		1,000		1,000
Outer Width	1,750		1,750		1,750
Length	2,500		2,500		2,500
Obstacle Clearance	***RWY 5R*** 50:1	***RWY 23L*** 50/34:1	***RWY 5*** 50:1	***RWY 23*** 20:1	***RWY 5L-23R*** 20:1
Taxiways					
Width	35		40		25
Safety Area Width	79		79		49
Object Free Area Width	131		131		89
Taxiway Centerline To:					
Parallel Taxiway/Taxilane	105		105		69
Fixed or Moveable Object	65.5		65.5		44.5
Taxilanes					
Taxilane Centerline To:					
Parallel Taxilane Centerline	97		97		64
Fixed or Moveable Object	57.5		57.5		39.5
Taxilane Object Free Area	115		115		79

Source: FAA Advisory Circular (AC) 150/5300-13, *Airport Design;* 14 CFR Part 77, *Objects Affecting Navigable Airspace*

Runway 23 is currently equipped with a non-precision GPS instrument approach that provides only course guidance. This GPS approach is available for use in visibility conditions down to a minimum of one mile. It may be desirable in the future to improve the instrument approach minimums into Runway 23; therefore, three considerations have been analyzed to accomplish this. The first consideration provides a precision instrument approach with ½-mile visibility minimums. The second consideration achieves ¾-mile visibility minimums with vertical guidance. The third consideration adds the vertical guidance capability but maintains the one mile visibility minimums. The following considerations are depicted on the airfield alternative exhibits.

A precision instrument approach to Runway 23 can be achieved by implementing a Global Navigation Satellite System Landing System (GLS) approach. The GLS utilizes GPS technology, which limits the amount of costly on-site navigation equipment needed at the airport. Like an ILS, a GLS would require the installation of an approach lighting system to achieve ½-mile visibility minimums. A medium intensity approach lighting system (MALS) is considered in the alternatives analysis. The MALS begins 200 feet beyond the runway threshold and extends 1,200 feet into the Runway 23 approach. Due to the location of State Highway 387 and the length of the MALS, a significant portion of Runway 5-23 would need to be relocated to the southwest to allow for the precision GLS approach. The Runway 23 RPZ would increase from its current size of 13.7 acres to 79 acres as a result of the change in approach capabilities. This will have a significant effect on land not owned by the airport east of the highway.

A GLS approach can also be considered to achieve ¾-mile visibility minimums. The difference from the precision GLS approach is that a ¾-mile approach would not require the installation of an approach lighting system and the size of the RPZ is reduced from 79 acres to 49 acres. This would keep the airport from needing to relocate runway pavement to the southwest to make way for an approach lighting system and would also reduce the amount of land on the east side of State Highway 387 that would be impacted by the RPZ.

To achieve vertical guidance while maintaining one mile visibility minimums, an approach procedure with vertical guidance (APV), GPS non-precision approach can be considered. The APV GPS approach would not require an approach lighting system, nor would it require relocating Runway 5-23 pavement. Due to the ultimate change from ARC B-II to D-II design standards for Runway 5-23, the RPZ will increase in size from 14 acres currently to 29 acres even though visibility minimums have not changed.

Each end of the proposed parallel runway is planned for one mile APV GPS non-precision instrument approaches. This would meet the FAA recommendation that all runway ends be equipped with a GPS instrument approach.

AIRPORT TRAFFIC CONTROL TOWER

A potential need for an airport traffic control tower (ATCT) was identified in the facility requirements analysis of this master plan. This alternatives analysis will address this potential need by identifying locations on the airport that would provide a clear line-of-site for airport traffic controllers and limit the height of an ATCT facility.

LAND ACQUISITIONS

When considering different alternatives for airfield expansion, it is common that ultimate facilities and safety areas may extend beyond current airport property boundaries. In these cases, it is recommended that land beyond current airport property boundaries that may be needed for future projects or for the protection of runway approaches is acquired through fee simple acquisition. An alternative to fee simple acquisition is for the airport to acquire an avigation easement from the land owner to prevent incompatible development. Each airfield alternative will plan for the acquisition or easement of various land areas depending on the proposed airfield developments.

AIRPORT PERIMETER SERVICE ROAD

A paved airport perimeter service road is proposed to provide service and emergency vehicles access to all areas of the airfield. The airfield alternatives show proposed alignments for this perimeter service road, which should encompass all airfield facilities. The perimeter service road would be closed to public traffic by use of security gates, which would limit access to authorized personnel.

SEGMENTED CIRCLE/LIGHTED WIND INDICATORS

The airport is currently equipped with a segmented circle and lighted wind indicator near midfield of the airport to aid pilots in determining appropriate traffic patterns and wind direction and intensity. These navigation aids will ultimately fall within the Runway 5R-23L object free area (OFA). It is defined in AC 150/5300-13, *Airport Design*, that the OFA should be cleared of objects protruding above the runway safety area edge elevation. Therefore, the segmented circle and lighted wind indicator should be relocated so that they lay completely outside the OFA. Each airfield alternative depicts the segmented circle and lighted wind indicator relocated to the north to a central location on the airfield with high visibility to pilots operating in local airspace.

DRAINAGE CANAL REALIGNMENT

The City of Casa Grande is currently served by a drainage canal that runs parallel to the existing runway immediately north of the airport and extends through airport property to the southwest. To allow for an extension to Runway 5-23 and other future land-

side developments to the north, the drainage canal should be realigned. Each of the airfield alternatives proposes realigning the canal farther to the north and extending it farther to the west. This would allow for adequate land to the southwest for an 8,400-foot primary runway and for expansion of landside facilities.

AIRSIDE ALTERNATIVES

AIRFIELD ALTERNATIVE I

The proposed airside configuration of Airfield Development Alternative 1 is shown on **Exhibit 4C**. This alternative incorporates the following:

1. Extension of Runway 5 3,650 feet to the southwest. The southwestern extension would include a shift of 450 feet from the 23 end. This relocation will provide room for the greater dimensions of the runway safety areas when the airport upgrades to ARC D-II design standards. The extension of the runway would also necessitate the relocation of the MALSR to the southwest.

2. Construction of a 3,800-foot long, 60-foot wide parallel Runway 5L-23R. This parallel runway would be designed to ARC B-I (small airplane exclusive) standards. It would be located 700 feet northwest of the existing runway centerline. The northeast end of the runway (23R threshold) would be aligned with the ultimate end of Runway 23L. A full-length parallel taxiway would be constructed with the runway at a distance of 240 feet from the centerline.

3. Runway 5 is planned for a ½-mile precision instrument approach, while Runways 23, 5L, and 23R are planned for one-mile visibility non-precision instrument approaches.

4. Construction of a full-length parallel taxiway for Runway 5-23 with a runway separation distance of 415 feet. This is to meet ARC D-II design standards for runways with instrument approach capabilities down to ½-mile visibility.

5. Construction of an airport traffic control tower south of the old terminal building.

This alternative proposes a number of exit taxiway improvements for the primary runway. Two high-speed exit taxiways are proposed for Runway 5. These high-speed exits are spaced so that they are capable of being utilized by a high percentage of aircraft in approach categories A to D. A single high-speed exit is proposed for Runway 23, at a location where it will allow small aircraft to exit the runway quickly.

Holding aprons are proposed at the end of each runway. These holding aprons will help reduce taxiway congestion, while providing a location for pre-flight engine run-ups.

Several land acquisitions are proposed on this alternative. The largest segment of proposed land acquisition encompasses 149 acres and would be needed for the southwesterly extension of the primary runway. Another segment of proposed land acquisition is located north of the airport along State Highway 387. This parcel encompasses 25 acres and is needed for the construction and approach protection of the parallel runway. An easement is proposed for a small segment of land beyond airport property that is encompassed by the parallel runway's western RPZ. This easement would encompass approximately 11 acres. The airport currently has easements on land east of the Runway 23 threshold. These easements are presently adequate; however, the Runway 23 RPZ will increase in size when the primary runway improves to ARC D-II design standards. This will necessitate the acquisition of an easement for approximately five acres within the larger RPZ. The existing and ultimate easement areas are depicted on each of the airfield alternative exhibits with blue and orange shading. This alternative requires approximately 190 additional acres.

Overall, Airfield Alternative I satisfies all airfield considerations that have been identified. The primary runway meets ARC D-II design standards without having to use declared distances; however, some existing pavement on the Runway 23L end would need to be abandoned. One disadvantage is that Runway 23L would be equipped with only a one-mile visibility instrument approach. This could affect the usefulness of the airport in weather conditions that favor a Runway 23L instrument approach.

AIRFIELD ALTERNATIVE II

The proposed airside configuration of Airfield Alternative II is shown in **Exhibit 4D**. The following projects proposed in Airfield Alternative II differ from Airfield Alternative I:

1. Runway 5-23 is planned to shift 1,550 feet to the southwest and extend an additional 3,200 feet to a full length of 8,400 feet. This shift from the 23 end would allow for the installation of a MALS to accommodate a ½-mile visibility minimum precision instrument approach to Runway 23. In addition, the larger RPZ would be kept on airport property to the greatest extent possible, limiting the amount of land that would need to be acquired for easements.

2. Construction of parallel Runway 5L-23R is shifted towards the ultimate center of the airfield. This is to take advantage of as much existing airport property as possible to the north of the existing runway.

3. Construction of an ATCT near the center of the airfield southwest of the existing terminal area.

High speed and right angled exit taxiways are still considered for Runway 5-23 at locations for all aircraft types

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RPZ
250′ x 1,000′x 450′

RPZ
500′ x 1,700′x 1,010′

20′ BRL

Runway 5L-23R (3,800′ x 60′)

240′

450′

700′

Relocated Segmented
Circle / Lighted Wind Cone

Ultimate Runway 5R-23L (8,400′ x 100′)

RPZ
250′ x 1,000′x 450′

35′

35′

35′ BRL

Airport Traffic
Control Tower

Airport Perimeter
Service Road

35′ BRL

3,650′ Extension

415′

35′

State Highway 387

RPZ
1,000′ x 2,500′x 1,750′

MALSR

LEGEND

- Airport Property Line
- Ultimate Airport Property Line
- Building Restriction Line (BRL)
- Realigned Canal
- Runway Safety Area (RSA)
- Object Free Area (OFA)
- Existing Easement
- Ultimate Easement
- Ultimate Airport Pavement
- Ultimate Airport Building
- Pavement to be Removed
- Runway Protection Zone (RPZ)

NORTH

0 1000 2000

SCALE IN FEET

Exhibit 4C
AIRFIELD ALTERNATIVE I

07MP05-4D-3/31/09

RPZ
1,000′ x 2,500′ x 1,750′

RPZ
250′ x 1,000′ x 450′

1,550′

MALS

20′ BRL

Relocated Segmented
Circle / Lighted Wind Cone

240′

35′

35′

Runway 5L-23R (3,800′ x 60′)

Ultimate Runway 5R-23L (8,400′ x 100′)

RPZ
250′ x 1,000′ x 450′

700′

415′

35′

Airport Traffic
Control Tower

State Highway 387

35′ BRL

Airport Perimeter
Service Road

4,750′ Extension

35′ BRL

MALSR

RPZ
1,000′ x 2,500′ x 1,750′

LEGEND

- Airport Property Line
- Ultimate Airport Property Line
- Building Restriction Line (BRL)
- Realigned Canal
- Runway Safety Area (RSA)
- Object Free Area (OFA)
- Existing Easement
- Ultimate Easement
- Ultimate Airport Pavement
- Ultimate Airport Building
- Pavement to be Removed
- Runway Protection Zone (RPZ)

NORTH

0 1000 2000

SCALE IN FEET

Exhibit 4D
AIRFIELD ALTERNATIVE II

to maximize airfield capacity and efficiency.

This airfield alternative proposes a greater amount of land acquisition than Airfield Alternative I. Due to the longer extension of the primary runway in this alternative, the airport would need to acquire approximately 199 acres southwest of the airport. This would accommodate the construction of the runway extension, the parallel taxiway, the relocation of the MALSR, and encompass the RPZ. Two parcels north of existing airport property encompassing a combined 23 acres is planned to be acquired to protect the parallel runway from incompatible development of the adjacent land. This land will also be available for various landside development opportunities. Easements are planned for approximately 10 acres of land encompassed by the Runway 23 RPZ. The amount of non-airport owned land affected by this alternative totals approximately 232 acres.

Airfield Alternative II satisfies each of the airfield considerations. An advantage of this alternative is that the development of the airfield is concentrated more to the west of State Highway 387, which will move airfield operations farther away from incompatible developments east of the highway.

There are several disadvantages as a result of this airfield alternative. A significant portion (1,550 feet) of existing pavement on the existing runway would no longer be useable. As a result, the longer runway extension to the southwest will increase construction costs greatly. This also puts the vast majority of existing landside facilities east of the ultimate end of Runway 23, which can create significant aircraft circulation issues between landside and airside facilities. The Runway 23 RPZ will also encompass a large portion of the existing terminal apron, which would render it unusable. It would also greatly increase taxiway distances to the ultimate Runway 5 threshold. At the same time, the realignment of the drainage ditch would need to be pushed farther to the southwest to allow for the longer runway extension. This will have a negative impact on surrounding land owners' property and could increase the cost of the realignment.

AIRFIELD ALTERNATIVE III

The proposed airside configuration of Airfield Alternative III is shown in **Exhibit 4E**. The following projects proposed in Airfield Alternative III differ from the previous airfield alternatives:

1. Construction of a 3,200-foot extension of the primary runway to the southwest. This would achieve a runway length of 8,400 feet. Declared distances and a 450-foot displaced threshold are used to meet ARC D-II design standards. Declared distances are discussed in detail below. Runway 23 would be equipped with a ¾-mile non-precision instrument approach.

2. The construction of the parallel runway is shifted to meet up

with the existing end of Runway 23.

3. Construction of an ATCT facility to the west of the old terminal building.

As it was pointed out, this airfield alternative would implement declared distances to achieve critical ARC D-II design standards for the runway safety area (RSA) and object free area (OFA) at the Runway 23L end. Declared distances are used by the FAA to define the effective runway length for landing and takeoff when a displaced or relocated threshold is involved. Declared distances are defined as the amount of runway that is declared available for certain takeoff and landing operations. Appendix 14 of FAA AC 150/5300-13 describes the four types of declared distances as follows:

Takeoff Run Available (TORA) – The runway length declared available and suitable for the ground run of an airplane taking off.

Takeoff Distance Available (TODA) – The TORA plus the length of any remaining runway and/or clearway beyond the far end of the TORA.

Accelerated-Stop Distance Available (ASDA) – The runway plus stopway length declared available for the acceleration and deceleration of an aircraft aborting a takeoff.

Landing Distance Available (LDA) – The runway length declared available and suitable for landing.

The 3,200-foot extension would achieve a total runway pavement length of 8,400 feet. Aircraft departing and arriving on Runway 5 would have 7,950 feet as the 450-foot displaced threshold at the end of the runway would need to be subtracted from the pavement length to meet the 1,000-foot extended RSA and OFA standards that allow for overshoots. Aircraft departing on Runway 23 would have the full runway length (8,400 feet) for departure as the displaced threshold can be used for departure operations. Aircraft arriving on Runway 23 could not touchdown until after the 450-foot displaced threshold, which results in 7,950 feet of LDA. This allows for a 1000-foot safety area for undershoot potential.

In this alternative, Runway 23 is equipped with a ¾-mile non-precision GLS instrument approach. The ¾-mile minimums are the best that can be achieved without an approach lighting system. The larger RPZ will result in a need for the airport to acquire easements for approximately eight acres of land east of State Highway 387. The construction of the parallel runway and its associated safety areas will require the airport to acquire 25 acres of land adjacent to the highway, and an additional five acres at the end of the Runway 5L RPZ. The 3,200-foot extension of the primary runway and the relocation of the MALSR will require the acquisition of 133 acres of land to the southwest. The amount of land affected by the proposed projects in this alternative totals approximately 171 acres.

There are several advantages to this airfield alternative. Unlike the pre-

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RPZ
250′ x 1,000′ x 450′

RPZ
1,000′ x 1,700′ x 1,510′

450′ Displaced Threshold

20′ BRL

240′

700′

Runway 5L-23R (3,800′ x 60′)

35′

35′

Ultimate Runway 5R-23L (8,400′ x 100′)

Airport Traffic Control Tower

35′ BRL

RPZ
250′ x 1,000′ x 450′

Relocated Segmented Circle / Lighted Wind Cone

415′

950′

35′ BRL

3,200′ Extension

35′

Airport Perimeter Service Road

TORA / TODA / ASDA / LDA 7,950′

LDA 7,950′

TORA / TODA / ASA 8,400′

Total Pavement 8,400′

RPZ
1,000′ x 2,500′ x 1,750′

MALSR

State Highway 387

NORTH

0 1000 2000

SCALE IN FEET

LEGEND

- Airport Property Line
- Ultimate Airport Property Line
- Building Restriction Line (BRL)
- Realigned Canal
- Runway Safety Area (RSA)
- Object Free Area (OFA)
- Existing Easement
- Ultimate Easement
- Ultimate Airport Pavement
- Ultimate Airport Building
- Runway Protection Zone (RPZ)

KEY

ASDA: Accelerated Stop Distance Available
LDA: Landing Distance Available
TODA: Takeoff Distance Available
TORA: Takeoff Run Available

Exhibit 4E
AIRFIELD ALTERNATIVE III

vious alternatives, this alternative makes use of all existing runway pavement while achieving ARC D-II design standards. This results in a shorter extension to the primary runway, which will save on construction costs. Since a displaced threshold is implemented, the existing landside facilities would not be affected by the closure of runway pavement. Another advantage is that Airfield Alternative III has the least amount of impact on surrounding land with only 171 acres needed for acquisition or easement.

A disadvantage of this alternative is that due to declared distances the FAA recommended useable runway length of 8,400 feet will not be available to aircraft operating on Runway 5. Also, the parallel runway's alignment would result in the need to purchase land adjacent to State Highway 387, which could be considered prime land for various types of developments. As a result, the land might be valued higher, making it more expensive for the airport to purchase.

AIRFIELD ALTERNATIVE IV

The proposed airside configuration of Airfield Alternative IV is shown in **Exhibit 4F**. Airfield Alternative IV proposes many of the same airfield improvements as Airfield Alternative I. Differences from Airfield Alternative I include:

1. The 3,800-foot long parallel runway is proposed to be located 700 feet south of the proposed extension to existing Runway 5-23.
2. The construction of the ATCT on the north side of the airfield near the center of the airfield system as identified on **Exhibit 4F**.

The construction of the parallel runway in the proposed southwestern location would leave the north side of the airport available for more landside development than the previous airfield alternatives. Drawbacks to this location for the parallel runway are that approaches to the ultimate Runway 23 would extend over existing landside facilities and areas of the Casa Grande Airpark that is available for development. However, none of these facilities would fall within the Runway 23 RPZ. The location of these facilities east of the end of Runway 23 will greatly limit future runway extension possibilities to the east.

Land acquisition required for the proposed airfield improvements would total approximately 201 acres. These land acquisitions would allow for the construction of a 3,650-foot extension to Runway 5-23, the installation of a MALSR, the construction of an airport perimeter service road, construction of an ATCT, and the construction of the parallel runway.

LANDSIDE DEVELOPMENT CONSIDERATIONS

The purpose of this section is to identify and evaluate various viable landside development alternatives at Casa Grande Municipal Airport to meet program requirements set forth in

Chapter Three. While the airfield is comprised of facilities where aircraft movement occurs (runways, taxiways, ramps), other "landside" functions occur outside of this area. The primary functions to be accommodated on the landside of Casa Grande Municipal Airport include terminal services, aircraft storage hangar development, aircraft parking aprons, and automobile parking and access. The interrelationship of these functions is important to defining a long-range landside layout for general aviation uses at the airport. Runway frontage should be reserved for those uses with a high level of airfield interface or need of exposure. Other uses with lower levels of aircraft movements or little need for runway exposure can be planned in more isolated locations.

Landside development considerations are summarized on **Exhibit 4B**. The following sections briefly describe proposed landside facility improvements.

TERMINAL SERVICES

Currently, the City of Casa Grande provides a variety of terminal services. Typical services that are provided at a general aviation airport include passenger waiting areas, a pilot's lounge and flight planning area, concessions, management, storage, and various other needs. The facility requirements analysis indicated that through the long-term planning horizon, Casa Grande Municipal Airport will need an additional 1,300 square feet of terminal service area. The landside alternatives analysis will identify potential locations for fixed base operator (FBO) development to meet the projected terminal service needs. The FBO facilities depicted on the landside alternative exhibits are 10,000 square-foot facilities, which will allow for their cross-utilization as aircraft storage facilities and terminal service providers.

AIRCRAFT STORAGE HANGARS

The facility requirements analysis indicated a need for the development of various types of aircraft storage hangars. This includes single aircraft storage facilities such as T-hangars, box hangars, and shade hangars, and clearspan conventional hangars for accommodating several aircraft simultaneously. Limited utility services are needed for these areas. Typically, this involves electricity, but may also include water and sanitary sewer. Due to the high number of hangar storage positions projected for Casa Grande Municipal Airport, the landside alternatives analysis will focus primarily on utilizing existing airport property to provide adequate storage hangar facilities.

AIRCRAFT PARKING APRON

As the number of transient and based aircraft increase through the planning period, it will be important to provide adequate aircraft parking positions. It will be particularly important as turboprop and jet aircraft operations increase at Casa Grande Municipal Airport that there is adequate parking for these larger, heavier aircraft. The landside alternative analysis will

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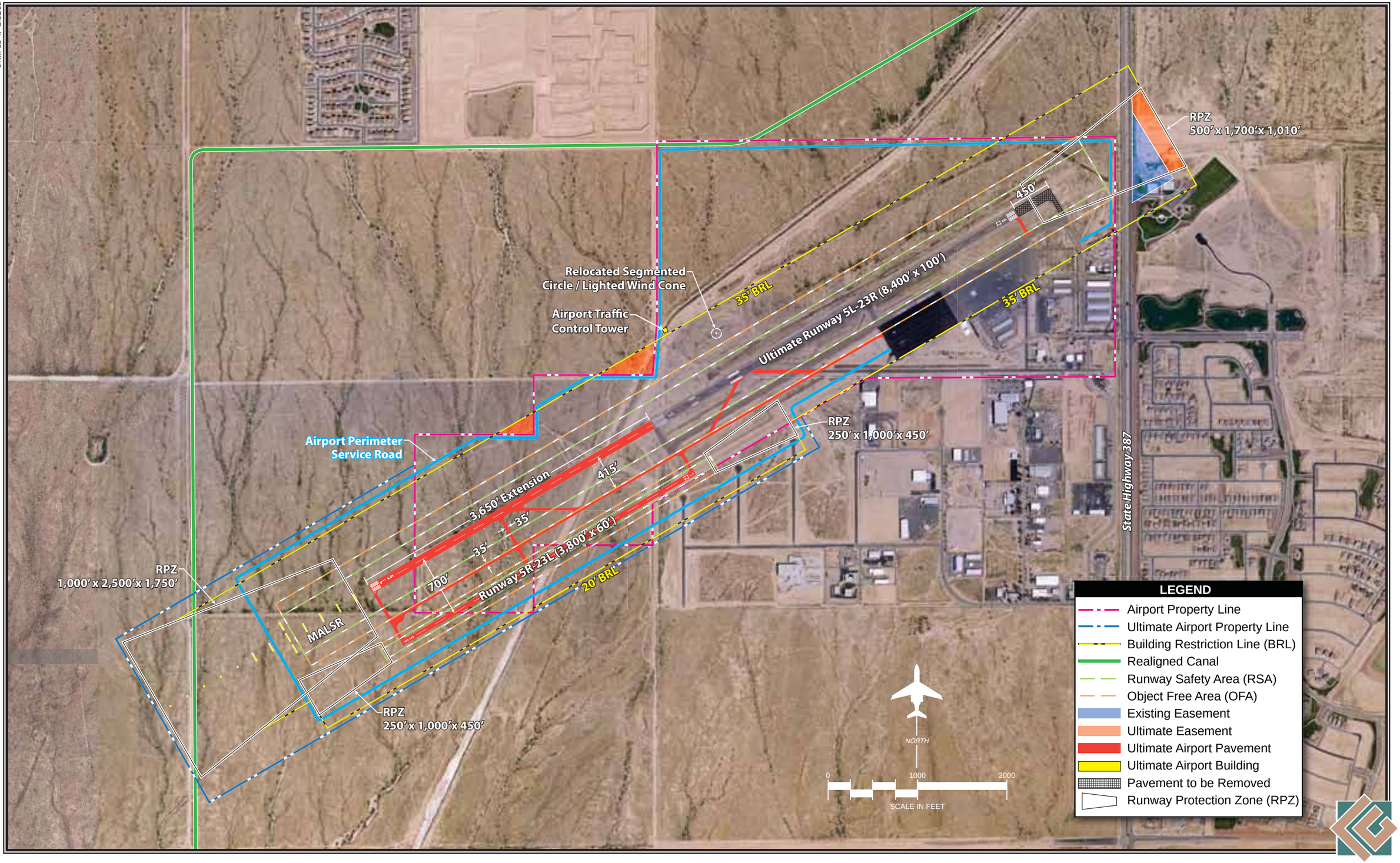


Exhibit 4F
AIRFIELD ALTERNATIVE IV

identify potential locations for fixed-wing and rotorcraft parking apron expansion.

AUTOMOBILE PARKING

As based aircraft and operations at Casa Grande Municipal Airport grow, automobile parking spaces will need to be increased. Existing automobile parking spaces at the airport are located adjacent to the terminal building. Future areas of automobile parking expansion will be examined in each landside alternative. This will primarily consist of parking lots adjacent to the larger box and conventional hangar developments.

LANDSIDE ALTERNATIVES

LANDSIDE ALTERNATIVE I

The layout for Landside Alternative I is depicted on **Exhibit 4G**. This and each subsequent landside development alternative associates to an airfield layout with the parallel runway north of the existing runway, but with slight modifications can be implemented with any airfield development concept.

Hangar development in this alternative includes a mixture of T-hangar, shade hangar, and box hangar facilities in the existing landside area. A larger conventional hangar that could be utilized by an FBO is located adjacent the Native Air facility. Several box hangar facilities are planned at the east end of Taxiway E. The development of this area for hangars would require W Piper Avenue to be severed and gated so that automobiles could not access the taxiway.

Three large T-hangar facilities are planned to the southwest of the existing landside area. An adjacent apron would provide parking positions for various sizes of fixed-wing aircraft and rotorcraft. A self-service Avgas fuel station would also be located at the southwest corner of this area to provide for an alternate location for aircraft to fuel. This would eliminate the need for aircraft to taxi longer distances to the existing fueling facilities.

Apron expansion would be focused primarily to the northeast of the existing terminal apron, and to the southwest along the parallel taxiway. Helicopter parking is planned for the existing parking lot adjacent to the old terminal building. This is a previously planned project that is included in each of the landside development alternatives. Additional helicopter parking is planned immediately west of the newly constructed apron. A wash rack is planned on the location of the existing old terminal building.

Once the existing landside area is built-out, it will be necessary to plan for the development of land north of the parallel runway. This alternative proposes the construction of T-hangar and box hangar facilities. An aircraft maintenance area and a self-service fuel island are also planned on the north side as an alternative to locating an FBO in this new development area. In addition to these facilities, a full-length parallel taxiway is also planned to the northwest of the parallel runway to serve the landside developments.

Access to these facilities would be provided by an access road from State Highway 387.

Landside Alternative I provides for an additional 58 box/conventional hangar facilities, approximately 214 individual T-hangar units, and 24 individual shade hangar units. Apron expansion in this alternative totals approximately 54,000 square yards.

LANDSIDE ALTERNATIVE II

The layout for Landside Alternative II is depicted on **Exhibit 4H**. This landside alternative corresponds to the projects proposed in Airfield Alternative II. The primary focus of the existing terminal area in this alternative is to develop larger box/conventional hangars. The majority of the T-hangar and smaller box hangar development is planned for the north side of the airport.

In this landside alternative, West Airport Road would lead into a large parking lot that would serve 12 box hangars and three large conventional hangars. Each of these hangars would have access to the airfield via the apron or Taxiway E. A wash rack is planned adjacent to the conventional hangar facilities. Small additions to two existing T-hangar facilities are planned, as well as the construction of a shade hangar facility adjacent to the Native Air and Sunshine Aviation facilities. Six box hangars are planned to the south of West Airport Road.

In this landside alternative, if Runway 23L is equipped with a ½-mile precision instrument approach, the RPZ would encompass the existing apron. As a result, approximately 9,300 square yards of existing apron would not be able to be used for aircraft parking.

Development on the north side of the airport would include several T-hangar facilities, box hangars, and shade hangars. A large conventional hangar is also planned for potential FBO development. Fuel storage on the north side is also planned so that aircraft would not have to taxi through the airfield system to reach the existing fuel facilities.

Landside Alternative II provides for an additional 94 box/conventional hangars, 174 individual T-hangar units, and 68 individual shade hangar units. Apron expansion in this alternative, taking into account lost apron, totals approximately 42,000 square yards.

LANDSIDE ALTERNATIVE III

The layout for Landside Alternative III is depicted on **Exhibit 4J**. This landside alternative correlates to Airfield Alternative III. The existing landside facility area in this alternative is utilized primarily for the development of small aircraft oriented storage facilities such as T-hangars and small box hangars. This alternative proposes relocating the Sunshine Aviation, Native Air, and Fire Training facilities to allow for the development of T-hangars and box hangars. A wash rack is proposed at the north end of this T-hangar development area.

07MP05-4G-5/06/08

Box Hangars
Aircraft Maintenance Area
Self Service Fuel Fuel Island
T-Hangars
Runway 5L-23R (3,800' x 60')
20' BRL
Runway 5R-23L (8,400' x 100')
Wash Rack
ATCT
T-Hangar
Helicopter Parking
Helicopter Parking
Shade Hangars
T-Hangars
FBO
Box Hangars
Box Hangars
Box Hangars
T-Hangar
35' BRL
T-Hangar
T-Hangar
Self Serve Avgas
State Highway 387
NORTH
0
500
1000
SCALE IN FEET

LEGEND

- Airport Property Line
- Building Restriction Line (BRL)
- Realigned Canal
- Ultimate Airport Pavement
- Ultimate Airport Building
- Ultimate Airport Roads / Parking
- Pavement to be Removed
- Runway Protection Zone (RPZ)

Exhibit 4G
LANDSIDE ALTERNATIVE I

07MP05-4H-5/14/08

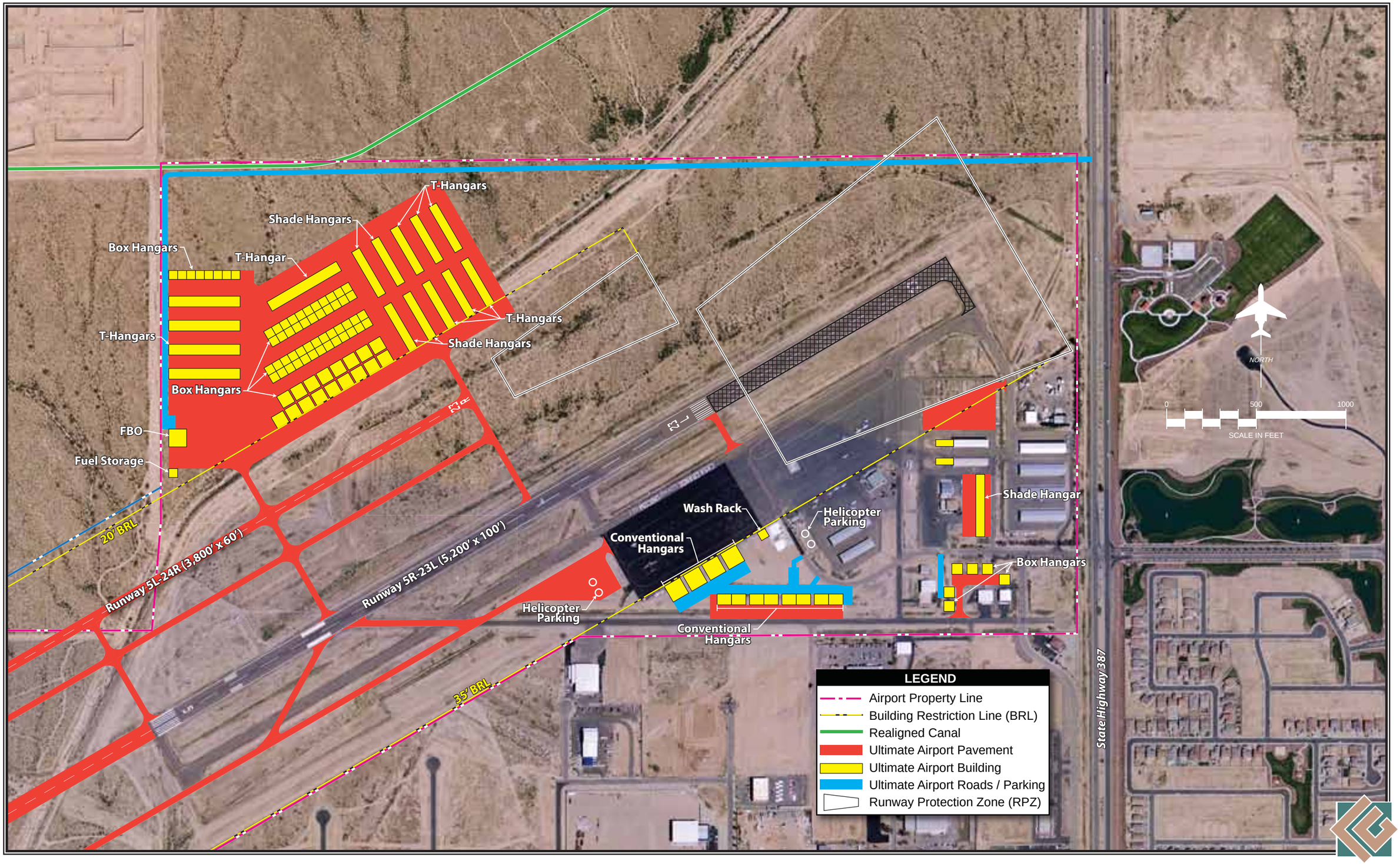


Exhibit 4H
LANDSIDE ALTERNATIVE II

07MP05-4J-5/08/08

NORTH

0 500 1000

SCALE IN FEET

Box Hangars

T-Hangars

Conventional Hangars

Fuel Storage

FBO

Runway 5L-23R (3,800' x 60')

20' BRL

Runway 5R-23L (8,400' x 100')

35' BRL

Wash Rack

T-Hangars

T-Hangars

Terminal Expansion

T-Hangars

Helicopter Parking

Box Hangars

Conventional Hangars

ATCT

Box Hangars

Conventional Hangars

Helicopter Parking

Box Hangars

Conventional Hangars

State Highway 387

LEGEND

- Airport Property Line
- Building Restriction Line (BRL)
- Realigned Canal
- Ultimate Airport Pavement
- Ultimate Airport Building
- Ultimate Airport Roads / Parking
- Runway Protection Zone (RPZ)

Exhibit 4J
LANDSIDE ALTERNATIVE III

The area to the southwest of the terminal would be developed with a combination of larger conventional hangars for specialty operators and FBOs and smaller box hangars. The planned conventional hangars would have frontage onto the newly constructed apron or access to Taxiway E. The terminal building is planned to be expanded to the northeast to accommodate higher traffic flows projected in the future. Several box hangars and conventional hangars are planned to the south of West Airport Road.

Several small conventional hangars and a large conventional hangar for a potential FBO along with a fuel storage site are planned for the north side. These facilities would be located adjacent to a large aircraft parking apron. Additional T-hangar and box hangar development is planned to the west with the potential of continued apron and hangar expansion to the southwest of these facilities. A partial-parallel taxiway is also planned to the north of the parallel runway to serve the north side facilities.

Landside Alternative III provides for an additional 85 box/conventional hangars, and 146 individual T-hangar units. Apron expansion in this alternative totals approximately 55,000 square yards.

SUMMARY

The process utilized in assessing airside and landside development alternatives involved a detailed analysis of short and long-term requirements, as well as future growth potential. Current airport design standards were considered at each stage of development.

These alternatives present an ultimate configuration of the airport that would need to be able to be developed over a long period of time. The next phase of the Master Plan will define a reasonable phasing program to implement a preferred master plan development concept over time.

Upon review of this chapter by the City of Casa Grande, the PAC, and the public, a final Master Plan concept can be formed. The resultant plan will represent an airside facility that fulfills safety and design standards, and a landside complex that can be developed as demand dictates.

The preferred master plan development concept for the airport must represent a means by which the airport can grow in a balanced manner, both on the airside as well as the landside, to accommodate forecast demand. In addition, it must provide for flexibility in the plan to meet activity growth beyond the 20-year planning period.

The remaining chapters will be dedicated to refining these basic alternatives into a final development concept with recommendations to ensure proper implementation and timing for a demand-based program.

Chapter Five

AIRPORT PLANS

Airport Plans

The planning process for the Casa Grande Municipal Airport Master Plan has involved several analytic efforts in the previous chapters intended to project potential aviation demand, establish airside and landside facility needs, and evaluate options for improving the airport to meet those airside and landside facility needs. The process, thus far, has included the presentation of two phase reports (representing the first four chapters of the Master Plan) to the Planning Advisory Committee (PAC). A plan for the use of Casa Grande Municipal Airport has evolved considering their input. The purpose of this chapter is to describe, in narrative and graphic form, the plan for the future use of Casa Grande Municipal Airport.

AIRFIELD PLAN

The airfield plan for Casa Grande Municipal Airport focuses on meeting Federal Aviation Administration (FAA) design and safety standards and improving airfield capacity to meet forecast demand levels. Airfield improvements such as the extension of Runway 5-23 to an ultimate length of 8,400 feet, the construction of new exit taxiways, and a 3,800-foot parallel runway will improve airfield capacity and the airport's ability to accommodate a wider range of business jet aircraft. Much of the airfield plan relies on the realignment of the drainage canal that runs along the northern border of airport property and extends to the southwest beyond the end of

Runway 5. This realignment is necessary to provide adequate land for the proposed airfield projects. Additional airfield improvements will be undertaken to meet FAA design standards for each runway. **Exhibit 5A** graphically depicts the proposed airfield improvements. The following text summarizes the elements of the airfield plan.

AIRFIELD DESIGN STANDARDS

As discussed in Chapter Three, Facility Requirements, Runway 5-23 at Casa Grande Municipal Airport is currently designed to Airport Reference Code (ARC) B-II standards. Business jet activity at the airport has begun to increase in recent years and will continue to become a larger portion of daily operations. Ultimately, the airport's critical aircraft from which the airport's safety and design standards are based will be in the ARC D-II category. This means the primary runway (Runway 5-23) and its associated taxiways will be planned to accommodate business jet aircraft up to the Gulfstream IV.

There are several notable effects of upgrading to ARC D-II design standards. These include the need to relocate Taxiway B to a distance of 415 feet from the Runway 5-23 centerline, and the expansion of the primary runway's safety areas.

Taxiway B is currently located at a distance of 300 feet from the centerline of Runway 5-23, which meets ARC B-II design standards. However, as higher performance aircraft utilize the airport in greater frequency, it will be necessary to extend the runway-taxiway separation distance to 415 feet to provide an additional safety buffer. The relocated Taxiway B will extend the full ultimate length of Runway 5-23 (8,400 feet) and will be equipped with holding aprons at both ends.

The area most greatly impacted by the expansion of the safety areas is the Runway 23 end and its runway protection zone (RPZ). FAA AC 150/5300-13, *Airport Design*, states that the function of the RPZ is "to enhance the protection of people and property on the ground" through owner control of the RPZ and maintaining the RPZ clear of incompatible objects. The airport currently has easements on approximately eight acres of land northeast of airport property that encompasses a portion of the existing RPZ. To ensure that the ultimate RPZ does not extend beyond the easement areas, the airfield development plan recommends shifting the Runway 23 threshold 650 feet to the southwest. This would result in the ultimate RPZ boundary not extending beyond the easement areas northeast of airport property. The ultimate runway safety area (RSA) and object free area (OFA) would also be fully encompassed by airport property. The pavement beyond the ultimate Runway 5 threshold would be maintained as a blast pad. A blast pad is used to provide blast erosion protection beyond runway ends.

The parallel runway is planned to be designed to ARC B-I (small airplane exclusive) standards. This will allow

07MP05-5A-9/23/08

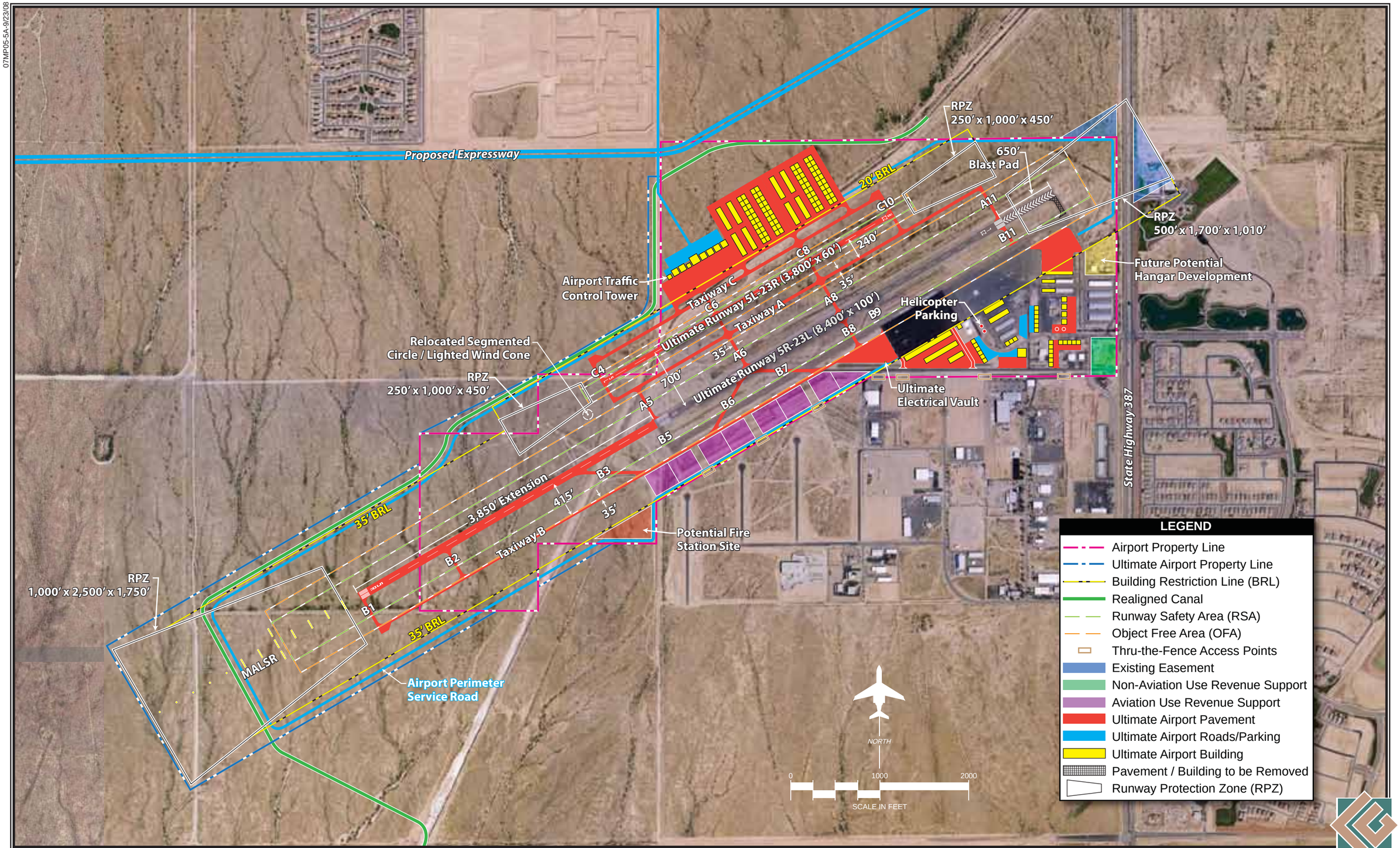


Exhibit 5A
AIRFIELD DEVELOPMENT CONCEPT

it to be used by smaller aircraft weighing less than 12,500 pounds SWL, which will continue to be the majority of aircraft operating at Casa Grande Municipal Airport.

AIRFIELD DEVELOPMENT

Airfield development focuses primarily on the extension to Runway 5-23, the construction of a parallel runway, and the construction of additional exit taxiways. Runway 5-23 is planned to be extended by 3,850 feet to the southwest. This extension includes a shift of 650 feet of pavement from the northeast end of the runway and will achieve an ultimate runway length of 8,400 feet. This extension will allow larger business jet aircraft to operate at Casa Grande Municipal Airport year round with useful loads capable of reaching the east coast. In addition to the extension, Runway 5-23 is planned to be strengthened to 74,000 pounds dual wheel loading (DWL). Strengthening the runway will allow it to be used by larger business jet aircraft such as the Gulfstream IV. To accommodate the 3,850-foot extension, approximately 156 acres of land southwest of existing airport property will need to be acquired. This land will also guarantee control of land encompassed by the ultimate Runway 5R RPZ and allow for the relocation of the medium intensity approach lighting system with runway alignment indicator lights (MALSR) approach lighting system. Runway 5-23 is currently equipped with precision approach path indicator (PAPI-2) navigational aids. These PAPIs will need to be relocated to the ultimate ends of the runway and should be maintained through the planning period.

High-speed exits and right-angled exits are planned for the primary runway to reduce runway occupancy time and to improve airfield capacity. These exit taxiways are spaced accordingly to maximize their impact and usefulness.

The airfield improvements that have been described thus far would improve airfield capacity to serve the demand at the airport to a certain operational level. Once the operational level at the airport exceeds the capacity of the single runway system and aircraft experience long delays, a parallel runway is planned to relieve these capacity issues. The parallel runway is planned to be located 700 feet northwest of the Runway 5-23 centerline. The parallel runway's northeast end will be offset from the end of the ultimate Runway 23L end by approximately 1,020 feet to allow for the Runway 23R RPZ to lie within existing airport property. The parallel runway will have dimensions of 3,800 feet in length and 60 feet in width. These dimensions and its pavement strength of 12,500 pounds SWL will serve the parallel runway's design aircraft (small airplane exclusive). The parallel runway is planned to be equipped with medium intensity runway lighting (MIRL), precision approach path indicator (PAPI-4) navigational aids, and one mile visibility non-precision GPS instrument approaches to both ends. Non-precision runway markings are planned to accommodate the non-precision instrument approach capabilities of the parallel runway.

To ensure efficient taxiway circulation, the parallel runway is planned to have 35-foot wide full-length parallel taxiways located 240 feet northwest (Taxiway C) and southeast (Taxiway A) of the runway centerline. Several right-angled exit taxiways will provide access to the parallel taxiways, to the existing landside facilities area at the southeastern section of the airport, and to the future north landside development area. Each of these new taxiways will be equipped with medium intensity taxiway lighting (MITL).

In addition to approximately 156 acres of land needed for the extension to Runway 5-23, an additional 57 acres is planned for acquisition. These 57 acres would accommodate the construction of the parallel runway, a parallel taxiway, the airport perimeter service road, and for the control of land encompassed by the Runway 5L RPZ. Approximately 213 acres of land is proposed to be acquired through fee simple acquisition for future airfield development projects. The ultimate property line is represented by a blue dashed line on **Exhibit 5A**.

The segmented circle and lighted wind indicator located north of Runway 5-23 would ultimately be within the runway object free area (OFA). The airfield development concept relocates the segmented circle and lighted wind indicator to the west of proposed parallel Taxiway A, north of the center of the ultimate Runway 5-23, and outside the ultimate OFA.

A paved airport perimeter service road is planned to allow service and emergency vehicles access around the airfield perimeter. The ultimate design of this perimeter road is depicted on **Exhibit 5A**. The perimeter road should be planned to remain clear of all runway safety areas where possible.

A site for the construction of an airport traffic control tower (ATCT) is shown on the north side of the airport. Once the airport has completed a benefit cost analysis and is approved for either an FAA operated ATCT or for the "Contract Tower" program, the airport will be able to move ahead with the construction of an ATCT. The north side of the airport will provide controllers with an unobstructed view of all aircraft movement areas.

LANDSIDE PLAN

The landside plan for Casa Grande Municipal Airport has been devised to safely, securely, and efficiently accommodate potential aviation demand. The Facility Requirements chapter indicated that there is high potential for aircraft storage hangar demand throughout the planning period. Casa Grande Municipal Airport has limited land available for development in the existing landside development area (south side). Once the south side is built-out, the north side of the airport will provide a location for hangar and landside facility expansion. The landside development concept is shown in detail on **Exhibit 5B**. The Landside Development Concept includes locations for FBO development, hangar development, and business development.

07MP05-5B-12/4/09

Proposed Expressway

0 500 1000
SCALE IN FEET

NORTH

Box Hangars
T-Hangars
Box Hangars
T-Hangars
Conventional Hangars
Fuel Storage
FBO
Airport Traffic Control Tower
Conventional Hangars

Ultimate Runway 5L-23R (3,800' x 60')
Ultimate Runway 5R-23L (8,400' x 100')

240'
240'
700'
35'
35'
35'
415'

20' BRL
35' BRL

Airport Perimeter Service Road
650' Blast Pad
35'

Wash Rack
Shade Hangars
Box Hangars
Helicopter Parking
Box Hangars
Helicopter Parking
Box Hangars
3.0 Acres
3.0 Acres

State Highway 387

T-Hangars
Box Hangars
Conventional Hangar

1.4 Acres
0.8 Acres
1.9 Acres
1.9 Acres
1.9 Acres
1.9 Acres
1.9 Acres
1.9 Acres

Relocated Segmented Circle / Lighted Wind Cone

LEGEND

- Airport Property Line
- Ultimate Airport Property Line
- Building Restriction Line (BRL)
- Realigned Canal
- Runway Safety Area (RSA)
- Object Free Area (OFA)
- Existing Easement
- Non-Aviation Use Revenue Support
- Aviation Use Revenue Support
- Ultimate Airport Pavement
- Ultimate Airport Roads/Parking
- Ultimate Airport Building
- Potential Hangar Development
- Pavement / Building to be Removed
- Runway Protection Zone (RPZ)
- Thru-the-Fence Access Points

Exhibit 5B
LANDSIDE DEVELOPMENT CONCEPT

South side landside development includes the construction of multiple hangar facilities. Three T-hangars are planned south of the west apron. Combined, these T-hangar facilities would have a storage capacity of 52 individual aircraft. Six 2,500 square foot box hangars are planned to the east of these T-hangars. Two taxilanes from the existing west apron to Taxiway E will provide access to the airfield for these hangars and make aircraft circulation in this area more efficient. An 11,000 square yard expansion is planned for the west apron to provide additional aircraft parking spaces.

A 10,000 square foot conventional hangar is planned on Taxiway E with an adjacent 3,700 square yard apron. This facility is large enough to accommodate multiple single and multiengine aircraft and could potentially be used by a fixed base operator or specialty operator.

East of the conventional hangar, 11 2,500 square foot box hangars are planned. Each of these hangars would be airfield accessible via Taxiway E. Two shade hangars providing 20 aircraft parking positions are planned north of the two existing shade hangars on the terminal apron adjacent to the terminal building. Three additional 2,500 square foot box hangars are planned south of the existing shade hangars. The existing parking lot for the old terminal building is planned to be resurfaced for future helicopter parking use.

The existing unpaved apron north of the existing T-hangar facilities is planned to be paved providing an additional 15,400 square yards of aircraft parking apron. The existing T-hangar facilities north of Sunshine Aviation are planned to be extended to the west, adding six storage units each. One new 14-unit T-hangar facility is planned to be constructed north of the existing T-hangars. Six 2,500 square foot box hangars are planned to the west of the Native Air facility and four 3,600 square foot box hangars are planned to the east of the Native Air and Sunshine Aviation facilities. A 6,400 square yard apron is planned adjacent to the easterly box hangars, which would provide for additional aircraft parking and potential helicopter parking spaces.

The terminal parking lot is planned to be expanded by approximately 2,125 square yards. Additional automobile parking is planned along West Airport Road adjacent to several hangar facilities.

The existing fire training facility has been set aside as a 3.0 acre potential future hangar development parcel. There are currently no plans to relocate the fire training facility; however, if in the future this facility is relocated, this land could be used for additional T-hangar development. A 3.2 acre parcel depicted on **Exhibit 5A** south of the Runway 5 extension has been designated as a potential fire training facility site. From this site, emergency responders would have quick access to the airfield and all other areas of the airport.

Remaining development on the south side of the airport includes eight avia-

tion related business development parcels along Taxiway B ranging in size from 1.9 acres to 0.8 acres. The airport can lease this land to private developers for revenue support. These parcels will be vehicle accessible from the industrial airpark to the south. The private developers of this land will be responsible for the construction of taxilanes from a hangar facility to Taxiway B. These parcels are spaced to allow for potential "through-the-fence" taxilanes to the Airport Industrial Airpark to the south. An additional three "thru-the-fence" access points are identified along Taxiway E. Airport access fees have been established by the City so that "through-the-fence" operators do not receive an unfair advantage over on-airport businesses. These access points will need to be gated to prevent access to the airfield by unauthorized users.

An additional business development parcel is located at the southeast corner of airport property along State Highway 387. This 3.0 acre parcel has been set aside for non-aviation related business development such as a restaurant.

North side development includes the construction of seven large conventional hangar facilities for the potential use by an FBO or specialty operator. A 30,000 square yard apron is planned adjacent to these conventional hangars for aircraft parking. A fuel storage facility is also planned for the north side so that aircraft stored on the north side would not need to taxi through the airfield system to the south side for fuel. Eight additional T-hangar facilities providing approximately 96 storage units and 80 box hangar facilities are planned to the east of the apron. Ground access to the north side would extend from the "conceptual" Val Vista Expressway as proposed in the DesertColor Conceptual Master Plan or from the existing W Val Vista Boulevard north of the airport.

AIRPORT LAYOUT PLAN DRAWINGS

Per FAA and Arizona Department of Transportation (ADOT) requirements, an official Airport Layout Plan (ALP) has been developed for Casa Grande Municipal Airport. The "Draft" ALP drawing set (Sheets 1 through 9) can be found at the end of this chapter. The airport layout drawing (ALD) (**Sheet 1**) graphically presents the existing and ultimate airport layout. The ALP is used, in part by the FAA and ADOT, to determine funding eligibility for future development projects. The ALP was 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 permits the user to focus in on any section of the airport at a 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.

A number of related drawings, which depict the ultimate airspace and landside development, are included with the ALP. The following provides a

brief discussion of the additional drawings included with the ALP:

Airport Airspace Drawing (Sheet 2) – The Airport Airspace Drawing is a graphic depiction of the Title 14 Code of Federal Regulations (CFR) Part 77, *Objects Affecting Navigable Airspace*, regulatory criterion. The Airport Airspace Drawing is intended to aid local authorities in determining if proposed development could present a hazard to the airport and obstruct the approach path to a runway end. This plan should be coordinated with local land use planners.

Runway Approach Zone Profiles (Sheet 3) – These drawings provide both plan and profile views of the 14 CFR Part 77 approach surfaces for each runway end. A composite profile of the extended ground line is depicted with obstructions identified where they exist.

Inner Portion of the Approach Surface Drawings (Sheets 4 through 6) – The Inner Portion of the Approach Surface Drawings are scaled drawings of the runway protection zone (RPZ) for each runway end. A plan and profile view of each RPZ is provided to facilitate identification of obstructions that lie within these safety areas. Detailed obstruction and facility data is provided to identify planned improvements and the disposition of obstructions (as appropriate).

Terminal Area Plan (Sheet 7) – The terminal area drawing provides greater detail concerning landside improvements on the north and south sides of the runway and at a larger scale than on the ALP.

Airport Land Use Drawing (Sheet 8) – The Airport Land Use Drawing is a graphic depiction of the land use recommendations. When development is proposed, it should be directed to the appropriate land use area depicted on this plan.

Airport Property Map (Sheet 9) – The Airport Property Map provides information on the acquisition and identification of all land tracts under the control of the airport. Both existing and future property holdings are identified on the "Exhibit A" Property Map.

The ALP set has been developed in accordance with accepted FAA and Arizona Department of Transportation (ADOT) – Aeronautics Division standards. The ALP set has not been approved by the FAA and is subject to FAA airspace review. Land use and other changes may result.

SUMMARY

The Master Plan for Casa Grande Municipal Airport has been developed in cooperation with the PAC, interested citizens, and the City of Casa Grande. It is designed to assist the City in making decisions relative to the future use of Casa Grande Municipal Airport as it is maintained and developed to meet its role as defined in Chapter Two.

Flexibility will be a key to the plan, since activity may not occur exactly as forecast. The Master Plan provides the City with options to pursue in marketing the assets of the airport for community development. Following the general recommendations of the plan, the airport can maintain its viability and continue to provide air transportation services to the region.

AIRPORT LAYOUT PLANS

FOR

CASA GRANDE MUNICIPAL AIRPORT

Prepared for

The City of

Casa Grande, Arizona

INDEX OF DRAWINGS

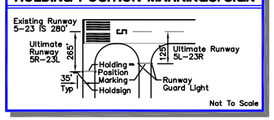
DRAFT

Coffman Associates
Airport Consultants

LEGEND

EXISTING	ULTIMATE	DESCRIPTION
		ABANDONED/REMOVED PAVEMENT
		AIRPORT PROPERTY LINE
		AIRPORT PARCEL LINE
		AIRPORT REFERENCE POINT (ARP)
		AIRPORT ROTATING BEACON
		AVIGATION EASEMENT (if applicable)
		BUILDING REMOVAL
		BUILDING CONSTRUCTION (On/Off Airport)
BRL	BRL	BUILDING RESTRICTION LINE (BRL)
		FACILITY (PAVEMENT) CONSTRUCTION
		FENCING
		GLIDE SLOPE ANTENNA
		HELIPAD
		LOCALIZER ANTENNA
		MEDIUM-INTENSITY APPROACH LIGHTING SYSTEM WITH RUNWAY ALIGNMENT INDICATOR (MALSR)
Critical Area	Critical Area	NAVAID CRITICAL AREA (Localizer/Glide Slope)
PAPI-4	PAPI-4	PRECISION APPROACH PATH INDICATOR
POFZ	POFZ	PRECISION OBJECT FREE ZONE
		PRIMARY/SECONDARY AIRPORT CONTROL STATION
ROFA	ROFA	RUNWAY OBJECT FREE AREA
ROFZ	ROFZ	RUNWAY OBSTACLE FREE ZONE
RPZ	RPZ	RUNWAY PROTECTION ZONE (RPZ)
RSA	RSA	RUNWAY SAFETY AREA
		RUNWAY END IDENTIFICATION LIGHTS (REIL)
		RUNWAY THRESHOLD LIGHTS
34/25	34/25	SECTION CORNER
		SEGMENTED CIRCLE/WIND INDICATOR
A	A	TAXIWAY DESIGNATION
		TAXIWAY HOLD LINE
1080	1080	TOPOGRAPHY
		WIND INDICATOR (Lighted)

HOLDING POSITION MARKINGS/SIGN



EXISTING BUILDINGS/FACILITIES

NO.	DESCRIPTION	TOP EL.
1	TERMINAL BUILDING	1471
2	OLD TERMINAL BUILDING	1465
3	SPECIALTY OPERATIONS (Sunshine Aviation)	1471
4	SPECIALTY OPERATIONS (Native Air)	1465
5	FIRE TRAINING FACILITY	1472
6	CONVENTIONAL HANGAR	1469
7	CONVENTIONAL HANGAR	1474
8	CONVENTIONAL HANGAR (Privately Owned)	1469
9	CONVENTIONAL HANGAR (Privately Owned)	1469
10	T-HANGAR	1469
11	T-HANGAR	1470
12	T-HANGAR	1471
13	T-HANGAR	1470
14	T-HANGAR	1471
15	T-HANGAR	1470
16	SHADE HANGAR	1470
17	SHADE HANGAR	1469
18	FUEL STORAGE	N/A
19	HELICOPTER PARKING	N/A
20	HELICOPTER PARKING	N/A
21	AWOS	1552*
22	GLIDESLOPE ANTENNA	1465*
23	LOCALIZER	1455*

*ESTIMATED ELEVATION

ULTIMATE BUILDINGS/FACILITIES

NO.	DESCRIPTION
21	AIRPORT TRAFFIC CONTROL TOWER
22	FIXED BASE OPERATION (FBO)
23	CONVENTIONAL HANGAR
24	BOX HANGAR
25	T-HANGAR
26	SHADE HANGAR
27	WASH RACK
28	FUEL STORAGE
29	HELICOPTER PARKING
30	HANGAR DEVELOPMENT PARCEL
31	AVIATION RELATED PARCEL
32	NONAVIATION RELATED PARCEL
33	FIRE TRAINING FACILITY
34	ELECTRICAL VAULT

VICINITY MAP

LOCATION MAP

Magnetic Variance
11° 03' East (December 2008)
Annual Rate of Change
00° 06' West (December 2008)

0 500 1000
SCALE IN FEET

AIRPORT DATA

CASA GRANDE MUNICIPAL AIRPORT (CGZ)

CITY: CASA GRANDE, ARIZONA | COUNTY: PINAL, ARIZONA | RANGE: 6E | TOWNSHIP: 5S

		EXISTING	ULTIMATE
AIRPORT SERVICE LEVEL		GENERAL AVIATION	GENERAL AVIATION
AIRPORT REFERENCE CODE		B-II	D-II
DESIGN AIRCRAFT		CESSNA CITATION 550	GULFSTREAM IV
AIRPORT ELEVATION		1464.1 MSL	1462.9 MSL
MEAN MAXIMUM TEMPERATURE OF HOTTEST MONTH		106.6° F (JULY)	106.6° F (JULY)
AIRPORT REFERENCE POINT (ARP)	LATITUDE	32° 57' 17.60" N	32° 57' 10.26" N
COORDINATES (NAD 83)	LONGITUDE	111° 46' 00.60" W	111° 46' 20.71" W
AIRPORT AND TERMINAL NAVIGATIONAL AIDS		AWOS-III ROTATING BEACON SEGMENTED CIRCLE LIGHTED WINDCONE MALSR ILS VOR	AWOS-III ROTATING BEACON SEGMENTED CIRCLE LIGHTED WINDCONE MALSR ILS VOR
GPS APPROACH		5/23	5L/5R/23L/23R

RUNWAY END COORDINATES (NAD 83)

RUNWAY		EXISTING	ULTIMATE
Runway 5(R)	Latitude	32° 57' 04.74" N	32° 56' 45.64" N
	Longitude	111° 46' 26.95" W	111° 47' 06.05" W
Runway 23(L)	Latitude	32° 57' 30.53" N	32° 57' 27.30" N
	Longitude	111° 45' 34.15" W	111° 45' 40.76" W
Runway 5L	Latitude	N/A	32° 57' 09.24" N
	Longitude	N/A	111° 46' 34.12" W
Runway 23R	Latitude	N/A	32° 57' 28.05" N
	Longitude	N/A	111° 45' 55.53" W

RUNWAY DATA

	RUNWAY 5(R)-23(L)				RUNWAY 5L-23R	
	EXISTING		ULTIMATE		ULTIMATE	
	5	23	5R	23L	5L	23R
AIRCRAFT APPROACH CATEGORY-DESIGN GROUP	B-II		D-II		B-I (Small Airplane)	
CRITICAL AIRCRAFT	CESSNA CITATION 550		GULFSTREAM IV		BEECHCRAFT KING AIR 100	
CRITICAL AIRCRAFT WINGSPAN	56.7'		77.8'		45.8'	
CRITICAL AIRCRAFT UNDERCARRIAGE WIDTH	17.6'		18.6'		13.0'	
CRITICAL AIRCRAFT APPROACH SPEED (KNOTS)	108		145		111	
CRITICAL AIRCRAFT MAXIMUM CERTIFIED TAKEOFF WEIGHT (1,000 LBS.)	16.1		71.8		11.8	
APPROACH VISIBILITY MINIMUMS (LOWEST)	1/2 MILE	1 MILE	1/2 MILE	1 MILE	1 MILE	1 MILE
F.A.R. PART 77 CATEGORY	PRECISION	NONPRECISION	PRECISION	NONPRECISION	NONPRECISION	NONPRECISION
PERCENTAGE OF WIND COVERAGE (ALL WEATHER IN MPH)	97.93%-13/98.10%-16/99.77%-10S/99.95%-22S		97.93%-13/98.10%-16/99.77%-10S/99.95%-22S		97.93%-13/98.10%-16/99.77%-10S/99.95%-22S	
LINE OF SIGHT REQUIREMENT MET	YES		YES		YES	
MAXIMUM ELEVATION (ABOVE MSL)	1464.1		1462.9		1462.0	
LOWEST ELEVATION (ABOVE MSL)	1446.9		1432.5		1455.0	
RUNWAY DIMENSIONS	5,200' x 100'		8,400' x 100'		3,800' x 60'	
RUNWAY BEARING (TRUE BEARING - DECIMAL DEGREES)	59.9117	239.9197	59.9117	239.9197	59.9117	239.9197
RUNWAY APPROACH SURFACES (F.A.R. PART 77)	50:1	34:1	50:1	34:1	34:1	34:1
RUNWAY END ELEVATION (NAVD 88)	1446.9	1464.1	1432.5	1462.9	1455.0	1462.0
RUNWAY THRESHOLD DISPLACEMENT	0'	0'	0'	0'	0'	0'
RUNWAY THRESHOLD SITING REQUIREMENTS (APPENDIX 2, CATEGORY)	9	6	9	6	5	6
RUNWAY SAFETY AREA WIDTH (RSA)	150'		500'		120'	
RUNWAY SAFETY AREA (RSA) BEYOND RUNWAY STOP END	300'	300'	1,000'	1,000'	240'	240'
RUNWAY OBSTACLE FREE ZONE WIDTH (OFZ)	400'		400'		250'	
RUNWAY OBSTACLE FREE ZONE (OFZ) BEYOND RUNWAY STOP END	200'	200'	200'	200'	200'	200'
RUNWAY OBJECT FREE AREA WIDTH (OFA)	500'		800'		400'	
RUNWAY OBJECT FREE AREA (OFA) BEYOND RUNWAY STOP END	300'	300'	1,000'	1,000'	240'	240'
RUNWAY PAVEMENT SURFACE MATERIAL	ASPHALT		ASPHALT		ASPHALT	
RUNWAY PAVEMENT STRENGTH (IN THOUSAND LBS.)†	16.5(S)/65(D)		30(S)/74(D)		12.5(S)	
RUNWAY EFFECTIVE GRADIENT	0.33%		0.36%		0.15%	
RUNWAY MAXIMUM GRADIENT	0.46%		0.45%		0.15%	
RUNWAY TOUCHDOWN ZONE ELEVATION (ABOVE MSL)	1468.1	1464.1	1443.7	1462.9	1460.5	1462.0
RUNWAY MARKING	PRECISION	BASIC	PRECISION	NONPRECISION	NONPRECISION	NONPRECISION
RUNWAY LIGHTING	MIRL		MIRL		MIRL	
RUNWAY APPROACH LIGHTING	MALSR	NONE	MALSR	NONE	NONE	NONE
RUNWAY TO TAXIWAY SEPARATION (FROM CENTERLINE TO CENTERLINE)	300'		415'		240'	
RUNWAY HOLD LINE POSITION (FROM RUNWAY CENTERLINE)	280'		265'		125'	
TAXIWAY TO TAXILANE SEPARATION (FROM CENTERLINE TO CENTERLINE)	105'		105'		69'	
TAXIWAY CENTERLINE TO FIX OR MOVEABLE OBJECT	57.5'		57.5'		44.5'	
TAXIWAY LIGHTING	MITL		MITL		MITL	
TAXIWAY MARKING	CENTERLINE/SIGNAGE		CENTERLINE/SIGNAGE		CENTERLINE/SIGNAGE	
TAXIWAY SURFACE MATERIAL	ASPHALT		ASPHALT		ASPHALT	
TAXIWAY WINGTIP CLEARANCE	26'		26'		20'	
TAXIWAY WIDTH	30' AND 40'		30' AND 35'		35'	
TAXIWAY SAFETY AREA WIDTH	79'		79'		49'	
TAXIWAY OBJECT FREE AREA WIDTH	131'		131'		89'	
RUNWAY NAVIGATIONAL AIDS	PAPI-2 L GPS ILS VOR	PAPI-2 L GPS	PAPI-2 L GPS ILS VOR	PAPI-2 L GPS REIL	PAPI-4 L GPS REIL	PAPI-4 L GPS REIL

†Pavement strengths are expressed in Single(S), Dual(D) wheel loading capacities.

ALL WEATHER WIND COVERAGE

Runways	10.5 Knots	13 Knots	16 Knots	20 Knots
Runway 5-23	97.93%	99.10%	99.77%	99.95%

SOURCE:
NOAA National Climatic Center
Asheville, North Carolina
Casa Grande Municipal Airport (CGZ)
Casa Grande, Arizona

OBSERVATIONS:
61,239 All Weather Observations
98 IFR CAT-I Observations
1998-2007

GENERAL NOTES:

1. See the INNER PORTION OF THE APPROACH SURFACE DRAWINGS for features, objects, and related elevations and clearances, within the runway approach.
2. Details concerning terminal improvements are depicted on the TERMINAL AREA DRAWING.
3. Recommended land uses are depicted on the AIRPORT LAND USE DRAWING.
4. All Elevations are in NAVD 88, all Horizontal Coordinates are in NAD 83.
5. No Threshold Siting Surface Object Penetrations.
6. No Obstacle Free Zone (OFZ) Object Penetrations.
7. The BRL is established for the ultimate runway conditions and represents an estimate of the minimum distance from the runway centerline to an object 35 feet in height. The BRL encompasses the runway protection zones, runway object free areas, the runway visibility zone, navaid critical areas and areas required for terminal instrument procedures. A 14 CFR Part 77 obstruction analysis should be conducted prior to constructing any building or object.

FOR APPROVAL BY:
City of
Casa Grande, Arizona
APPROVED BY: ON THE DATE OF:

Steve Hallonard
Airport Manager

FAA APPROVAL STAMP

No.	REVISIONS	DATE	BY	APP'D.
2	REVALIDATION APPROVAL	11/19/02		
1	REVALIDATION APPROVAL	8/12/98		

CASA GRANDE MUNICIPAL AIRPORT

AIRPORT LAYOUT PLAN

DRAFT

CASA GRANDE, ARIZONA

PLANNED BY: Eric S. Pfefer
DETAILED BY: Richard A. Lally
APPROVED BY: James M. Harris

December 14, 2009 | SHEET 1 OF 9

Coffman Associates
Airport Consultants

OBSTRUCTION TABLE

Object Description	Obstructed Part 77 Surface	Object Elevation	Surface Elevation	Object Penetration	Proposed Object Disposition
1. TOPO	PRIMARY SURFACE	1451	1445	6'	TO BE GRADED
2. TREE	PRIMARY SURFACE	1474	1461	13'	TO BE REMOVED
3. TREE	PRIMARY SURFACE	1470	1462	8'	TO BE REMOVED
4. TOPO	PRIMARY SURFACE	1462	1462	1'	TO BE GRADED
5. TOPO	PRIMARY SURFACE	1465	1462	3'	TO BE GRADED
6. TOWER	20:1 CONICAL SURFACE	1784	1378	46'	FOR FUNCTIONAL PURPOSE

OBSTRUCTION LEGEND

- OBSTRUCTION
- GROUP or MULTIPLE OBSTRUCTIONS
- TOPOGRAPHIC OBSTRUCTION

GENERAL NOTES:

1. Obstructions, clearances, and locations are computed from airfield runway and taxiways and private approach surfaces, unless otherwise noted.
2. Depiction of features and objects within the primary, approach, and horizontal Part 77 surfaces, is illustrated on the PART 77 AIRSPACE DRAWING, sheet 2 of these plans.
3. Depiction of features and objects within the outer portion of the approach surfaces, is illustrated on the RUNWAY APPROACH ZONES PROFILES, sheets 4 and 5 of these plans.
4. Depiction of features and objects within the inner portion of the approach surfaces, is illustrated on the INNER PORTION OF RUNWAY APPROACH SURFACE DRAWINGS, sheets 7, 8 and 9 of these plans.
5. Distances for road obstructions and clearances reflect a safety clearance of 10' for longest service trucks, 15' for intermediate trucks, 17' for interstate trucks, and 23' for railroads.
6. Existing and future height and hazard estimates are to be assessed and/or referenced upon approval of updated PART 77 AIRSPACE DRAWING.

Magnetic Variance
11° 30' East (December 2002)
Annual Rate of Change
03° 00' West (Decreases Easily)

0 2000 4000
SCALE IN FEET

No.	REVISIONS	DATE	BY	APP'D
2	REVALIDATION APPROVAL	12/15/03		
1	REVALIDATION APPROVAL	5/12/03		

CASA GRANDE MUNICIPAL AIRPORT

PART 77 AIRSPACE DRAWING

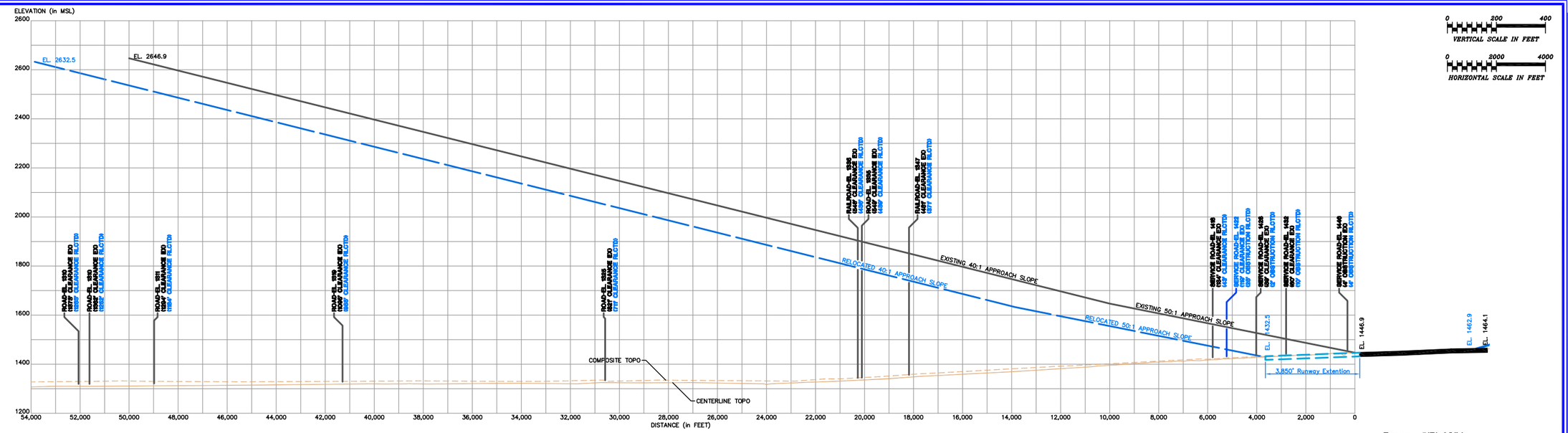
CASA GRANDE, ARIZONA

DRAFT

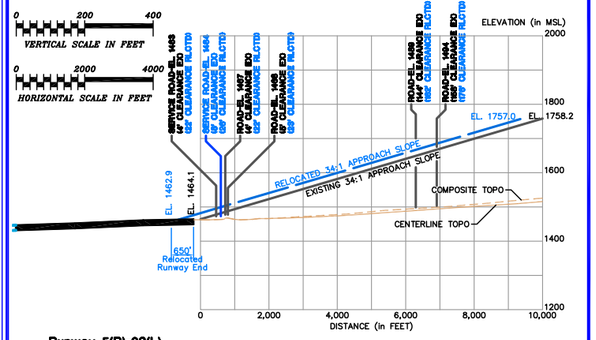
PLANNED BY: Dan T. Taylor
DETAILED BY: Richard A. Eddy
APPROVED BY: James M. Harris

December 14, 2003 | SHEET 2 OF 9

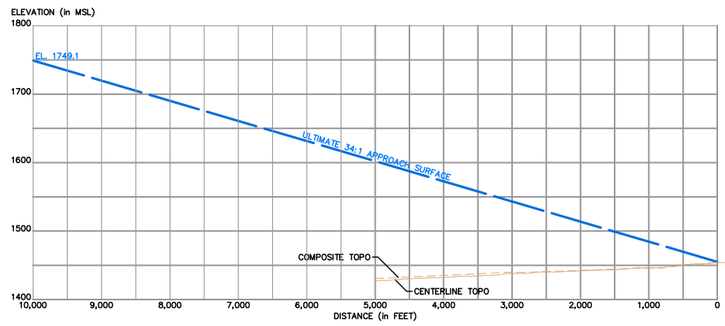
Coffman Associates Airport Consultants



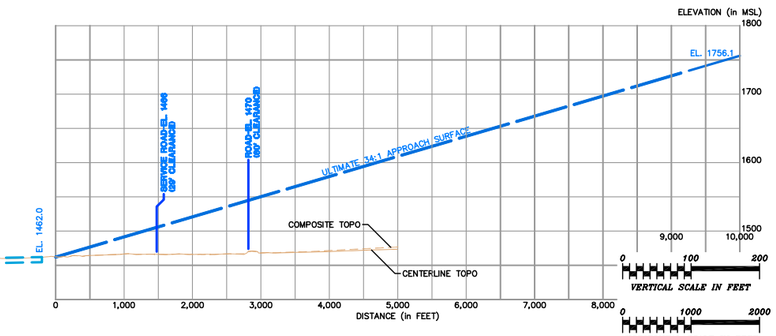
Runway 5(R)-23(L)



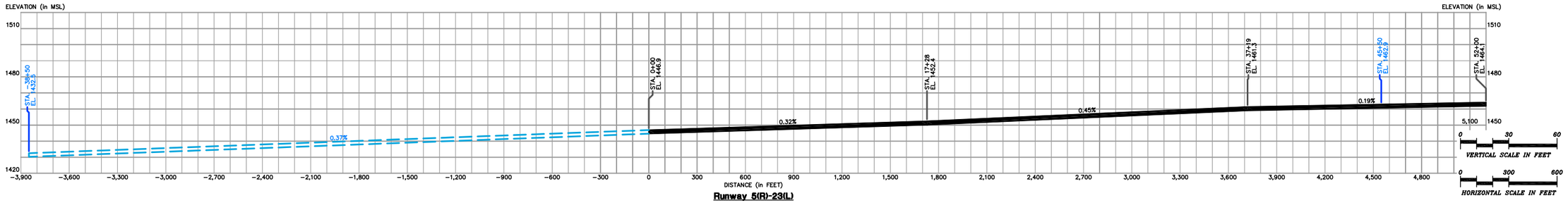
Runway 5(R)-23(L)



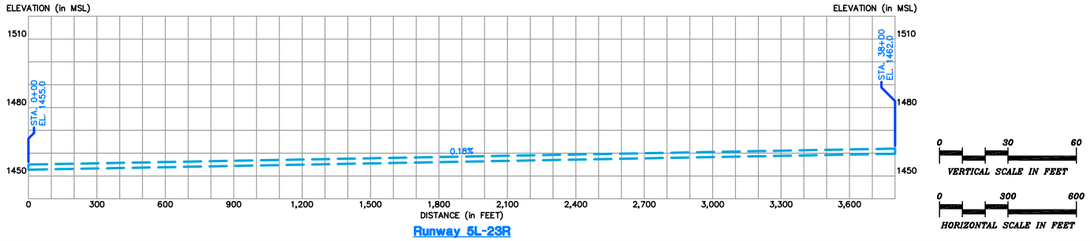
Runway 5L-23R



Runway 5L-23R



Runway 5(R)-23(L)



Runway 5L-23R

GENERAL NOTES:

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4. Depiction of features and objects within the inner portion of the approach surfaces, is illustrated on the INNER PORTION OF RUNWAY APPROACH SURFACE DRAWINGS, sheets 4, 5 and 6 of these plans.
5. Distance for road obstructions and clearances reflect a safety clearance of 10' for airport service roads, 15' for noninterstate roads, 17' for interstate roads, and 23' for railroads.
6. Exising and future height and hazard ordinances are to be amended and/or referenced upon approval of updated PART 77 AIRSPACE DRAWING.

No.	REVISIONS	DATE	BY	APP'D.
2	REVALIDATION APPROVAL	11/19/02		
1	REVALIDATION APPROVAL	8/12/98		

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CASA GRANDE MUNICIPAL AIRPORT

RUNWAY APPROACH ZONES PROFILES/RUNWAY PROFILES

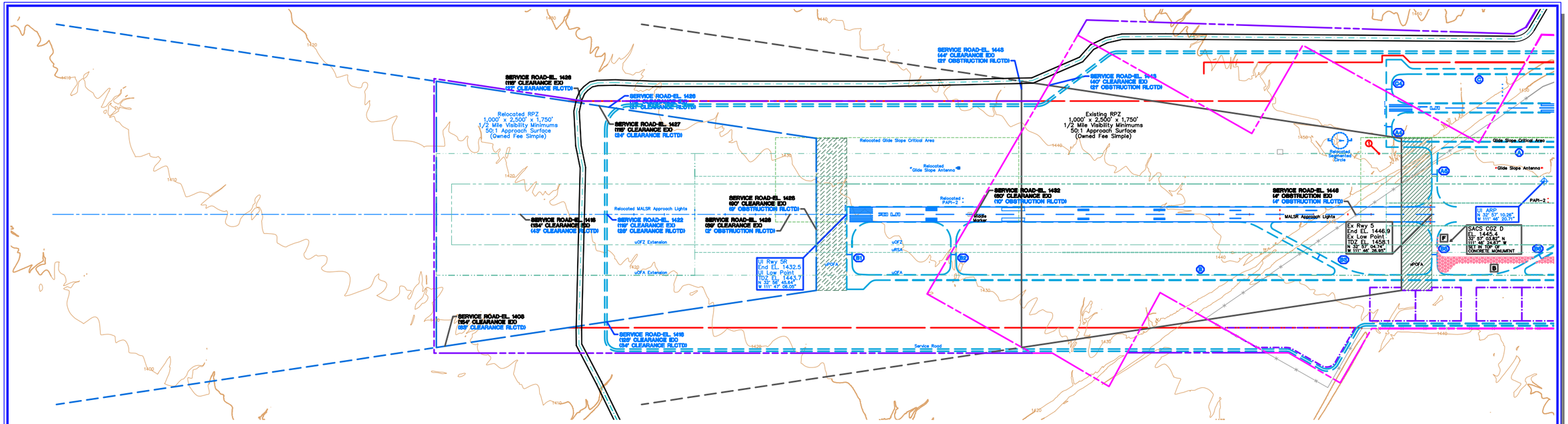
DRAFT

CASA GRANDE, ARIZONA

PLANNED BY: Eric S. Fiefer
DETAILED BY: Richard A. Lally
APPROVED BY: James M. Harris

December 14, 2009 | SHEET 3 OF 9

Coffman Associates
Airport Consultants



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4. Depiction of features and objects within the inner portion of the approach surfaces, is illustrated on the INNER PORTION OF RUNWAY APPROACH SURFACE DRAWINGS, sheets 4, 5 and 6 of these plans.
5. Distance for road obstructions and clearances reflect a safety clearance of 10' for airport service roads, 15' for noninterstate roads, 17' for interstate roads, and 23' for railroads.
6. Exising and future height and hazard ordinances are to be amended and/or referenced upon approval of updated PART 77 AIRSPACE DRAWING.

OBSTRUCTION TABLE

Object Description	Obstructed Part 77 Surface	Object Elevation	Surface Elevation	Object Penetration	Proposed Object Disposition
1. TOPO	PRIMARY SURFACE	1451	1445	6'	TO BE GRADED

0 30 60
VERTICAL SCALE IN FEET

0 300 600
HORIZONTAL SCALE IN FEET

No.	REVISIONS	DATE	BY	APP'D.
2	REVALIDATION APPROVAL	11/19/02		
1	REVALIDATION APPROVAL	8/12/98		

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CASA GRANDE MUNICIPAL AIRPORT

INNER PORTION OF RUNWAY 5(R) APPROACH SURFACE

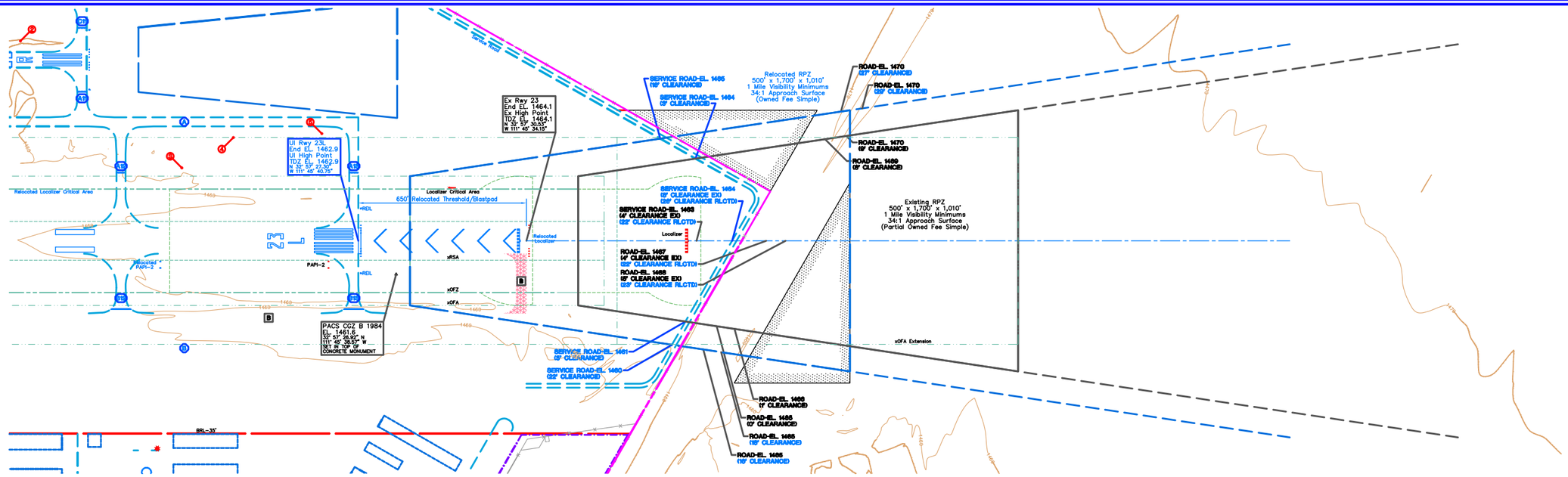
CASA GRANDE, ARIZONA

DRAFT

PLANNED BY: Eric S. Pfefer
DETAILED BY: Richard A. Lelly
APPROVED BY: James M. Harris
December 14, 2009

SHEET 4 OF 9

Coffman Associates
Airport Consultants



Runway 23(L)

GENERAL NOTES:

1. Obstructions, clearances, and locations are calculated from ultimate runway end elevations and ultimate approach surfaces, unless otherwise noted.
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OBSTRUCTION TABLE

Object Description	Obstructed Part 77 Surface	Object Elevation	Surface Elevation	Object Penetration	Proposed Object Disposition
2. TREE	PRIMARY SURFACE	1474	1461	13'	TO BE REMOVED
3. TREE	PRIMARY SURFACE	1470	1461	9'	TO BE REMOVED
4. TOPO	PRIMARY SURFACE	1463	1462	1'	TO BE GRADED
5. TOPO	PRIMARY SURFACE	1465	1462	3'	TO BE GRADED

0 20 40
VERTICAL SCALE IN FEET

0 200 400
HORIZONTAL SCALE IN FEET

No.	REVISIONS	DATE	BY	APP'D.
2	REVALIDATION APPROVAL	11/19/02		
1	REVALIDATION APPROVAL	8/12/98		

CASA GRANDE MUNICIPAL AIRPORT

INNER PORTION OF RUNWAY 23(L) APPROACH SURFACE

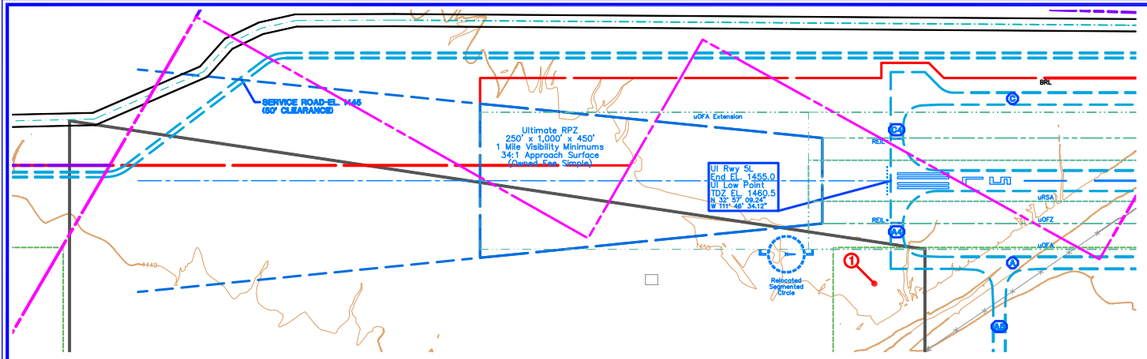
CASA GRANDE, ARIZONA

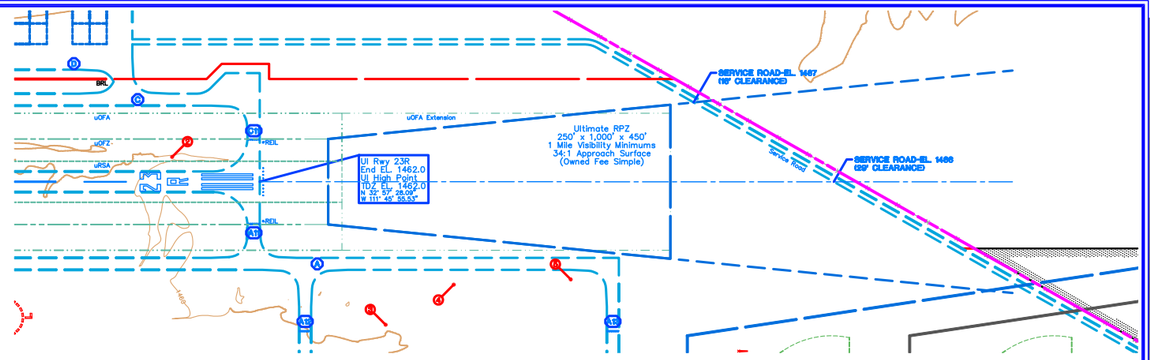
DRAFT

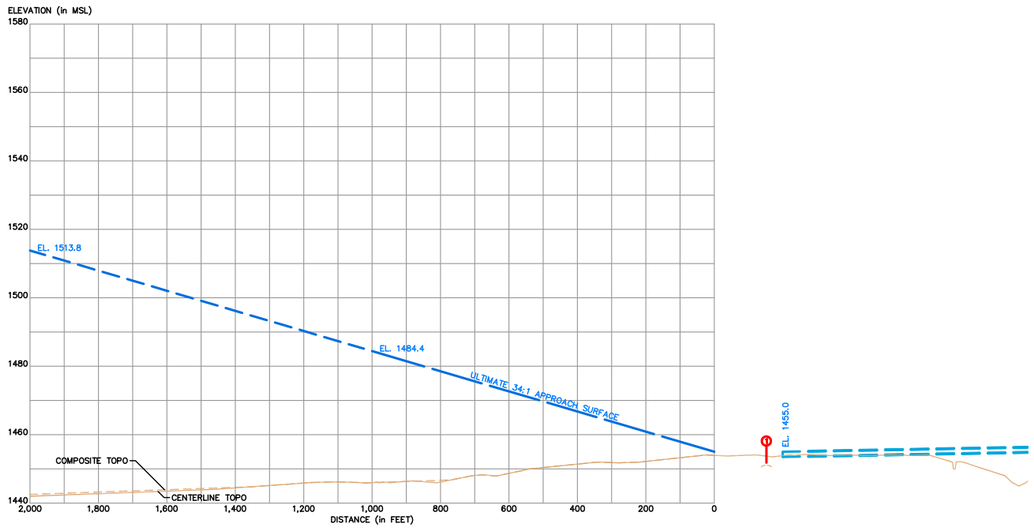
PLANNED BY: Eric S. Stofer
DETAILED BY: Richard A. Lally
APPROVED BY: James M. Harris

December 14, 2009 | SHEET 5 OF 9

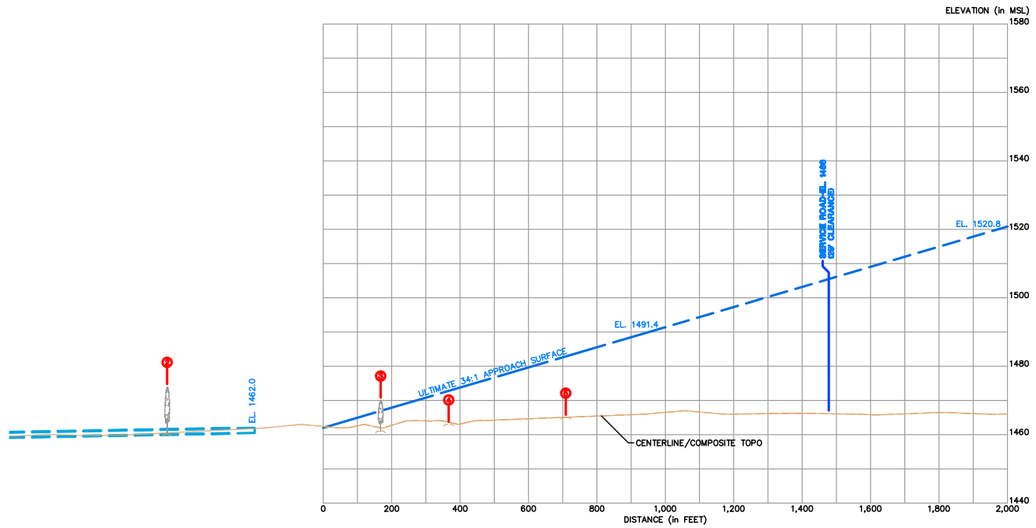
Coffman Associates
Airport Consultants







Runway 5L



Runway 23R

GENERAL NOTES:

1. Obstructions, clearances, and locations are calculated from ultimate runway end elevations and ultimate approach surfaces, unless otherwise noted.
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5. Distance for road obstructions and clearances reflect a safety clearance of 10' for airport service roads, 15' for noninterstate roads, 17' for interstate roads, and 23' for railroads.
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OBSTRUCTION TABLE

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3. TREE	PRIMARY SURFACE	1470	1461	9'	TO BE REMOVED
4. TOPO	PRIMARY SURFACE	1463	1462	1'	TO BE GRADED
5. TOPO	PRIMARY SURFACE	1465	1462	3'	TO BE GRADED

0 20 40
VERTICAL SCALE IN FEET

0 200 400
HORIZONTAL SCALE IN FEET

No.	REVISIONS	DATE	BY	APP'D.
2	REVALIDATION APPROVAL	11/19/02		
1	REVALIDATION APPROVAL	8/12/98		

CASA GRANDE MUNICIPAL AIRPORT

INNER PORTION OF RUNWAYS 5L-23R APPROACH SURFACES

CASA GRANDE, ARIZONA

DRAFT

PLANNED BY: Eric S. Hafer
DETAILED BY: Richard A. Lally
APPROVED BY: James M. Harris

December 14, 2009 | SHEET 6 OF 9

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Airport Consultants

LEGEND

EXISTING	ULTIMATE	DESCRIPTION
		ABANDONED/REMOVED PAVEMENT
		AIRPORT PROPERTY LINE
		AIRPORT PARCEL LINE
		AIRPORT REFERENCE POINT (ARP)
		AIRPORT ROTATING BEACON
		AVIGATION EASEMENT (if applicable)
		BUILDING REMOVAL
		BUILDING CONSTRUCTION (On/Off Airport)
BRL	BRL	BUILDING RESTRICTION LINE (BRL)
		FACILITY (PAVEMENT) CONSTRUCTION
		FENCING
		GLIDE SLOPE ANTENNA
H		HELIPAD
		LOCALIZER ANTENNA
		MEDIUM-INTENSITY APPROACH LIGHTING SYSTEM WITH RUNWAY ALIGNMENT INDICATOR (MALSR)
Critical Area	Critical Area	NAVAID CRITICAL AREA (Localizer/Glide Slope)
PAPI-4	PAPI-4	PRECISION APPROACH PATH INDICATOR
POFZ	POFZ	PRECISION OBJECT FREE ZONE
		PRIMARY/SECONDARY AIRPORT CONTROL STATION
ROFA	ROFA	RUNWAY OBJECT FREE AREA
ROFZ	ROFZ	RUNWAY OBSTACLE FREE ZONE
RPZ	RPZ	RUNWAY PROTECTION ZONE (RPZ)
RSA	RSA	RUNWAY SAFETY AREA
		RUNWAY END IDENTIFICATION LIGHTS (REIL)
		RUNWAY THRESHOLD LIGHTS
34.35	34.35	SECTION CORNER
		SEGMENTED CIRCLE/WIND INDICATOR
A		TAXIWAY DESIGNATION
		TAXIWAY HOLD LINE
1080	1080	TOPOGRAPHY
		WIND INDICATOR (Lighted)

EXISTING BUILDINGS/FACILITIES

NO.	DESCRIPTION	TOP EL.
1	TERMINAL BUILDING	1471
2	OLD TERMINAL BUILDING	1465
3	SPECIALTY OPERATIONS (Sunshine Aviation)	1471
4	SPECIALTY OPERATIONS (Native Air)	1465
5	FIRE TRAINING FACILITY	1472
6	CONVENTIONAL HANGAR	1469
7	CONVENTIONAL HANGAR	1474
8	CONVENTIONAL HANGAR (Privately Owned)	1469
9	CONVENTIONAL HANGAR (Privately Owned)	1469
10	T-HANGAR	1469
11	T-HANGAR	1470
12	T-HANGAR	1471
13	T-HANGAR	1470
14	T-HANGAR	1471
15	T-HANGAR	1470
16	SHADE HANGAR	1470
17	SHADE HANGAR	1469
18	FUEL STORAGE	N/A
19	HELICOPTER PARKING	N/A
20	HELICOPTER PARKING	N/A
21	AWOS	1552*
22	GLIDERSLOPE ANTENNA	1465*
23	LOCALIZER	1455*

*ESTIMATED ELEVATION

ULTIMATE BUILDINGS/FACILITIES

NO.	DESCRIPTION
21	AIRPORT TRAFFIC CONTROL TOWER
22	FIXED BASE OPERATION (FBO)
23	CONVENTIONAL HANGAR
24	BOX HANGAR
25	T-HANGAR
26	SHADE HANGAR
27	WASH RACK
28	FUEL STORAGE
29	HELICOPTER PARKING
30	HANGAR DEVELOPMENT PARCEL
31	AVIATION RELATED PARCEL
32	NONAVIATION RELATED PARCEL
33	FIRE TRAINING FACILITY
34	ELECTRICAL VAULT

E 745500 E 746000 E 746500 E 747000 E 747500 E 748000 E 748500 E 749000 E 749500 E 750000

N 713000 N 712500 N 712000 N 711500 N 711000 N 710500 N 710000

Proposed Expressway

Realigned Drainage Channel

Service Road

Existing RPZ
500' x 1,700' x 1,010'
1 Mile Visibility Minimums
34:1 Approach Surface
(Partial Owned Fee Simple)

ROFA Extension

Ultimate RPZ
250' x 1,000' x 450'
1 Mile Visibility Minimums
34:1 Approach Surface
(Owned Fee Simple)

Relocated RPZ
500' x 1,700' x 1,010'
1 Mile Visibility Minimums
34:1 Approach Surface
(Owned Fee Simple)

Ex Rwy 23
End EL. 1464.1
Ex High Point
TDZ EL. 1464.1
N 32° 55' 53.57"
W 111° 45' 34.15"

Localizer

Ultimate 7,800'x150' Runway
Existing 5,200'x100' Runway
N 59° 54' 42" E (True Bearing)

Ultimate 7,800'x150' Runway
Existing 5,200'x100' Runway
S 59° 54' 42" W (True Bearing)

Ul Rwy 23L
End EL. 1462.9
Ul High Point
TDZ EL. 1462.9
N 32° 57' 27.30"
W 111° 45' 40.75"

Ul Rwy 23R
End EL. 1462.0
Ul High Point
TDZ EL. 1462.0
N 32° 57' 58.08"
W 111° 45' 55.33"

600' Relocated Threshold/Blastpad

Localizer Critical Area

Relocated Localizer

Glide Slope Critical Area

Glide Slope Antenna

Ul ARP
N 32° 57' 10.08"
W 111° 46' 20.71"

Ex ARP
N 32° 57' 17.60"
W 111° 46' 00.80"

SACS CGZ C
EL. 1454.3
32° 57' 16.00" N
111° 46' 00.20" W
SET IN TOP OF
CONCRETE MONUMENT

SACS CGZ D
EL. 1445.4
32° 57' 03.82" N
111° 46' 24.62" W
SET IN TOP OF
CONCRETE MONUMENT

PACS CGZ B 1984
EL. 1461.6
32° 57' 26.95" N
111° 45' 38.57" W
SET IN TOP OF
CONCRETE MONUMENT

Segmented Circle

Kitchen Localizer Critical Area

Through The Fence Access Point

Airport Rd

N Piper Ave

N Pinal Ave

Village Pkwy

Magnetic Variance
11° 03' East (December 2008)
Annual Rate of Change
00° 06' West (December 2008)

0 200 400
SCALE IN FEET

No.	REVISIONS	DATE	BY	APP'D.
2	REVALIDATION APPROVAL	11/19/02		
1	REVALIDATION APPROVAL	8/12/98		

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CASA GRANDE MUNICIPAL AIRPORT

TERMINAL AREA PLAN

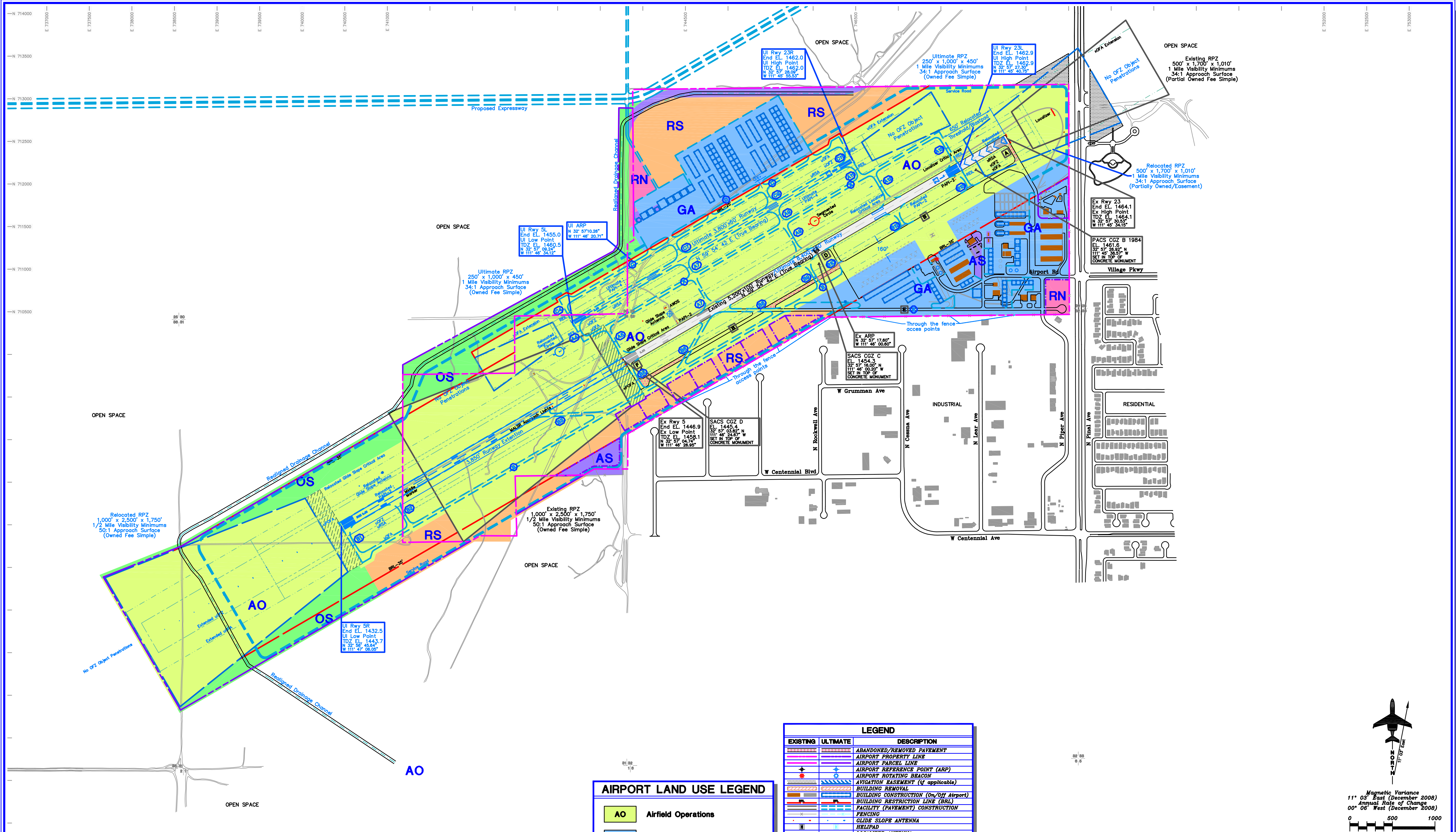
DRAFT

CASA GRANDE, ARIZONA

PLANNED BY: Eric S. Pfeifer
DETAILED BY: Richard A. Lelly
APPROVED BY: James M. Harris

December 14, 2009 | SHEET 7 OF 9

Coffman Associates
Airport Consultants



AIRPORT LAND USE LEGEND	
AO	Airfield Operations
GA	General Aviation
AS	Airport Support
RS	Revenue Support (Aviation Use)
RN	Revenue Support (Non-Aviation Use)
OS	Open Space/Agriculture

LEGEND

EXISTING	ULTIMATE	DESCRIPTION
		ABANDONED/REMOVED PAVEMENT
		AIRPORT PROPERTY LINE
		AIRPORT PARCEL LINE
		AIRPORT REFERENCE POINT (ARP)
		AIRPORT ROTATING BEACON
		AVIGATION EASEMENT (if applicable)
		BUILDING REMOVAL
		BUILDING CONSTRUCTION (On/Off Airport)
BRL	BRL	BUILDING RESTRICTION LINE (BRL)
		FACILITY (PAVEMENT) CONSTRUCTION
		FENCING
		GLIDE SLOPE ANTENNA
H	H	HELIPAD
		LOCALIZER ANTENNA
		MEDIUM-INTENSITY APPROACH LIGHTING SYSTEM WITH RUNWAY ALIGNMENT INDICATOR (MALSR)
Critical Area	Critical Area	NAVAID CRITICAL AREA (Localizer/Glide Slope)
PAPI-4	PAPI-4	PRECISION APPROACH PATH INDICATOR
xPOFZ	uPOFZ	PRECISION OBJECT FREE ZONE
		PRIMARY/SECONDARY AIRPORT CONTROL STATION
xOFA	uOFA	RUNWAY OBJECT FREE AREA
xOFZ	uOFZ	RUNWAY OBSTACLE FREE ZONE
		RUNWAY PROTECTION ZONE (RPZ)
xRSA	uRSA	RUNWAY SAFETY AREA
		RUNWAY END IDENTIFICATION LIGHTS (REIL)
		RUNWAY THRESHOLD LIGHTS
34|35 3|2	34|35 3|2	SECTION CORNER
		SEGMENTED CIRCLE/WIND INDICATOR
A		TAXIWAY DESIGNATION
		TAXIWAY HOLD LINE
1080	1080	TOPOGRAPHY
		WIND INDICATOR (Lighted)

Magnetic Variance
11° 03' East (December 2008)
Annual Rate of Change
00° 06' West (December 2008)

0 500 1000
SCALE IN FEET

No.	REVISIONS	DATE	BY	APP'D.
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CASA GRANDE MUNICIPAL AIRPORT

AIRPORT LAND USE PLAN

DRAFT

CASA GRANDE, ARIZONA

PLANNED BY: Eric S. Pfeifer
DETAILED BY: Richard A. Lally
APPROVED BY: James M. Harris

December 14, 2009 SHEET 8 OF 9

Coffman Associates Airport Consultants

PROPERTY LEGEND

- Existing Property Boundary Line
- Future Property Boundary Line
- Tract Boundary Line

E 740000 E 740500 E 741000 E 744500 E 745000 E 752000 E 752500 E 753000

N 712000 N 711500 N 711000 N 710500

Approx. 6.5 Acres

Approx. 13.8 Acres

Approx. 13.5 Acres

Approx. 3.16 Acres

Approx. 55.36 Acres

Approx. 19.03 Acres

Approx. 39.80 Acres

Approx. 25.04 Acres

Approx. 3.6 Acres

Approx. 7.84 Acres

Approx. 4.10 Acres

Approx 0.78 Acres

Acquire Approx. 0.73 Acres

Acquire Approx. 1.94 Acres

Ultimate 3,800'x60' Runway
N 59° 54' 42" E (True Bearing)

Ultimate 6,400'x100' Runway
N 59° 54' 42" E (True Bearing)

1 2 3 4 5 6 7 8

PROPERTY DATA

TRACT	APN	ACRES	TITLE	FEE NUMBER	VOL & PAGE	DATE
1	NAP	Not Available	PLAT	1990-00686	1650/398	06/26/2007
2	509460050	299.50	QUIT CLAIM DEED	NONE	178/29	06/01/1956
3	509810810	30.72	QUIT CLAIM DEED	NONE	179/29	06/01/1956
4	50947001G	59.15	WARRENTY DEED	1981-015568	1069/283	06/26/1981
5	50947001C	23.17	WARRENTY DEED	1981-015569	1069/283	06/27/1981
6	50947001D	21.58	WARRENTY DEED	1981-015570	1069/283	06/28/1981
7	509467000	Not Available	ROW	1982-011547	1117/658	05/26/1982
8	509467700	Not Available	ROW	1983-001682	1148/251	01/21/1983

NORTH

Magnetic Variance
11° 03' East (December 2008)
Annual Rate of Change
00° 06' West (December 2008)

0 500 1000
SCALE IN FEET

No.	REVISIONS	DATE	BY	APP'D.
2	REVALIDATION APPROVAL	11/19/02		
1	REVALIDATION APPROVAL	8/12/98		

THE CONTENTS OF THIS PLAN DO NOT NECESSARILY REFLECT THE OFFICIAL VIEWS OR POLICIES OF THE FAA OR ADOT AERONAUTICS DIVISION. ACCEPTANCE OF THESE DOCUMENTS BY FAA OR ADOT AERONAUTICS DIVISION 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, STATE OR FEDERAL LAWS.

CASA GRANDE MUNICIPAL AIRPORT

AIRPORT PROPERTY MAP

DRAFT

CASA GRANDE, ARIZONA

PLANNED BY: Eric S. Shafer
DETAILED BY: Diana L. Hopkins
APPROVED BY: James M. Harris

November 2, 2009 SHEET 9 OF 9

Coffman Associates
Airport Consultants

Chapter Six

CAPITAL IMPROVEMENT PROGRAM

Capital Improvement Program

The implementation of the Casa Grande Municipal Airport Master Plan will require sound judgment on the part of airport management. Among the more important factors influencing decisions to carry out a recommendation are timing and airport activity. Both of these factors should be used as references in plan implementation.

Experience has indicated that problems can materialize from the standard time-based format of traditional planning documents. The problems typically center on inflexibility and an inability to deal with unforeseen changes that may occur.

While it is necessary for scheduling and budgeting purposes to consider timing of airport development, the actual need for facilities is established by airport activity. Proper master planning implementation suggests the use of airport activity levels, rather than time, as guidance for development.

This section of the Master Plan is intended to become one of the primary references for decision-makers responsible for implementing master plan recommendations. Consequently, the narrative and graphic presentations must provide understanding of each recommended development item. This understanding will be critical in maintaining a realistic and cost-effective program that provides maximum benefit to the community.

AIRPORT DEVELOPMENT SCHEDULES AND COST SUMMARIES

Once the specific needs and improvements for the airport have been established, the next step is to determine the cost of development and a realistic schedule for implementing the plan. This section will examine the overall cost of each item in the development plan and present a development schedule.

The recommended improvements are grouped by planning horizon: short term, intermediate term, and long term. **Table 6A** summarizes the key milestones for each of the three planning horizons.

TABLE 6A
Planning Horizon Summary
Casa Grande Municipal Airport

	Base Demand	Short Term	Intermediate Term	Long Term
Based Aircraft	114	150	235	500
Annual Operations				
General Aviation	117,282	133,380	192,940	325,000
Military	1,900	1,900	1,900	1,900
Total Operations	119,182	135,280	194,840	326,900

A key aspect of this planning document is the use of demand-based planning milestones. The short term planning horizon contains items of highest priority. These items should be considered for development based on actual demand levels within the next five years. As short term horizon activity levels are reached, it will then be time to program for the intermediate term based upon the next activity milestones. Similarly, when the intermediate term milestones are reached, it will be time to program for the long term activity milestones.

Many development items included in the recommended concept will need to follow demand indicators. For example, the plan includes construction of hangar facilities. Based aircraft will be the indicator for additional hangar needs. If based aircraft growth occurs as projected, additional hangars will need to be constructed to meet the demand. If growth slows or does not occur as projected, hangar development projects can be delayed. As a result, capital expenditures will be undertaken as needed, which leads to a responsible use of capital assets. Some development items do not depend on demand, such as pavement maintenance. These types of projects typically are associated with day-to-day operations and should be monitored and identified by airport management.

As a master plan is a conceptual document, implementation of these capital projects should only be undertaken after further refinement of their design and costs through architectural and engineering analyses. Moreover, some projects, such as the runway ex-

tension and the construction of a parallel runway, will require further study at the time of implementation.

The cost estimates presented in this chapter have been increased to allow for contingencies that may arise on the project. Capital costs presented here should be viewed only as estimates subject to further refinement during design. Nevertheless, these estimates are considered sufficiently accurate for planning purposes. Cost estimates for each of the development projects listed in the capital improvement plan are listed in current (2008) dollars. **Exhibit 6A** presents the proposed capital improvement program for Casa Grande Municipal Airport.

SHORT TERM IMPROVEMENTS

As indicated above, the short term planning horizon is the only development stage that is correlated to time. This is because development within this initial period is concentrated first on the most immediate needs of the airfield and landside areas. Therefore, the program is presented year-by-year for the first five years (2009-2013) to assist in capital improvement. The short term improvement projects are depicted on **Exhibit 6B** with yellow shading.

The primary focus of the short term planning horizon is to provide the airport with essential facilities and the property that will be needed to preserve its long term viability. The first step is to acquire lands immediately adjacent to the airport that are planned for ultimate airfield development projects and for runway protection. The airport development plan proposes the fee simple acquisition of approximately 213 acres of land to the west/southwest of existing airport property. This land is needed for the extension to Runway 5-23, the construction of a parallel runway, the relocation of the MALSR approach lighting system, and for the protection of the Runway 5 approach.

The realignment of the drainage canal is also necessary in the short term to accommodate an extension to Runway 5-23. The ultimate alignment is depicted on **Exhibit 6B**, following near to the northern airport boundary and turning south beyond the ultimate end of Runway 5. In addition to providing for future airfield expansion projects, the drainage canal realignment will allow for the development of landside facilities on the north side of the airport.

Once adequate land has been acquired and the drainage canal realigned, a project to extend Runway 5 can be undertaken. Turbine-powered aircraft operations at Casa Grande Municipal Airport are on the rise and are projected to continue increasing through the planning period. It has been determined that an ultimate runway length of 8,400 feet will be needed to accommodate this increasing traffic. To minimize the cost of the runway extension it is recommended to complete the full extension in one project as opposed to building the extension in phases. In the short term horizon, a 3,850-foot extension to Runway 5 and the shift of the Runway 23 threshold 650 feet from the existing Runway 23 end is recommended to meet the 8,400

foot full length. The shift of the Runway 23 threshold will provide for increased safety standards and will remove the Runway 23 runway protection zone (RPZ) from encompassing uncontrolled land beyond airport property and beyond the easement areas. The remaining 650 foot of pavement beyond the shifted threshold will be maintained as a blast pad. This project will help Casa Grande Municipal Airport transition to increased use by business jet and turboprop aircraft while increasing the overall safety of operations.

Another safety related short term project is the relocation of Taxiway B to 415 feet from the centerline of Runway 5-23. This separation distance will meet ARC D-II design standards for runways with a precision instrument approach. The relocation of Taxiway B will result in the elimination of the aircraft parking positions that will ultimately fall within the taxiway object free area on the west apron. Therefore, the west apron is planned to be expanded by 11,000 square yards to make up for the lost parking locations. In addition, two taxilanes are planned to be constructed extending from the existing west apron to Taxiway E. This is a short term project that will help improve the efficiency of taxiway circulation in the terminal area.

Additional landside development projects planned in the short term horizon include the construction of shade hangar facilities immediately north of the existing shade hangars. These facilities will be similar to the existing shade hangars providing coverage for 20 aircraft parking positions. An aircraft wash rack is planned immediately west of the proposed shade hangar facilities. This wash rack will provide a location for the proper disposal of aircraft cleaning fluids used during the cleaning process. A helicopter parking apron is planned for the old terminal building parking lot adjacent to the existing and proposed shade hangar facilities. This approximately 833 square yard apron will consist of two helicopter parking spaces. The terminal building parking lot is planned to be expanded by 2,125 square yards in the short term to accommodate increasing automobile parking demand.

For the future development of the northern portion of the airport, utilities must first be installed. A short term project is planned to be undertaken to provide the north side of the airport with water, sanitary sewer, electricity and gas, and telecommunication services.

A paved airport perimeter service road is planned in the short term to allow quick access to all airfield facilities by maintenance and emergency vehicles. This perimeter road is planned to be located outside of runway safety areas where possible.

The total investment necessary for the short term CIP is approximately $23.4 million. Of this total, $19.5 million is eligible for FAA grant funding, $576,000 is eligible for state funds, with the airport sponsor responsible for $3.3 million.

		Total Project Cost	FAA Eligible	ADOT Eligible	Local Share
SHORT TERM					
2009					
1	Expand South Terminal Apron, Parking, and Utilities	$1,200,000	$1,140,000	$30,000	$30,000
2	Environmental Assessment for Land Acquisition	$175,000	$166,250	$4,375	$4,375
3	Construct New Runway and Taxiway Lighting	$1,081,633	$1,027,551	$27,041	$27,041
	2009 Subtotal	***$2,456,633***	***$2,333,801***	***$61,416***	***$61,416***
2010					
1	Acquire 213 Acres For Airfield Expansion / Runway Protection	$1,917,000	$1,821,150	$47,925	$47,925
2	Relocation of Drainage Canal/Design	$1,200,000	$1,140,000	$30,000	$30,000
3	Expand Terminal Vehicle Parking Capacity	$798,636	$758,704	$19,966	$19,966
4	Expand West Apron 11,000 Square Yards	$847,000	$804,650	$21,175	$21,175
5	Construct Shade Hangars/Design	$250,000	$0	$0	$250,000
6	Airport Pavement Maintenance	$70,000	$0	$0	$70,000
	2010 Subtotal	***$5,082,636***	***$4,524,504***	***$119,066***	***$439,066***
2011					
1	Construct Helicopter Parking Apron/Design	$83,000	$78,850	$2,075	$2,075
2	Rehabilitate Taxiway E	$105,000	$99,750	$2,625	$2,625
3	Construct Aircraft Wash Rack	$316,000	$300,200	$7,900	$7,900
	2011 Subtotal	***$504,000***	***$478,800***	***$12,600***	***$12,600***
2012					
1	Construct Airport Perimeter Service Road	$1,338,875	$1,271,931	$33,472	$33,472
2	Construct Taxilane From West Apron to Taxiway E (500 lf.)	$150,000	$142,500	$3,750	$3,750
3	Construct Taxilane From West Apron to Taxiway E (125 lf.)	$37,000	$35,150	$925	$925
	2012 Subtotal	***$1,525,875***	***$1,449,581***	***$38,147***	***$38,147***
2013					
1	Apron Pavement Preservation	$70,662	$0	$63,596	$7,066
2	Extend Runway 5-23 3,850 Feet	$5,932,000	$5,635,400	$148,300	$148,300
3	Relocate Taxiway B and Extend 3,850 Feet	$4,009,000	$3,808,550	$100,225	$100,225
4	Relocate MALSR	$1,300,000	$1,235,000	$32,500	$32,500
5	Relocate Runway 23 Threshold 650 Feet (Threshold Markings and Pavement Removal)	$12,000	$11,400	$300	$300
6	Install Utilities for North Side Development	$2,500,000	$0	$0	$2,500,000
	2013 Subtotal	***$13,823,662***	***$10,690,350***	***$344,921***	***$2,788,391***
	Short Term Totals	***$23,392,806***	***$19,477,037***	***$576,149***	***$3,339,620***
INTERMEDIATE TERM					
1	Construct Taxiway to North Landside Development Area	$841,000	$798,950	$21,025	$21,025
2	Construct 11,700 Square Yard Apron	$1,556,000	$1,478,200	$38,900	$38,900
3	Construct North Side Access Road and Parking Lot	$788,000	$0	$0	$788,000
4	Construct Airport Traffic Control Tower	$1,500,000	$1,425,000	$37,500	$37,500
5	Relocate Segmented Circle/Lighted Wind Cone	$150,000	$142,500	$3,750	$3,750
6	Construct 16,500 Square Yard Apron	$1,271,000	$1,207,450	$31,775	$31,775
7	Construct Parallel Runway 3,800 Feet	$3,609,000	$3,428,550	$90,225	$90,225
8	Construct Parallel Taxiway A 3,800 Feet	$2,600,000	$2,470,000	$65,000	$65,000
9	Pavement Maintenance	$1,000,000	$950,000	$25,000	$25,000
	Intermediate Term Totals	***$13,315,000***	***$11,900,650***	***$313,175***	***$1,101,175***
LONG TERM					
1	Strengthen Runway 5-23 and Taxiway B to 74,000 lbs. DWL	$3,520,000	$3,344,000	$88,000	$88,000
2	Construct Two High-Speed Exit Taxiways	$1,354,000	$1,286,300	$33,850	$33,850
3	Construct One Right-Angled Exit Taxiway	$244,000	$231,800	$6,100	$6,100
4	Construct Parallel Taxiway C 3,800 Feet	$2,750,000	$2,612,500	$68,750	$68,750
5	Construct 16,700 Square Yard Apron	$2,221,000	$2,109,950	$55,525	$55,525
6	Expand North Automobile Parking Lot	$481,000	$0	$0	$481,000
7	Pavement Maintenance	$2,000,000	$1,900,000	$50,000	$50,000
	Long Term Totals	***$12,570,000***	***$11,484,550***	***$302,225***	***$783,225***
	TOTAL DEVELOPMENT COSTS	**$49,277,806**	**$42,862,237**	**$1,191,549**	**$5,224,020**

Source: CGZ 2008 ACIP and Coffman Associates Analysis

Exhibit 6A
CAPITAL IMPROVEMENT PROGRAM

07MP05-6B-3/27/09

0 1000 2000

SCALE IN FEET

NORTH

Proposed Expressway

State Highway 387

LEGEND

- Airport Property Line
- Ultimate Airport Property Line
- Building Restriction Line (BRL)
- Runway Safety Area (RSA)
- Object Free Area (OFA)
- Pavement to be Removed
- Runway Protection Zone (RPZ)

SHORT TERM

1. Acquire 213 Acres
2. Construct 2 Shade Hangars
3. Realign Drainage Canal
4. Construct Helicopter Parking Apron
5. Expand Terminal Parking Lot
6. Expand West Apron (11,000 yd²)
7. Construct Airport Perimeter Service Road
8. Construct Aircraft Wash Rack
9. Construct Taxilane
10. Construct Taxilane
11. Extend Runway 5-23 3,850' / Shift Runway 23 Threshold 650'
12. Relocate MALSR
13. Relocate Taxiway B 415' from Runway Centerline

INTERMEDIATE TERM

1. Construct Taxiway to North Landside Development Area
2. Construct 11,700 yd² Apron
3. Construct North Side Access Road and Parking lot
4. Construct Airport Traffic Control Tower
5. Relocate Segmented Circle / Lighted Wind Cone
6. Construct 16,500 yd² Apron
7. Construct Parallel Runway
8. Construct Parallel Taxiway A

LONG TERM

1. Construct Exit / Entrance Taxiways
2. Construct Parallel Taxiway C
3. Construct 16,700 yd² Apron
4. Expand Automobile Parking Lot

Exhibit 6B
AIRPORT DEVELOPMENT STAGING

INTERMEDIATE PLANNING HORIZON

The intermediate term planning horizon focuses on the airport's development needs during the six- to ten-year time frame. Due to the fluid nature of general aviation growth and the uncertainty of infrastructure and development needs more than five years into the future, the projects in the intermediate term were combined into a single project listing and not prioritized by year. However, the project listing is intended to depict a prioritization of projects as now anticipated to meet future demand. Intermediate projects are depicted on **Exhibit 6B** with red shading.

The implementation of many of the items in the intermediate term should be based upon actual demand. Those projects, such as the construction of additional apron and taxiways, should not be undertaken unless there is an existing demand for such facilities.

The intermediate term projects focus on the expansion of landside facilities to the north side of the airport. The first project involves the construction of a taxiway from the south side to the north side of the airport to serve an 11,700 square yard aircraft parking apron. This apron would support FBO or specialty operator development on the north side. An access road to the north side development area is planned to be constructed from the "conceptual" W Val Vista Expressway or the existing W Val Vista Boulevard, both located north of the airport. An airport traffic control tower is also planned on the north side of the airport during this time frame. South side development for the intermediate term includes paving the 16,500 square yard unpaved apron north of the existing T-hangar facilities.

It was determined in the analysis of airfield capacity that the airport's operations could reach a level in the intermediate term near the capacity of the runway system. This will result in increased aircraft delay experienced and runway incursion potential. To alleviate capacity issues, it is recommended that a parallel runway be constructed in the intermediate term.

A parallel runway to be designated 5L-23R will provide additional capacity and separate smaller aircraft training operations from larger business jet operations, which will typically operate on the primary runway (Runway 5R-23L). The parallel runway will be constructed to a length of 3,800 feet and a width of 60 feet. This parallel runway and its parallel taxiway (Taxiway A) will be designed to be used by small aircraft exclusively (12,500 pounds SWL or less).

A total of $1.0 million is included in this planning period for on-going pavement maintenance needs such as crack sealing, rejuvenating seal coats, and slab replacements as necessary.

The total investment necessary for the intermediate term CIP is approximately $13.3 million. Of this total, $11.9 million is eligible for FAA grant funding, and $313,000 is eligible for state funds, with the airport sponsor responsible for $1.1 million.

LONG TERM PLANNING HORIZON

Long term improvements, as presented on **Exhibit 6B** with blue shading, continue the expansion of airside facilities and aircraft aprons to improve airfield capacity while accommodating a wider range of business jet aircraft and overall airport operational growth.

Airfield improvements are focused on the accommodation of large business jet operations and the separation of smaller training operations from larger aircraft operations. In the long term, Runway 5-23 is planned to be strengthened to 74,000 pounds dual wheel loading (DWL). Runway capacity improvements include the construction of high-speed exit taxiways on Runway 5-23 and the construction of a parallel taxiway (Taxiway C) north of the parallel runway. The high-speed exits proposed on the primary runway will reduce runway occupancy times allowing a greater number of aircraft to operate on the runway in a given time. These exits are strategically located to provide optimum efficiency. Parallel Taxiway C will serve the north landside development area improving the efficiency of taxiway circulation.

Long term landside projects include an additional 16,700 square yards of apron on the north side of the airport. This apron expansion will serve the development of additional aviation related business facilities on the north side.

A total of $2.0 million is included in this planning period for on-going pavement maintenance needs such as crack sealing, rejuvenating seal coats, and slab replacements as necessary.

The total investment necessary for the long term CIP is approximately $12.6 million. Of this total, $11.5 million is eligible for FAA grant funding, $302,000 is eligible for state funds, with the airport sponsor responsible for $783,000.

CAPITAL IMPROVEMENTS FUNDING

Financing capital improvements at the airport will not rely exclusively upon the financial resources of the City of Casa Grande. Capital improvement funding is available through various grants-in-aid programs at both the federal and state levels. The following discussion outlines the key sources for capital improvement funding.

FEDERAL GRANTS

The United States Congress has long recognized the need to develop and maintain a system of aviation facilities across the nation for the purpose of national defense and promotion of interstate commerce. Various grants-in-aid programs to public airports have been established over the years for this purpose. The most recent legislation is the *Airport Improvement Pro-*

gram (AIP) of 1982. The AIP has been reauthorized several times, with the most recent legislation enacted in 2003 and entitled the *Vision 100 – Century of Aviation Reauthorization Act.*

Fiscal year 2007 was the last year of the four-year program. That bill presented similar funding levels to the previous reauthorization – *AIR-21*. Funding was authorized at $3.7 billion in 2007. *Vision 100* expired in September 2007 and since this time; Congress has not passed reauthorization legislation. However, Congress passed the FAA *Extension Act of 2008, Part II*, which is a continuation of funds through March 6, 2009. Funds available from October 1, 2008 to March 6, 2009 totaled $1.5 billion. On March 30th, 2009 the President signed another bill extending the AIP program through the end of September, 2009. Funds made available by this bill total $3.5 billion.

The source for AIP funds is the Aviation Trust Fund. The Aviation Trust Fund was established in 1970 to provide funding for aviation capital investment programs (aviation development, facilities and equipment, and research and development). The Trust Fund also finances the operation of the FAA. It is funded by user fees, taxes on airline tickets, aviation fuel, and various aircraft parts. Funds are distributed each year by the FAA from appropriations by Congress. A portion of the annual distribution is to primary commercial service airports based upon enplanement levels. General aviation airports, however, also received entitlements under the last reauthorization. After all specific funding mechanisms are distributed, the remaining AIP funds are disbursed by the FAA, based upon the priority of the project for which they have requested federal assistance through discretionary apportionments. A national priority system is used to evaluate and rank each airport project. Those projects with the highest priority are given preference in funding.

Under the AIP program, examples of eligible development projects include the airfield, aprons, and access roads. Passenger terminal building improvements (such as bag claim and public waiting lobbies) may also be eligible for FAA funding. Under the newest version of AIP, *Vision 100*, automobile parking at small hub airports can also be eligible. Improvements such as fueling facilities, utilities (with the exception of water supply for fire prevention), hangar buildings, airline ticketing, and airline operations areas are not typically eligible for AIP funds.

Under *Vision 100*, Casa Grande Municipal Airport has been eligible for 95 percent funding assistance from AIP grants, as opposed to the previous *AIR-21* level of 90 percent. While similar programs have been in place for over 50 years, it will be up to Congress to either extend or draft new legislation authorizing and appropriating future federal funding.

STATE AID TO AIRPORTS

In support of the state airport system, the State of Arizona also participates

in airport improvement projects. The source for state airport improvement funds is the Arizona Aviation Fund. Taxes levied by the state on aviation fuel, flight property, aircraft registration tax, and registration fees (as well as interest on these funds), are deposited in the Arizona Aviation Fund. The transportation board establishes the policies for distribution of these state funds.

Under the State of Arizona grant program, an airport can receive funding for one-half (2.5 percent) of the local share of projects receiving federal AIP funding. The state also provides 90 percent funding for projects which are typically not eligible for federal AIP funding or have not received federal funding.

State Airport Loan Program

The Arizona Department of Transportation - Aeronautics Division (ADOT) Airport Loan Program was established to enhance the utilization of state funds and provide a flexible funding mechanism to assist airports in funding improvement projects. Eligible projects include runway, taxiway, and apron improvements; land acquisition; planning studies; and the preparation of plans and specifications for airport construction projects; as well as revenue-generating improvements such as hangars and fuel storage facilities. Projects which are not currently eligible for the State Airport Loan Program are considered if the project would enhance the airport's ability to be financially self-sufficient.

There are two ways in which the loan funds can be used: Matching Funds or Revenue Generating Projects. The Matching Funds are provided to meet the local matching fund requirement for securing federal airport improvement grants or other federal or state grants. The Revenue Generating Projects' funds are provided for airport-related construction projects that are not eligible for funding under another program.

Pavement Maintenance Program

The airport system in Arizona is a multi-million dollar investment of public and private funds that must be protected and preserved. State aviation fund dollars are limited and the State Transportation Board recognizes the need to protect and extend to the maximum amount the useful life of the airport system's pavement. This program, the Arizona Pavement Preservation Program (APPP), is established to assist in the preservation of the Arizona airport system infrastructure. Casa Grande Municipal Airport participates in this program.

Public Law 103-305 requires that airports requesting federal AIP funding for pavement rehabilitation or reconstruction have an effective pavement maintenance management system. To this end, ADOT-Aeronautics has completed and is maintaining an Airport Pavement Management System (APMS) which, coupled with monthly pavement evaluations by the airport sponsors, fulfills this requirement.

The Arizona Airport Pavement Management System uses the Army Corps of Engineers' "Micropaver" program as a basis for generating a Five-Year Airport Pavement Preservation Program (APPP). The APMS consists of visual inspections of all airport pavements. Evaluations are made of the types and severities observed and entered into a computer program database. Pavement Condition Index (PCI) values are determined through the visual assessment of pavement condition in accordance with the most recent FAA Advisory Circular 150/5380-6, and range from 0 (failed) to 100 (excellent). Every three years, a complete database update with new visual observations is conducted. Individual airport reports from the update are shared with all participating system airports. The Aeronautics Division ensures that the APMS database is kept current, in compliance with FAA requirements.

Every year, the Aeronautics Division, utilizing the APMS, will identify airport pavement maintenance projects eligible for funding for the upcoming five years. These projects will appear in the State's Five-Year Airport Development Program. Once a project has been identified and approved for funding by the State Transportation Board, the airport sponsor may elect to accept a state grant for the project and not participate in the Airport Pavement Preservation Program (APPP), or the airport sponsor may sign an Inter-Government Agreement (IGA) with the Aeronautics Division to participate in the APPP.

LOCAL FUNDING

The balance of project costs, after consideration has been given to grants, must be funded through airport resources. Assuming federal funding, this essentially equates to 2.5 percent of the project costs if all eligible FAA and state funds are available. If only ADOT grants are available, the airport share would be 10 percent of the project.

According to **Exhibit 6A**, airport funding will be needed in each planning horizon. This includes $3.3 million in the short term, $1.1 million in the intermediate term, and $783,000 in the long range. Airport funding is usually accomplished through the use of airport earnings and reserves, to the extent possible, with the remaining costs financed through revenue bonding.

The following subsections provide a review of the sources of operating revenue that are available at Casa Grande Municipal Airport to assist in meeting operating expenses and capital improvement program costs for the airport. These include land leases and fuel revenues and other income sources.

Land Leases

The City of Casa Grande currently leases land to several entities in the airport terminal area for aviation-related uses. Leasable land is still available on existing airport property

that can be developed for aviation related or non-aviation related uses. The available land not only offers flexibility in the development of the airport, but also a source for operating revenue.

At Casa Grande Municipal Airport, the City owns the T-hangar and shade hangar facilities and leases out spaces to private individuals. The option exists for the City to continue to fund the construction of hangar facilities or to allow private entities to lease land from the City to construct hangars.

Separate cost estimates for T-hangar and shade hangar construction has been prepared and is presented in **Table 6B**. These estimates are based on $30,000 per T-hangar unit and $15,000 per shade hangar unit. The demand for additional hangar units was determined in Chapter Three, Facility Requirements.

TABLE 6B
Hangar Development Cost Estimates
Casa Grande Municipal Airport

	Short Term	Intermediate Term	Long Term
Additional T-Hangar Units	18	44	154
Estimated Cost	$540,000	$1,320,000	$4,620,000
Additional Shade Hangar Units	10	16	40
Estimated Cost	$150,000	$240,000	$600,000

Current land leases on the airport are in line with comparable lease rates at other general aviation airports. Lease clauses should be included to permit periodical adjustments for inflation.

Tie-down fees are another source of revenue to the airport that is similar to a land lease. Local tie-downs are leased to individual aircraft owners on a monthly basis, while fees are charged for transient tie-downs on an overnight basis.

Fuel Revenues

Fuel sales at Casa Grande Municipal Airport are provided by the City of Casa Grande. City of Casa Grande staff fuel individual aircraft using fuel trucks and collect sales in the terminal building. Fuel is sold at going market rates. Fuel revenues can be expected to increase due to the higher amounts of fuel used by turbine-powered aircraft.

Other Income

There are other smaller and less reliable sources of income that can be considered at the airport. Other income typically includes landing fees, automobile parking, concession income, and special events.

Landing fees and automobile parking are not typically charged on general aviation airports due to the low return for the cost of collection. Landing fees

on larger aircraft that use the airport may be considered, but could also be a deterrent to use of the airport. The trade-off could be more significant losses in potential fuel revenues than could be gained from landing fees.

Fees from advertising and concessions in an airport-owned terminal building would be a means of helping to support the operating and construction costs of the facility. General aviation airports are often good locations for hosting special events such as air shows and fly-ins. While part of the interest in hosting special events is to draw attention to the airport's facilities, temporary use of available areas can also provide additional revenue. Casa Grande Municipal Airport hosts two fly-in events each year: the Copperstate Fly-in and the Cactus Fly-in. Each of these events provides a strong revenue source for the airport and the local economy.

PLAN IMPLEMENTATION

The best means to begin implementation of the recommendations in this master plan is to first recognize that planning is a continuous process that does not end with completion and approval of this document. Rather, the ability to continuously monitor the existing and forecast status of airport activity must be provided and maintained. The issues upon which this master plan is based will remain valid for a number of years. The primary goal is for the airport to best serve the air transportation needs of the region, while continuing to be economically self-sufficient.

The actual need for facilities is most appropriately established by airport activity levels rather than a specified date. For example, projections have been made as to when additional hangars may be needed at the airport. In reality, however, the timeframe in which the development is needed may be substantially different. Actual demand may be slower to develop than expected. On the other hand, high levels of demand may establish the need to accelerate development. Although every effort has been made in this master planning process to conservatively estimate when facility development may be needed, aviation demand will dictate when facility improvements need to be delayed or accelerated.

The real value of a usable master plan is in keeping the issues and objectives in the minds of the managers and decision-makers so that they are better able to recognize change and its effect. In addition to adjustments in aviation demand, decisions made as to when to undertake the improvements recommended in this master plan will impact the period that the plan remains valid. The format used in this plan is intended to reduce the need for formal and costly updates by simply adjusting the timing. Updating can be done by the manager, thereby improving the plan's effectiveness.

In summary, the planning process requires that airport management consistently monitor the progress of the airport in terms of aircraft operations and based aircraft. Analysis of aircraft demand is critical to the timing and need for new airport facilities.

The information obtained from continually monitoring airport activity will provide the data necessary to determine if the development schedule should be accelerated or decelerated.

Appendix A

GLOSSARY OF TERMS

Glossary of Terms

A

ABOVE GROUND LEVEL: The elevation of a point or surface above the ground.

ACCELERATE-STOP DISTANCE AVAILABLE (ASDA): See declared distances.

ADVISORY CIRCULAR: External publications issued by the FAA consisting of nonregulatory material providing for the recommendations relative to a policy, guidance and information relative to a specific aviation subject.

AIR CARRIER: An operator which: (1) performs at least five round trips per week between two or more points and publishes flight schedules which specify the times, days of the week, and places between which such flights are performed; or (2) transports mail by air pursuant to a current contract with the U.S. Postal Service. Certified in accordance with Federal Aviation Regulation (FAR) Parts 121 and 127.

AIRCRAFT: A transportation vehicle that is used or intended for use for flight.

AIRCRAFT APPROACH CATEGORY: A grouping of aircraft based on 1.3 times the stall speed in their landing configuration at their maximum certificated landing weight. The categories are as follows:

- Category A: Speed less than 91 knots.
- Category B: Speed 91 knots or more, but less than 121 knots.
- Category C: Speed 121 knots or more, but less than 141 knots.
- Category D: Speed 141 knots or more, but less than 166 knots.
- Category E: Speed greater than 166 knots.

AIRCRAFT OPERATION: The landing, takeoff, or touch-and-go procedure by an aircraft on a runway at an airport.

AIRCRAFT OPERATIONS AREA (AOA): A restricted and secure area on the airport property designed to protect all aspects related to aircraft operations.

AIRCRAFT OWNERS AND PILOTS ASSOCIATION: A private organization serving the interests and needs of general aviation pilots and aircraft owners.

AIRCRAFT RESCUE AND FIRE FIGHTING: A facility located at an airport that provides emergency vehicles, extinguishing agents, and personnel responsible for minimizing the impacts of an aircraft accident or incident.

AIRFIELD: The portion of an airport which contains the facilities necessary for the operation of aircraft.

AIRLINE HUB: An airport at which an airline concentrates a significant portion of its activity and which often has a significant amount of connecting traffic.

AIRPLANE DESIGN GROUP (ADG): A grouping of aircraft based upon wingspan. The groups are as follows:

- Group I: Up to but not including 49 feet.
- Group II: 49 feet up to but not including 79 feet.
- Group III: 79 feet up to but not including 118 feet.
- Group IV: 118 feet up to but not including 171 feet.
- Group V: 171 feet up to but not including 214 feet.
- Group VI: 214 feet or greater.

AIRPORT AUTHORITY: A quasi-governmental public organization responsible for setting the policies governing the management and operation of an airport or system of airports under its jurisdiction.

AIRPORT BEACON: A navigational aid located at an airport which displays a rotating light beam to identify whether an airport is lighted.

AIRPORT CAPITAL IMPROVEMENT PLAN: The planning program used by the Federal Aviation Administration to identify, prioritize, and distribute funds for airport development and the needs of the National Airspace System to meet specified national goals and objectives.

AIRPORT ELEVATION: The highest point on the runway system at an airport expressed in feet above mean sea level (MSL).

AIRPORT IMPROVEMENT PROGRAM: A program authorized by the Airport and Airway

Improvement Act of 1982 that provides funding for airport planning and development.

AIRPORT LAYOUT DRAWING (ALD): The drawing of the airport showing the layout of existing and proposed airport facilities.

AIRPORT LAYOUT PLAN (ALP): A scaled drawing of the existing and planned land and facilities necessary for the operation and development of the airport.

AIRPORT LAYOUT PLAN DRAWING SET: A set of technical drawings depicting the current and future airport conditions. The individual sheets comprising the set can vary with the complexities of the airport, but the FAA-required drawings include the Airport Layout Plan (sometimes referred to as the Airport Layout Drawing (ALD), the Airport Airspace Drawing, and the Inner Portion of the Approach Surface Drawing, On-Airport Land Use Drawing, and Property Map.

AIRPORT MASTER PLAN: The planner's concept of the long-term development of an airport.

AIRPORT MOVEMENT AREA SAFETY SYSTEM: A system that provides automated alerts and warnings of potential runway incursions or other hazardous aircraft movement events.

AIRPORT OBSTRUCTION CHART: A scaled drawing depicting the Federal Aviation Regulation (FAR) Part 77 surfaces, a representation of objects that penetrate these surfaces, runway, taxiway, and ramp areas, navigational aids, buildings, roads and other detail in the vicinity of an airport.

AIRPORT REFERENCE CODE (ARC): A coding system used to relate airport design criteria to the operational (Aircraft Approach Category) to the physical characteristics (Airplane Design Group) of the airplanes intended to operate at the airport.

AIRPORT REFERENCE POINT (ARP): The latitude and longitude of the approximate center of the airport.

AIRPORT SPONSOR: The entity that is legally responsible for the management and operation of an airport, including the fulfillment of the requirements of laws and regulations related thereto.

AIRPORT SURFACE DETECTION EQUIPMENT: A radar system that provides air traffic controllers with a visual representation of the movement of aircraft and other vehicles on the ground on the airfield at an airport.

AIRPORT SURVEILLANCE RADAR: The primary radar located at an airport or in an air traffic control terminal area that receives a signal at an antenna and transmits the signal to air traffic control display equipment defining the location of aircraft in the air. The signal provides only the azimuth and range of aircraft from the location of the antenna.

AIRPORT TRAFFIC CONTROL TOWER (ATCT): A central operations facility in the terminal air traffic control system, consisting of a tower, including an associated instrument flight rule (IFR) room if radar equipped, using air/ground communications and/or radar, visual signaling and other devices to provide safe and expeditious movement of terminal air traffic.

AIR ROUTE TRAFFIC CONTROL CENTER: A facility which provides en route air traffic control service to aircraft operating on an IFR flight plan within controlled airspace over a large, multi-state region.

AIRSIDE: The portion of an airport that contains the facilities necessary for the operation of aircraft.

AIRSPACE: The volume of space above the surface of the ground that is provided for the operation of aircraft.

AIR TAXI: An air carrier certificated in accordance with FAR Part 121 and FAR Part 135 and authorized to provide, on demand, public transportation of persons and property by aircraft. Generally operates small aircraft "for hire" for specific trips.

AIR TRAFFIC CONTROL: A service operated by an appropriate organization for the purpose of providing for the safe, orderly, and expeditious flow of air traffic.

AIR ROUTE TRAFFIC CONTROL CENTER (ARTCC): A facility established to provide air traffic control service to aircraft operating on an IFR flight plan within controlled airspace and principally during the en route phase of flight.

AIR TRAFFIC CONTROL SYSTEM COMMAND CENTER: A facility operated by the FAA which is responsible for the central flow control, the central altitude reservation system, the airport reservation position system, and the air traffic service contingency command for the air traffic control system.

AIR TRAFFIC HUB: A categorization of commercial service airports or group of commercial service airports in a metropolitan or urban area based upon the proportion of annual national enplanements existing at the airport or airports. The categories are large hub, medium hub, small hub, or non-hub. It forms the basis for the apportionment of entitlement funds.

AIR TRANSPORT ASSOCIATION OF AMERICA: An organization consisting of the principal U.S. airlines that represents the interests of the airline industry on major aviation issues before federal, state, and local government bodies. It promotes air transportation safety by coordinating industry and governmental safety programs and it serves as a focal point for industry efforts to standardize practices and enhance the efficiency of the air transportation system.

ALERT AREA: See special-use airspace.

ALTITUDE: The vertical distance measured in feet above mean sea level.

ANNUAL INSTRUMENT APPROACH (AIA): An approach to an airport with the intent to land by an aircraft in accordance with an IFR flight plan when visibility is less than three miles and/or when the ceiling is at or below the minimum initial approach altitude.

APPROACH LIGHTING SYSTEM (ALS): An airport lighting facility which provides visual guidance to landing aircraft by radiating light beams by which the pilot aligns the aircraft with the extended centerline of the runway on his final approach and landing.

APPROACH MINIMUMS: The altitude below which an aircraft may not descend while on an IFR approach unless the pilot has the runway in sight.

APPROACH SURFACE: An imaginary obstruction limiting surface defined in FAR Part 77 which is longitudinally centered on an extended runway centerline and extends outward and upward from the primary surface at each end of a runway at a designated slope and distance based upon the type of available or planned approach by aircraft to a runway.

APRON: A specified portion of the airfield used for passenger, cargo or freight loading and unloading, aircraft parking, and the refueling, maintenance and servicing of aircraft.

AREA NAVIGATION: The air navigation procedure that provides the capability to establish and maintain a flight path on an arbitrary course that remains within the coverage area of navigational sources being used.

AUTOMATED TERMINAL INFORMATION SERVICE (ATIS): The continuous broadcast of recorded non-control information at towered airports. Information typically includes wind speed, direction, and runway in use.

AUTOMATED SURFACE OBSERVATION SYSTEM (ASOS): A reporting system that provides frequent airport ground surface weather observation data through digitized voice broadcasts and printed reports.

AUTOMATED WEATHER OBSERVATION STATION (AWOS): Equipment used to automatically record weather conditions (i.e. cloud height, visibility, wind speed and direction, temperature, dew point, etc.)

AUTOMATIC DIRECTION FINDER (ADF): An aircraft radio navigation system which senses and indicates the direction to a non-directional radio beacon (NDB) ground transmitter.

AVIGATION EASEMENT: A contractual right or a property interest in land over which a right of unobstructed flight in the airspace is established.

AZIMUTH: Horizontal direction expressed as the angular distance between true north and the direction of a fixed point (as the observer's heading).

B

BASE LEG: A flight path at right angles to the landing runway off its approach end. The base leg normally extends from the downwind leg to the intersection of the extended runway centerline. See "traffic pattern."

BASED AIRCRAFT: The general aviation aircraft that use a specific airport as a home base.

BEARING: The horizontal direction to or from any point, usually measured clockwise from true north or magnetic north.

BLAST FENCE: A barrier used to divert or dissipate jet blast or propeller wash.

BLAST PAD: A prepared surface adjacent to the end of a runway for the purpose of eliminating the erosion of the ground surface by the wind forces produced by airplanes at the initiation of takeoff operations.

BUILDING RESTRICTION LINE (BRL): A line which identifies suitable building area locations on the airport.

C

CAPITAL IMPROVEMENT PLAN: The planning program used by the Federal Aviation Administration to identify, prioritize, and distribute Airport Improvement Program funds for airport development and the needs of the National Airspace System to meet specified national goals and objectives.

CARGO SERVICE AIRPORT: An airport served by aircraft providing air transportation of property only, including mail, with an annual aggregate landed weight of at least 100,000,000 pounds.

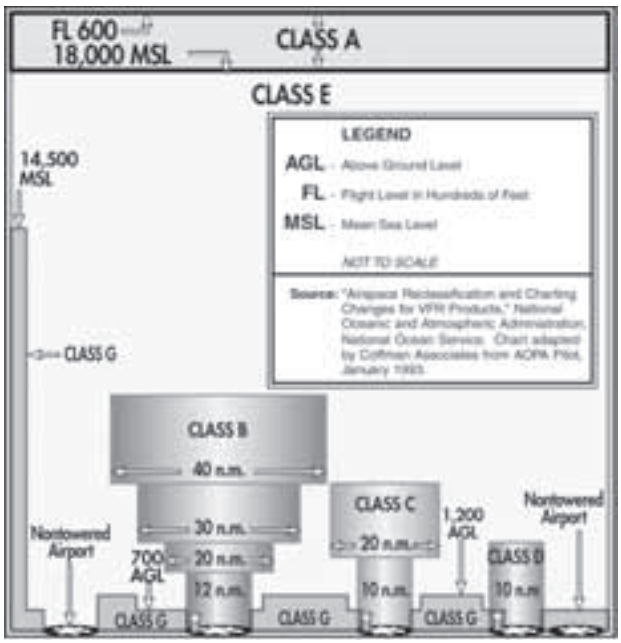
CATEGORY I: An Instrument Landing System (ILS) that provides acceptable guidance information to an aircraft from the coverage limits of the ILS to the point at which the localizer course line intersects the glide path at a decision height of 100 feet above the horizontal plane containing the runway threshold.

CATEGORY II: An ILS that provides acceptable guidance information to an aircraft from the coverage limits of the ILS to the point at which the localizer course line intersects the glide path at a decision height of 50 feet above the horizontal plane containing the runway threshold.

CATEGORY III: An ILS that provides acceptable guidance information to a pilot from the coverage limits of the ILS with no decision height specified above the horizontal plane containing the runway threshold.

CEILING: The height above the ground surface to the location of the lowest layer of clouds which is reported as either broken or overcast.

CIRCLING APPROACH: A maneuver initiated by the pilot to align the aircraft with the runway for landing when flying a predetermined circling instrument approach under IFR.



CLASS A AIRSPACE: See Controlled Airspace.

CLASS B AIRSPACE: See Controlled Airspace.

CLASS C AIRSPACE: See Controlled Airspace.

CLASS D AIRSPACE: See Controlled Airspace.

CLASS E AIRSPACE: See Controlled Airspace.

CLASS G AIRSPACE: See Controlled Airspace.

CLEAR ZONE: See Runway Protection Zone.

COMMERCIAL SERVICE AIRPORT: A public airport providing scheduled passenger service that enplanes at least 2,500 annual passengers.

COMMON TRAFFIC ADVISORY FREQUENCY: A radio frequency identified in the appropriate aeronautical chart which is designated for the purpose of transmitting airport advisory information and procedures while operating to or from an uncontrolled airport.

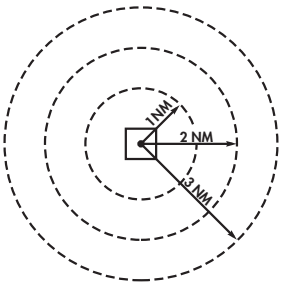
COMPASS LOCATOR (LOM): A low power, low/medium frequency radio-beacon installed in conjunction with the instrument landing system at one or two of the marker sites.

CONICAL SURFACE: An imaginary obstruction-limiting surface defined in FAR Part 77 that extends from the edge of the horizontal surface outward and upward at a slope of 20 to 1 for a horizontal distance of 4,000 feet.

CONTROLLED AIRPORT: An airport that has an operating airport traffic control tower.

CONTROLLED AIRSPACE: Airspace of defined dimensions within which air traffic control services are provided to instrument flight rules (IFR) and visual flight rules (VFR) flights in accordance with the airspace classification. Controlled airspace in the United States is designated as follows:

- **CLASS A**: Generally, the airspace from 18,000 feet mean sea level (MSL) up to but not including flight level FL600. All persons must operate their aircraft under IFR.

- **CLASS B**:
  

  Generally, the airspace from the surface to 10,000 feet MSL surrounding the nation's busiest airports. The configuration of Class B airspace is unique to each airport, but typically consists of two or more layers of air space and is designed to contain all published instrument approach procedures to the airport. An air traffic control clearance is required for all aircraft to operate in the area.

- **CLASS C**: Generally, the airspace from the surface to 4,000 feet above the airport elevation (charted as MSL) surrounding those airports that have an operational control tower and radar approach control and are served by a qualifying number of IFR operations or passenger enplanements. Although individually tailored for each airport, Class C airspace typically consists of a surface area with a five nautical mile (nm) radius and an outer area with a 10 nautical mile radius that extends from 1,200 feet to 4,000 feet above the airport elevation. Two-way radio communication is required for all aircraft.

- **CLASS D**: Generally, that airspace from the surface to 2,500 feet above the air port elevation (charted as MSL) surrounding those airports that have an operational control tower. Class D airspace is individually tailored and configured to encompass published instrument approach procedure . Unless otherwise authorized, all persons must establish two-way radio communication.

- **CLASS E**: Generally, controlled airspace that is not classified as Class A, B, C, or D. Class E airspace extends upward from either the surface or a designated altitude to the overlying or adjacent controlled airspace. When designated as a surface area, the airspace will be configured to contain all instrument procedures. Class E airspace encompasses all Victor Airways. Only aircraft following instrument flight rules are required to establish two-way radio communication with air traffic control.

- **CLASS G**: Generally, that airspace not classified as Class A, B, C, D, or E. Class G airspace is uncontrolled for all aircraft. Class G airspace extends from the surface to the overlying Class E airspace.

CONTROLLED FIRING AREA: See special-use airspace.

CROSSWIND: A wind that is not parallel to a runway centerline or to the intended flight path of an aircraft.

CROSSWIND COMPONENT: The component of wind that is at a right angle to the runway centerline or the intended flight path of an aircraft.

CROSSWIND LEG: A flight path at right angles to the landing runway off its upwind end. See "traffic pattern."

D

DECIBEL: A unit of noise representing a level relative to a reference of a sound pressure 20 micro newtons per square meter.

DECISION HEIGHT: The height above the end of the runway surface at which a decision must be made by a pilot during the ILS or Precision Approach Radar approach to either continue the approach or to execute a missed approach.

DECLARED DISTANCES: The distances declared available for the airplane's takeoff runway, takeoff distance, accelerate-stop distance, and landing distance requirements. The distances are:

- **TAKEOFF RUNWAY AVAILABLE (TORA)**: The runway length declared available and suitable for the ground run of an airplane taking off.
- **TAKEOFF DISTANCE AVAILABLE (TODA)**: The TORA plus the length of any remaining runway and/or clear way beyond the far end of the TORA.
- **ACCELERATE-STOP DISTANCE AVAILABLE (ASDA)**: The runway plus stopway length declared available for the acceleration and deceleration of an aircraft aborting a takeoff.
- **LANDING DISTANCE AVAILABLE (LDA)**: The runway length declared available and suitable for landing.

DEPARTMENT OF TRANSPORTATION: The cabinet level federal government organization consisting of modal operating agencies, such as the Federal Aviation Administration, which was established to promote the coordination of federal transportation programs and to act as a focal point for research and development efforts in transportation.

DISCRETIONARY FUNDS: Federal grant funds that may be appropriated to an airport based upon designation by the Secretary of Transportation or Congress to meet a specified national priority such as enhancing capacity, safety, and security, or mitigating noise.

DISPLACED THRESHOLD: A threshold that is located at a point on the runway other than the designated beginning of the runway.

DISTANCE MEASURING EQUIPMENT (DME): Equipment (airborne and ground) used to measure, in nautical miles, the slant range distance of an aircraft from the DME navigational aid.

DNL: The 24-hour average sound level, in Aweighted decibels, obtained after the addition of ten decibels to sound levels for the periods between 10 p.m. and 7 a.m. as averaged over a span of one year. It is the FAA standard metric for determining the cumulative exposure of individuals to noise.

DOWNWIND LEG: A flight path parallel to the landing runway in the direction opposite to landing. The downwind leg normally extends between the crosswind leg and the base leg. Also see "traffic pattern."

E

EASEMENT: The legal right of one party to use a portion of the total rights in real estate owned by another party. This may include the right of passage over, on, or below the property; certain air rights above the property, including view rights; and the rights to any specified form of development or activity, as well as any other legal rights in the property that may be specified in the easement document.

ELEVATION: The vertical distance measured in feet above mean sea level.

ENPLANED PASSENGERS: The total number of revenue passengers boarding aircraft, including originating, stop-over, and transfer passengers, in scheduled and nonscheduled services.

ENPLANEMENT: The boarding of a passenger, cargo, freight, or mail on an aircraft at an airport.

ENTITLEMENT: Federal funds for which a commercial service airport may be eligible based upon its annual passenger enplanements.

ENVIRONMENTAL ASSESSMENT (EA): An environmental analysis performed pursuant to the National Environmental Policy Act to determine whether an action would significantly affect the environment and thus require a more detailed environmental impact statement.

ENVIRONMENTAL AUDIT: An assessment of the current status of a party's compliance with applicable

environmental requirements of a party's environmental compliance policies, practices, and controls.

ENVIRONMENTAL IMPACT STATEMENT (EIS): A document required of federal agencies by the National Environmental Policy Act for major projects are legislative proposals affecting the environment. It is a tool for decision-making describing the positive and negative effects of a proposed action and citing alternative actions.

ESSENTIAL AIR SERVICE: A federal program which guarantees air carrier service to selected small cities by providing subsidies as needed to prevent these cities from such service.

F

FEDERAL AVIATION REGULATIONS: The general and permanent rules established by the executive departments and agencies of the Federal Government for aviation, which are published in the Federal Register. These are the aviation subset of the Code of Federal Regulations.

FEDERAL INSPECTION SERVICES: The provision of customs and immigration services including passport inspection, inspection of baggage, the collection of duties on certain imported items, and the inspections for agricultural products, illegal drugs, or other restricted items.

FINAL APPROACH: A flight path in the direction of landing along the extended runway centerline. The final approach normally extends from the base leg to the runway. See "traffic pattern."

FINAL APPROACH AND TAKEOFF AREA (FATO). A defined area over which the final phase of the helicopter approach to a hover, or a landing is completed and from which the takeoff is initiated.

FINAL APPROACH FIX: The designated point at which the final approach segment for an aircraft landing on a runway begins for a non-precision approach.

FINDING OF NO SIGNIFICANT IMPACT (FONSI): A public document prepared by a Federal agency that presents the rationale why a proposed action will not have a significant effect on the environment and for which an environmental impact statement will not be prepared.

FIXED BASE OPERATOR (FBO): A provider of services to users of an airport. Such services include, but are not limited to, hangaring, fueling, flight training, repair, and maintenance.

FLIGHT LEVEL: A designation for altitude within controlled airspace.

FLIGHT SERVICE STATION: An operations facility in the national flight advisory system which utilizes data interchange facilities for the collection and dissemination of Notices to Airmen, weather, and administrative data and which provides pre-flight and in-flight advisory services to pilots through air and ground based communication facilities.

FRANGIBLE NAVAID: A navigational aid which retains its structural integrity and stiffness up to a designated maximum load, but on impact from a greater load, breaks, distorts, or yields in such a manner as to present the minimum hazard to aircraft.

G

GENERAL AVIATION: That portion of civil aviation which encompasses all facets of aviation except air carriers holding a certificate of convenience and necessity, and large aircraft commercial operators.

GENERAL AVIATION AIRPORT: An airport that provides air service to only general aviation.

GLIDESLOPE (GS): Provides vertical guidance for aircraft during approach and landing. The glideslope consists of the following:

1. Electronic components emitting signals which provide vertical guidance by reference to airborne instruments during instrument approaches such as ILS; or

2. Visual ground aids, such as VASI, which provide vertical guidance for VFR approach or for the visual portion of an instrument approach and landing.

GLOBAL POSITIONING SYSTEM (GPS): A system of 24 satellites used as reference points to enable navigators equipped with GPS receivers to determine their latitude, longitude, and altitude.

GROUND ACCESS: The transportation system on and around the airport that provides access to and

from the airport by ground transportation vehicles for passengers, employees, cargo, freight, and airport services.

H

HELIPAD: A designated area for the takeoff, landing, and parking of helicopters.

HIGH INTENSITY RUNWAY LIGHTS: The highest classification in terms of intensity or brightness for lights designated for use in delineating the sides of a runway.

HIGH-SPEED EXIT TAXIWAY: A long radius taxiway designed to expedite aircraft turning off the runway after landing (at speeds to 60 knots), thus reducing runway occupancy time.

HORIZONTAL SURFACE: An imaginary obstruction- limiting surface defined in FAR Part 77 that is specified as a portion of a horizontal plane surrounding a runway located 150 feet above the established airport elevation. The specific horizontal dimensions of this surface are a function of the types of approaches existing or planned for the runway.

I

INITIAL APPROACH FIX: The designated point at which the initial approach segment begins for an instrument approach to a runway.

INSTRUMENT APPROACH PROCEDURE: A series of predetermined maneuvers for the orderly transfer of 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.

INSTRUMENT FLIGHT RULES (IFR): Procedures for the conduct of flight in weather conditions below Visual Flight Rules weather minimums. The term IFR is often also used to define weather conditions and the type of flight plan under which an aircraft is operating.

INSTRUMENT LANDING SYSTEM (ILS): A precision instrument approach system which normally consists of the following electronic components and visual aids:

1. Localizer.
2. Glide Slope.
3. Outer Marker.
4. Middle Marker.
5. Approach Lights.

INSTRUMENT METEOROLOGICAL CONDITIONS: Meteorological conditions expressed in terms of specific visibility and ceiling conditions that are less than the minimums specified for visual meteorological conditions.

ITINERANT OPERATIONS: Operations by aircraft that are not based at a specified airport.

K

KNOTS: A unit of speed length used in navigation that is equivalent to the number of nautical miles traveled in one hour.

L

LANDSIDE: The portion of an airport that provides the facilities necessary for the processing of passengers, cargo, freight, and ground transportation vehicles.

LANDING DISTANCE AVAILABLE (LDA): See declared distances.

LARGE AIRPLANE: An airplane that has a maximum certified takeoff weight in excess of 12,500 pounds.

LOCAL AREA AUGMENTATION SYSTEM: A differential GPS system that provides localized measurement correction signals to the basic GPS signals to improve navigational accuracy integrity, continuity, and availability.

LOCAL OPERATIONS: Aircraft operations performed by aircraft that are based at the airport and that operate in the local traffic pattern or within sight of the airport, that are known to be departing for or arriving from flights in local practice areas within a prescribed distance from the airport, or that execute simulated instrument approaches at the airport.

LOCAL TRAFFIC: Aircraft operating in the traffic pattern or within sight of the tower, or aircraft known to be departing or arriving from the local practice areas, or aircraft executing practice instrument

approach procedures. Typically, this includes touch and-go training operations.

LOCALIZER: The component of an ILS which provides course guidance to the runway.

LOCALIZER TYPE DIRECTIONAL AID (LDA): A facility of comparable utility and accuracy to a localizer, but is not part of a complete ILS and is not aligned with the runway.

LONG RANGE NAVIGATION SYSTEM (LORAN): Long range navigation is an electronic navigational aid which determines aircraft position and speed by measuring the difference in the time of reception of synchronized pulse signals from two fixed transmitters. Loran is used for en route navigation.

LOW INTENSITY RUNWAY LIGHTS: The lowest clas- sification in terms of intensity or brightness for lights designated for use in delineating the sides of a runway.

M

MEDIUM INTENSITY RUNWAY LIGHTS: The middle classification in terms of intensity or brightness for lights designated for use in delineating the sides of a runway.

MICROWAVE LANDING SYSTEM (MLS): An instrument approach and landing system that provides precision guidance in azimuth, elevation, and distance measurement.

MILITARY OPERATIONS: Aircraft operations that are performed in military aircraft.

MILITARY OPERATIONS AREA (MOA): See special-use airspace

MILITARY TRAINING ROUTE: An air route depicted on aeronautical charts for the conduct of military flight training at speeds above 250 knots.

MISSED APPROACH COURSE (MAC): The flight route to be followed if, after an instrument approach, a landing is not affected, and occurring normally:

1. When the aircraft has descended to the decision height and has not established visual contact; or

2. When directed by air traffic control to pull up or to go around again.

MOVEMENT AREA: The runways, taxiways, and other areas of an airport which are utilized for taxiing/hover taxiing, air taxiing, takeoff, and landing of aircraft, exclusive of loading ramps and parking areas. At those airports with a tower, air traffic control clearance is required for entry onto the movement area.

N

NATIONAL AIRSPACE SYSTEM: The network of air traffic control facilities, air traffic control areas, and navigational facilities through the U.S.

NATIONAL PLAN OF INTEGRATED AIRPORT SYSTEMS: The national airport system plan developed by the Secretary of Transportation on a biannual basis for the development of public use airports to meet national air transportation needs.

NATIONAL TRANSPORTATION SAFETY BOARD: A federal government organization established to investigate and determine the probable cause of transportation accidents, to recommend equipment and procedures to enhance transportation safety, and to review on appeal the suspension or revocation of any certificates or licenses issued by the Secretary of Transportation.

NAUTICAL MILE: A unit of length used in navigation which is equivalent to the distance spanned by one minute of arc in latitude, that is, 1,852 meters or 6,076 feet. It is equivalent to approximately 1.15 statute mile.

NAVAID: A term used to describe any electrical or visual air navigational aids, lights, signs, and associated supporting equipment (i.e. PAPI, VASI, ILS, etc.)

NAVIGATIONAL AID: A facility used as, available for use as, or designed for use as an aid to air navigation.

NOISE CONTOUR: A continuous line on a map of the airport vicinity connecting all points of the same noise exposure level.

NON-DIRECTIONAL BEACON (NDB): A beacon transmitting nondirectional signals whereby the pilot of an aircraft equipped with direction finding equipment can determine his or her bearing to and from the radio beacon and home on, or track to, the station. When the radio beacon is installed in conjunction with the Instrument Landing System marker, it is normally called a Compass Locator.

NON-PRECISION APPROACH PROCEDURE: A standard instrument approach procedure in which no electronic glide slope is provided, such as VOR, TACAN, NDB, or LOC.

NOTICE TO AIRMEN: A notice containing information concerning the establishment, condition, or change in any component of or hazard in the National Airspace System, the
timely knowledge of which is considered essential to personnel concerned with flight operations.

O

OBJECT FREE AREA (OFA): An area on the ground centered on a runway, taxiway, or taxilane centerline provided to enhance the safety of aircraft operations by having the area free of objects, except for objects that need to be located in the OFA for air navigation or aircraft ground maneuvering purposes.

OBSTACLE FREE ZONE (OFZ): The airspace below 150 feet above the established airport elevation and along the runway and extended runway centerline that is required to be kept clear of all objects, except for frangible visual NAVAIDs that need to be located in the OFZ because of their function, in order to provide clearance for aircraft landing or taking off from the runway, and for missed approaches.

ONE-ENGINE INOPERABLE SURFACE: A surface emanating from the runway end at a slope ratio of 62.5:1. Air carrier airports are required to maintain a technical drawing of this surface depicting any object penetrations by January 1, 2010.

OPERATION: The take-off, landing, or touch-and-go procedure by an aircraft on a runway at an airport.

OUTER MARKER (OM): An ILS navigation facility in the terminal area navigation system located four to seven miles from the runway edge on the extended centerline, indicating to the pilot that he/she is passing over the facility and can begin final approach.

P

PILOT CONTROLLED LIGHTING: Runway lighting systems at an airport that are controlled by activating the microphone of a pilot on a specified radio frequency.

PRECISION APPROACH: A standard instrument approach procedure which provides runway alignment and glide slope (descent) information. It is categorized as follows:

- **CATEGORY I (CAT I)**: A precision approach which provides for approaches with a decision height of not less than 200 feet and visibility not less than 1/2 mile or Runway Visual Range (RVR) 2400 (RVR 1800) with operative touchdown zone and runway centerline lights.

- **CATEGORY II (CAT II)**: A precision approach which provides for approaches with a decision height of not less than 100 feet and visibility not less than 1200 feet RVR.

- **CATEGORY III (CAT III)**: A precision approach which provides for approaches with minima less than Category II.

PRECISION APPROACH PATH INDICATOR (PAPI): A lighting system providing visual approach slope guidance to aircraft during a landing approach. It is similar to a VASI but provides a sharper transition between the colored indicator lights.

PRECISION APPROACH RADAR: A radar facility in the terminal air traffic control system used to detect and display with a high degree of accuracy the direction, range, and elevation of an aircraft on the final approach to a runway.

PRECISION OBJECT FREE AREA (POFA): An area centered on the extended runway centerline, beginning at the runway threshold and extending behind the runway threshold that is 200 feet long by 800 feet wide. The POFA is a clearing standard which requires the POFA to be kept clear of above ground objects protruding above the runway safety

area edge elevation (except for frangible NAVAIDS). The POFA applies to all new authorized instrument approach procedures with less than 3/4 mile visibility.

PRIMARY AIRPORT: A commercial service airport that enplanes at least 10,000 annual passengers.

PRIMARY SURFACE: An imaginary obstruction limiting surface defined in FAR Part 77 that is specified as a rectangular surface longitudinally centered about a runway. The specific dimensions of this surface are a function of the types of approaches existing or planned for the runway.

PROHIBITED AREA: See special-use airspace.

PVC: Poor visibility and ceiling. Used in determining Annual Service Volume. PVC conditions exist when the cloud ceiling is less than 500 feet and visibility is less than one mile.

R

RADIAL: A navigational signal generated by a Very High Frequency Omni-directional Range or VORTAC station that is measured as an azimuth from the station.

REGRESSION ANALYSIS: A statistical technique that seeks to identify and quantify the relationships between factors associated with a forecast.

REMOTE COMMUNICATIONS OUTLET (RCO): An unstaffed transmitter receiver/facility remotely controlled by air traffic personnel. RCOs serve flight service stations (FSSs). RCOs were established to provide ground-to-ground communications between air traffic control specialists and pilots at satellite airports for delivering en route clearances, issuing departure authorizations, and acknowledging instrument flight rules cancellations or departure/landing times.

REMOTE TRANSMITTER/RECEIVER (RTR): See remote communications outlet. RTRs serve ARTCCs.

RELIEVER AIRPORT: An airport to serve general aviation aircraft which might otherwise use a congested air-carrier served airport.

RESTRICTED AREA: See special-use airspace.

RNAV: Area navigation - airborne equipment which permits flights over determined tracks within prescribed accuracy tolerances without the need to overfly ground-based navigation facilities. Used en route and for approaches to an airport.

RUNWAY: A defined rectangular area on an airport prepared for aircraft landing and takeoff. Runways are normally numbered in relation to their magnetic direction, rounded off to the nearest 10 degrees. For example, a runway with a magnetic heading of 180 would be designated Runway 18. The runway heading on the opposite end of the runway is 180 degrees from that runway end. For example, the opposite runway heading for Runway 18 would be Runway 36 (magnetic heading of 360). Aircraft can takeoff or land from either end of a runway, depending upon wind direction.

RUNWAY ALIGNMENT INDICATOR LIGHT: A series of high intensity sequentially flashing lights installed on the extended centerline of the runway usually in conjunction with an approach lighting system.

RUNWAY END IDENTIFIER LIGHTS (REIL): Two synchronized flashing lights, one on each side of the runway threshold, which provide rapid and positive identification of the approach end of a particular runway.

RUNWAY GRADIENT: The average slope, measured in percent, between the two ends of a runway.

RUNWAY PROTECTION ZONE (RPZ): An area off the runway end to enhance the protection of people and property on the ground. The RPZ is trapezoidal in shape. Its dimensions are determined by the aircraft approach speed and runway approach type and minima.

RUNWAY SAFETY AREA (RSA): A defined surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot, or excursion from the runway.

RUNWAY VISIBILITY ZONE (RVZ): An area on the airport to be kept clear of permanent objects so that there is an unobstructed line of- site from any point five feet above the runway centerline to

any point five feet above an intersecting runway centerline.

RUNWAY VISUAL RANGE (RVR): An instrumentally derived value, in feet, representing the horizontal distance a pilot can see down the runway from the runway end.

S

SCOPE: The document that identifies and defines the tasks, emphasis, and level of effort associated with a project or study.

SEGMENTED CIRCLE: A system of visual indicators designed to provide traffic pattern information at airports without operating control towers.

SHOULDER: An area adjacent to the edge of paved runways, taxiways, or aprons providing a transition between the pavement and the adjacent surface; support for aircraft running off the pavement; enhanced drainage; and blast protection. The shoulder does not necessarily need to be paved.

SLANT-RANGE DISTANCE: The straight line distance between an aircraft and a point on the ground.

SMALL AIRPLANE: An airplane that has a maximum certified takeoff weight of up to 12,500 pounds.

SPECIAL-USE AIRSPACE: Airspace of defined dimensions identified by a surface area wherein activities must be confined because of their nature and/or wherein limitations may be imposed upon aircraft operations that are not a part of those activities. Special-use airspace classifications include:

- **ALERT AREA**: Airspace which may contain a high volume of pilot training activities or an unusual type of aerial activity, neither of which is hazardous to aircraft.

- **CONTROLLED FIRING AREA**: Airspace wherein activities are conducted under conditions so controlled as to eliminate hazards to nonparticipating aircraft and to ensure the safety of persons or property on the ground.

- **MILITARY OPERATIONS AREA (MOA)**: Designated airspace with defined vertical and lateral dimensions established outside Class A airspace to separate/segregate certain military activities from instrument flight rule (IFR) traffic and to identify for visual flight rule (VFR) traffic where these activities are conducted.

- **PROHIBITED AREA**: Designated airspace within which the flight of aircraft is prohibited.

- **RESTRICTED AREA**: Airspace designated under Federal Aviation Regulation (FAR) 73, within which the flight of aircraft, while not wholly prohibited, is subject to restriction. Most restricted areas are designated joint use. When not in use by the using agency, IFR/VFR operations can be authorized by the controlling air traffic control facility.

- **WARNING AREA**: Airspace which may contain hazards to nonparticipating aircraft.

STANDARD INSTRUMENT DEPARTURE (SID): A preplanned coded air traffic control IFR departure routing, preprinted for pilot use in graphic and textual form only.

STANDARD INSTRUMENT DEPARTURE PROCEDURES: A published standard flight procedure to be utilized following takeoff to provide a transition between the airport and the terminal area or en route airspace.

STANDARD TERMINAL ARRIVAL ROUTE (STAR): A preplanned coded air traffic control IFR arrival routing, preprinted for pilot use in graphic and textual or textual form only.

STOP-AND-GO: A procedure wherein an aircraft will land, make a complete stop on the runway, and then commence a takeoff from that point. A stop-and-go is recorded as two operations: one operation for the landing and one operation for the takeoff.

STOPWAY: An area beyond the end of a takeoff runway that is designed to support an aircraft during an aborted takeoff without causing structural damage to the aircraft. It is not to be used for takeoff, landing, or taxiing by aircraft.

STRAIGHT-IN LANDING/APPROACH: A landing made on a runway aligned within 30 degrees

of the final approach course following completion of an instrument approach.

T

TACTICAL AIR NAVIGATION (TACAN): An ultrahigh frequency electronic air navigation system which provides suitably-equipped aircraft a continuous indication of bearing and distance to the TACAN station.

TAKEOFF RUNWAY AVAILABLE (TORA): See declared distances.

TAKEOFF DISTANCE AVAILABLE (TODA): See declared distances.

TAXILANE: The portion of the aircraft parking area used for access between taxiways and aircraft parking positions.

TAXIWAY: A defined path established for the taxiing of aircraft from one part of an airport to another.

TAXIWAY SAFETY AREA (TSA): A defined surface alongside the taxiway prepared or suitable for reducing the risk of damage to an airplane unintentionally departing the taxiway.

TERMINAL INSTRUMENT PROCEDURES: Published flight procedures for conducting instrument approaches to runways under instrument meteorological conditions.

TERMINAL RADAR APPROACH CONTROL: An element of the air traffic control system responsible for monitoring the en-route and terminal segment of air traffic in the airspace surrounding airports with moderate to high levels of air traffic.

TETRAHEDRON: A device used as a landing direction indicator. The small end of the tetrahedron points in the direction of landing.

THRESHOLD: The beginning of that portion of the runway available for landing. In some instances the landing threshold may be displaced.

TOUCH-AND-GO: An operation by an aircraft that lands and departs on a runway without stopping or exiting the runway. A touch-and go is recorded as two operations: one operation for the landing and one operation for the takeoff.

TOUCHDOWN: The point at which a landing aircraft makes contact with the runway surface.

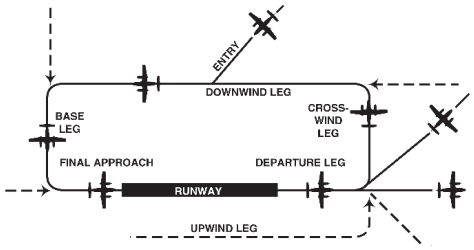
TOUCHDOWN AND LIFT-OFF AREA (TLOF): A load bearing, generally paved area, normally centered in the FATO, on which the helicopter lands or takes off.

TOUCHDOWN ZONE (TDZ): The first 3,000 feet of the runway beginning at the threshold.

TOUCHDOWN ZONE ELEVATION (TDZE): The highest elevation in the touchdown zone.

TOUCHDOWN ZONE (TDZ) LIGHTING: Two rows of transverse light bars located symmetrically about the runway centerline normally at 100- foot intervals. The basic system extends 3,000 feet along the runway.

TRAFFIC PATTERN: The traffic flow that is prescribed for aircraft landing at or taking off from an airport. The components of a typical traffic pattern are the upwind leg, crosswind leg, downwind leg, base leg, and final approach.



U

UNCONTROLLED AIRPORT: An airport without an air traffic control tower at which the control of Visual Flight Rules traffic is not exercised.

UNCONTROLLED AIRSPACE: Airspace within which aircraft are not subject to air traffic control.

UNIVERSAL COMMUNICATION (UNICOM): A nongovernment communication facility which may provide airport information at certain airports. Locations and frequencies of UNICOM's are shown on aeronautical charts and publications.

UPWIND LEG: A flight path parallel to the landing runway in the direction of landing. See "traffic pattern."

V

VECTOR: A heading issued to an aircraft to provide navigational guidance by radar.

VERY HIGH FREQUENCY/ OMNIDIRECTIONAL RANGE (VOR): A ground-based electronic navigation aid transmitting very high frequency navigation signals, 360 degrees in azimuth, oriented from magnetic north. Used as the basis for navigation in the national airspace system. The VOR periodically identifies itself by Morse Code and may have an additional voice identification feature.

VERY HIGH FREQUENCY OMNI-DIRECTIONAL RANGE/ TACTICAL AIR NAVIGATION (VORTAC): A navigation aid providing VOR azimuth, TACAN azimuth, and TACAN distance-measuring equipment (DME) at one site.

VICTOR AIRWAY: A control area or portion thereof established in the form of a corridor, the centerline of which is defined by radio navigational aids.

VISUAL APPROACH: An approach wherein an aircraft on an IFR flight plan, operating in VFR conditions under the control of an air traffic control facility and having an air traffic control authorization, may proceed to the airport of destination in VFR conditions.

VISUAL APPROACH SLOPE INDICATOR (VASI): An airport lighting facility providing vertical visual approach slope guidance to aircraft during approach to landing by radiating a directional pattern of high intensity red and white focused light beams which indicate to the pilot that he is on path if he sees red/white, above path if white/white, and below path if red/red. Some airports serving large aircraft have three-bar VASI's which provide two visual guide paths to the same runway.

VISUAL FLIGHT RULES (VFR): Rules that govern the procedures for conducting flight under visual conditions. The term VFR is also used in the United States to indicate weather conditions that are equal to or greater than minimum VFR requirements. In addition, it is used by pilots and controllers to indicate type of flight plan.

VISUAL METEOROLOGICAL CONDITIONS: Meteorological conditions expressed in terms of specific visibility and ceiling conditions which are equal to or greater than the threshold values for instrument meteorological conditions.

VOR: See "Very High Frequency Omnidirectional Range Station."

VORTAC: See "Very High Frequency Omnidirectional Range Station/Tactical Air Navigation."

W

WARNING AREA: See special-use airspace.

WIDE AREA AUGMENTATION SYSTEM: An enhancement of the Global Positioning System that includes integrity broadcasts, differential corrections, and additional ranging signals for the purpose of providing the accuracy, integrity, availability, and continuity required to support all phases of flight.

AC: advisory circular

ADF: automatic direction finder

ADG: airplane design group

AFSS: automated flight service station

AGL: above ground level

AIA: annual instrument approach

AIP: Airport Improvement Program

AIR-21: Wendell H. Ford Aviation Investment and Reform Act for the 21st Century

ALS: approach lighting system

ALSF-1: standard 2,400-foot high intensity approach lighting system with sequenced flashers (CAT I configuration)

ALSF-2: standard 2,400-foot high intensity approach lighting system with sequenced flashers (CAT II configuration)

AOA: Aircraft Operation Area

APV: instrument approach procedure with vertical guidance

ARC: airport reference code

ARFF: aircraft rescue and fire fighting

ARP: airport reference point

ARTCC: air route traffic control center

ASDA: accelerate-stop distance available

ASR: airport surveillance radar

ASOS: automated surface observation station

ATCT: airport traffic control tower

ATIS: automated terminal information service

AVGAS: aviation gasoline - typically 100 low lead (100L)

AWOS: automated weather observation station

BRL: building restriction line

CFR: Code of Federal Regulation

CIP: capital improvement program

DME: distance measuring equipment

DNL: day-night noise level

DWL: runway weight bearing capacity of aircraft with dual-wheel type landing gear

DTWL: runway weight bearing capacity of aircraft with dual-tandem type landing gear

FAA: Federal Aviation Administration

FAR: Federal Aviation Regulation

FBO: fixed base operator

FY: fiscal year

GPS: global positioning system

GS: glide slope

HIRL: high intensity runway edge lighting

IFR: instrument flight rules (FAR Part 91)

ILS: instrument landing system

IM: inner marker

LDA: localizer type directional aid

LDA: landing distance available

LIRL: low intensity runway edge lighting

LMM: compass locator at ILS outer marker

LORAN: long range navigation

MALS: midium intensity approach lighting system with indicator lights

MIRL: medium intensity runway edge lighting

MITL: medium intensity taxiway edge lighting

MLS: microwave landing system

MM: middle marker

MOA: military operations area

MSL: mean sea level

NAVAID: navigational aid

NDB: nondirectional radio beacon

NM: nautical mile (6,076.1 feet)

NPES: National Pollutant Discharge Elimination System

NPIAS: National Plan of Integrated Airport Systems

NPRM: notice of proposed rule making

ODALS: omnidirectional approach lighting system

OFA: object free area

OFZ: obstacle free zone

OM: outer marker

PAC: planning advisory committee

PAPI: precision approach path indicator

PFC: porous friction course

PFC: passenger facility charge

PCL: pilot-controlled lighting

PIW public information workshop

PLASI: pulsating visual approach slope indicator

POFA: precision object free area

PVASI: pulsating/steady visual approach slope indicator

PVC: poor visibility and ceiling

RCO: remote communications outlet

REIL: runway end identifier lighting

RNAV: area navigation

RPZ: runway protection zone

RSA: runway safety area

RTR: remote transmitter/receiver

RVR: runway visibility range

RVZ: runway visibility zone

SALS: short approach lighting system

SASP: state aviation system plan

SEL: sound exposure level

SID: standard instrument departure

SM: statute mile (5,280 feet)

SRE: snow removal equipment

SSALF: simplified short approach lighting system with runway alignment indicator lights

STAR: standard terminal arrival route

SWL: runway weight bearing capacity for aircraft with single-wheel tandem type landing gear

TACAN: tactical air navigational aid

TDZ: touchdown zone

TDZE: touchdown zone elevation

TAF: Federal Aviation Administration (FAA) Terminal Area Forecast

TODA: takeoff distance available

TORA: takeoff runway available

TRACON: terminal radar approach control

VASI: visual approach slope indicator

VFR: visual flight rules (FAR Part 91)

VHF: very high frequency

VOR: very high frequency omni-directional range

VORTAC: VOR and TACAN collocated

Appendix B

ENVIRONMENTAL OVERVIEW

Appendix B
ENVIRONMENTAL OVERVIEW

A review of the potential environmental impacts associated with proposed airport projects is an essential consideration in the Airport Master Plan process. The primary purpose of this section is to review the proposed improvement program at Casa Grande Municipal Airport to determine whether the proposed actions could, individually or collectively, have the potential to significantly affect the quality of the environment. The information contained in this section was obtained from previous studies, various internet websites, and analysis by the consultant.

Construction of the improvements depicted on the Airport Layout Plan will require compliance with the *National Environmental Policy Act* (NEPA) *of 1969*, as amended, to receive federal financial assistance. For projects not "categorically excluded" under FAA Order 1050.1E, *Environmental Impacts: Policies and Procedures*, compliance with NEPA is generally satisfied through the preparation of an Environmental Assessment (EA). In instances in which significant environmental impacts are expected, an Environmental Impact Statement (EIS) may be required. While this portion of the Master Plan is not designed to satisfy the NEPA requirements for a categorical exclusion, EA, or EIS, it is intended to supply a preliminary review of environmental issues that would need to be analyzed in more detail within the NEPA process. This evaluation considers all environmental categories required for the NEPA process as outlined in FAA Order 1050.1E and Order 5050.4B, *National Environmental Policy Act* (NEPA) *Im-*

plementation Instructions for Airport Actions.

ENVIRONMENTAL ANALYSIS

FAA Orders 1050.1E and 5050.4B contain a list of the environmental categories to be evaluated for airport projects. Of the 20 plus environmental categories, the following resources are not found within the airport environs:

- Coastal Resources
- Environmental Justice Areas and Children's Environmental Health Risks
- Farmlands
- Floodplains
- Wetlands
- Wild and Scenic Rivers

The following sections describe potential impacts to resources present within the airport environs. These resources were described in detail within Chapter One of this study.

AIR QUALITY

According to the most recent update contained on the EPA's Greenbook website, Pinal County is currently in nonattainment for 8-hour ozone, Particulate Matter (PM_{10}), and Sulfur Dioxide (SO_2).

To determine the significance of potential air quality impacts, an emissions inventory will be needed to determine if the project meets general conformity as outlined within the *State Implementation Plan* (SIP).

A number of projects planned at the airport could also have temporary air quality impacts during construction. Emissions from the operation of construction vehicles and fugitive dust from pavement removal are common air pollutants during construction. However, with the use of best management practices (BMPs) during construction, these air quality impacts can be significantly lessened. Local construction permits will need to be acquired prior to the commencing of any construction project.

COMPATIBLE LAND USE

According to the "Draft" Future Land Use Map included within the *City of Casa Grande General Plan 2020* (October 2008), the area surrounding the airport is designated for "manufacturing/industrial" and "commerce and business" development. A city-owned park is located to the east of the airport. These land use designations are considered to be compatible with airport operations. The land proposed for acquisition in this master plan along the northern boundary of airport property is privately owned.

CONSTRUCTION IMPACTS

Construction impacts typically relate to the effects on specific impact categories, such as air quality or noise, during construction. The use of BMPs during construction is typically a requirement of construction-related permits such as an NPDES (AZDES) permit. Use of these measures typi-

cally alleviates potential resource impacts.

Short-term construction-related noise impacts should be minimal as land immediately adjacent to the airport is primarily vacant. Also, these impacts typically do not arise unless construction is being undertaken during early morning, evening, or nighttime hours.

Construction-related air quality impacts can be expected. Air emissions related to construction activities will be short-term in nature and will be included in air emissions inventories prepared prior to project implementation as requested by the FAA.

FISH, WILDLIFE, AND PLANTS

Table B1 lists the threatened, endangered, and candidate species with the potential to occur in Pinal County.

As discussed in Chapter One, the Arizona Heritage Data Management System on-line environmental review tool indicates that there are no occurrences of special status species or critical habitats within three miles of the airport. However, prior to development in previously undisturbed areas, field surveys will likely be needed to confirm a lack of critical habitat for protected species. Surveys could be required prior to the extension of Runway 5-23, the construction of a parallel runway, and the construction of new apron and hangar facilities. Survey results should be communicated to the U.S. Fish and Wildlife Service and the Arizona Fish and Game Department.

HAZARDOUS MATERIALS, POLLUTION PREVENTION, AND SOLID WASTE

According to the Environmental Protection Agency's (EPA) National Priorities List (NPL), there are no active Superfund sites located in the vicinity of the airport.

The airport will need to continue to comply with a National Pollution Discharge Elimination System (NPDES) permit, which will ensure that pollution control measures are in place at the airport. As development occurs at the airport, the permit will need to be modified to reflect the additional impervious surfaces and stormwater retention facilities. The addition and removal of impervious surfaces may require modifications to this permit should drainage patterns be modified.

As a result of increased operations at the airport, solid waste will slightly increase; however, these increases are not anticipated to be significant.

Prior to the acquisition of additional lands west of existing airport property, a Phase I Environmental Due Diligence Audit (EDDA) will likely be requested by the FAA as part of the NEPA documentation.

TABLE B1
Federally Listed Threatened, Endangered, and Candidate Species with Habitat in Pinal County

COMMON NAME	SCIENTIFIC NAME	HABITAT	STATUS
Arizona Hedgehog	Echinocereus triglochidiatus var. arizonicus	Ecotone between interior chapparal and madrean evergreen woodland.	Endangered
California Brown Pelican	Pelecanus occidentalis californicus	Coastal land and islands; species found around many Arizona lakes and rivers.	Endangered
Desert Pupfish	Cyprinodon macularius	Shallow springs, small streams, and marshes. Tolerates saline and warm water.	Endangered
Gila Chub	Gila intermedia	Pools, springs, cienegas, and streams.	Endangered
Gila Topminnow	Poeciliopsis occidentalis occidentalis	Small streams, springs, and cienegas vegetated shallows.	Endangered
Lesser Long-nosed Bat	Leptonycteris curasoae yerbabuenae	Desert scrub habitat with agave and columnar cacti present as food plants.	Endangered
Loach Minnow	Tiaroga cobitis	Small to large perennial streams with swift shallow water over cobble and gravel.	Threatened
Mexican Spotted Owl	Strix occidentalis lucida	Nests in canyons and dense forests with multilayered foliage structure.	Threatened
Nichol Turk's Head Cactus	Echinocactus horizonthalonius var. nicholii	Sonoran desert scrub.	Endangered
Razorback Sucker	Xyrauchen texanus	Riverine and lacustrine areas, generally not in fast moving water and may use backwaters.	Endangered
Southwestern Willow Flycatcher	Empidonax traillii extimus	Cottonwood/willow and tasmarisk vegetation communities along rivers and streams.	Endangered
Spikedance	Meda fulgida	Moderate to large perennial streams-with gravel substrates and moderate to swift velocities over sand and gravel substitutes.	Threatened
Yuma Clapper Rail	Rallus longirostris yumanensis	Fresh water and brackish marshes	Endangered
Acuna Cactus	Echinomastus erectocentrus var. acunensis	Well drained knolls and gravel ridges in Sonoran desertscrub.	Candidate
Yellow-billed Cuckoo	Coccyzus americanus	Large blocks of riparian woodlands (cottonwood, willow, or tamarisk galleries).	Candidate

Source: U.S. Fish and Wildlife Service, Pinal County Species List, December 2007

HISTORICAL, ARCHITECTURAL, ARCHAEOLOGICAL, AND CULTURAL RESOURCES

It is currently not known if any cultural or historic resources are located on airport property. Field surveys will be needed for previously undisturbed areas prior to development. These surveys would typically be undertaken during the NEPA documentation processes and the results coordinated with the State Historic Preservation Office.

LIGHT EMISSIONS AND VISUAL IMPACTS

Airside developments include a 4,750-foot extension to Runway 5-23, the construction of a parallel runway, and the relocation of the medium intensity approach lighting systems (MALSR) at the end of Runway 5. The runway extension and additional parallel runway will result in the extension of runway and taxiway lighting.

Landside development at the airport will create new hangar space, aviation-use revenue support parcels, relocated segmented circle/lighted wind sock, and an airport perimeter service road.

Construction of these proposed facilities will introduce new light emissions, resulting in an increase of light emissions from the airport. However, the land immediately surrounding the airport consists of vacant, commercial, and industrial uses, which provide a buffer between the airport and any surrounding residential development. This buffer should prevent light and visual impacts.

NATURAL RESOURCES AND ENERGY SUPPLY

Increased use of energy and natural resources are anticipated as the operations at the airport grow. None of the planned development projects are anticipated to result in significant increases in energy consumption.

NOISE

An airport's compatibility with surrounding land uses is usually associated with the extent of the airport's noise contours. Airport projects such as those needed to accommodate fleet mix changes, an increase in operations at the airport, or air traffic changes are examples of activities which can alter noise impacts and affect surrounding land uses. The 2007 noise exposure contours for Casa Grande Municipal Airport are shown on **Exhibit B1**. As shown on the exhibit, the 65 DNL noise contour remains largely on airport property. The contour extends off airport property at the west end of Runway 5 and beyond the end of Runway 23. Land encompassed by the 65 DNL contour off airport property is not planned by the City of Casa Grande for noise-sensitive land uses.

Exhibit B2 depicts the 2027 noise exposure contours for the airport. The 65 DNL contour extends beyond air-

port property north and south of the airport. The 70 DNL contour also extends beyond airport property north of the Runway 5L threshold and south of the Runway 5R end. According to the "Draft" Future Land Use Map presented in the *City of Casa Grande General Plan 2020 Update*, land surrounding the airport is planned for "manufacturing/industrial" and "commerce and business" uses, which should not be affected by airport related noise.

SECONDARY (INDUCED) IMPACTS

Significant shifts in patterns of population movement or growth or public service demands are not anticipated as a result of the proposed development. It could be expected, however, that the proposed development would potentially induce positive socioeconomic impacts for the community over a period of years. The airport, with expanded facilities and services, would be expected to attract additional users. It is also expected to encourage tourism, industry, and trade, and to enhance the future growth and expansion of the community's economic base. Future socioeconomic impacts resulting from the proposed development are anticipated to be primarily positive in nature.

DEPARTMENT OF TRANSPORTATION ACT SECTION 4(f) PROPERTIES

A significant impact would occur when a proposed action involves more than a minimal physical use of a Section 4(f) property, (publicly owned land from a public park, recreation area, or wildlife and waterfowl refuge of national, state, or local significance, or any land from a historic site of national, state, or local significance) or is deemed a "constructive use" substantially impairing the Section 4(f) property where mitigation measures do not reduce or eliminate the impacts. Substantial impairment would occur when impacts to Section 4(f) lands are sufficiently serious that the value of the site in terms of its prior significance and enjoyment are substantially reduced or lost.

A city-owned park is currently located on the approach end of Runway 23 and is encompassed partially by the runway protection zone (RPZ). This park may be considered a Section 4(f) property. The airfield plan calls for the relocation of the Runway 23 threshold 1,550 feet to the southwest. As a result, the RPZ will shift to the southwest and approaching aircraft will be at a higher altitude over the park during approach procedures, thereby likely minimizing the impact of airport operations on this park.

SOCIOECONOMIC IMPACTS

The proposed project includes the acquisition of a total of approximately 222 acres located on the west end of the existing property line. This land would be acquired to accommodate the extension to Runway 5-23, its runway protection zone (RPZ), the relocation of the MALSR, the potential construction of a parallel runway, and the construc-

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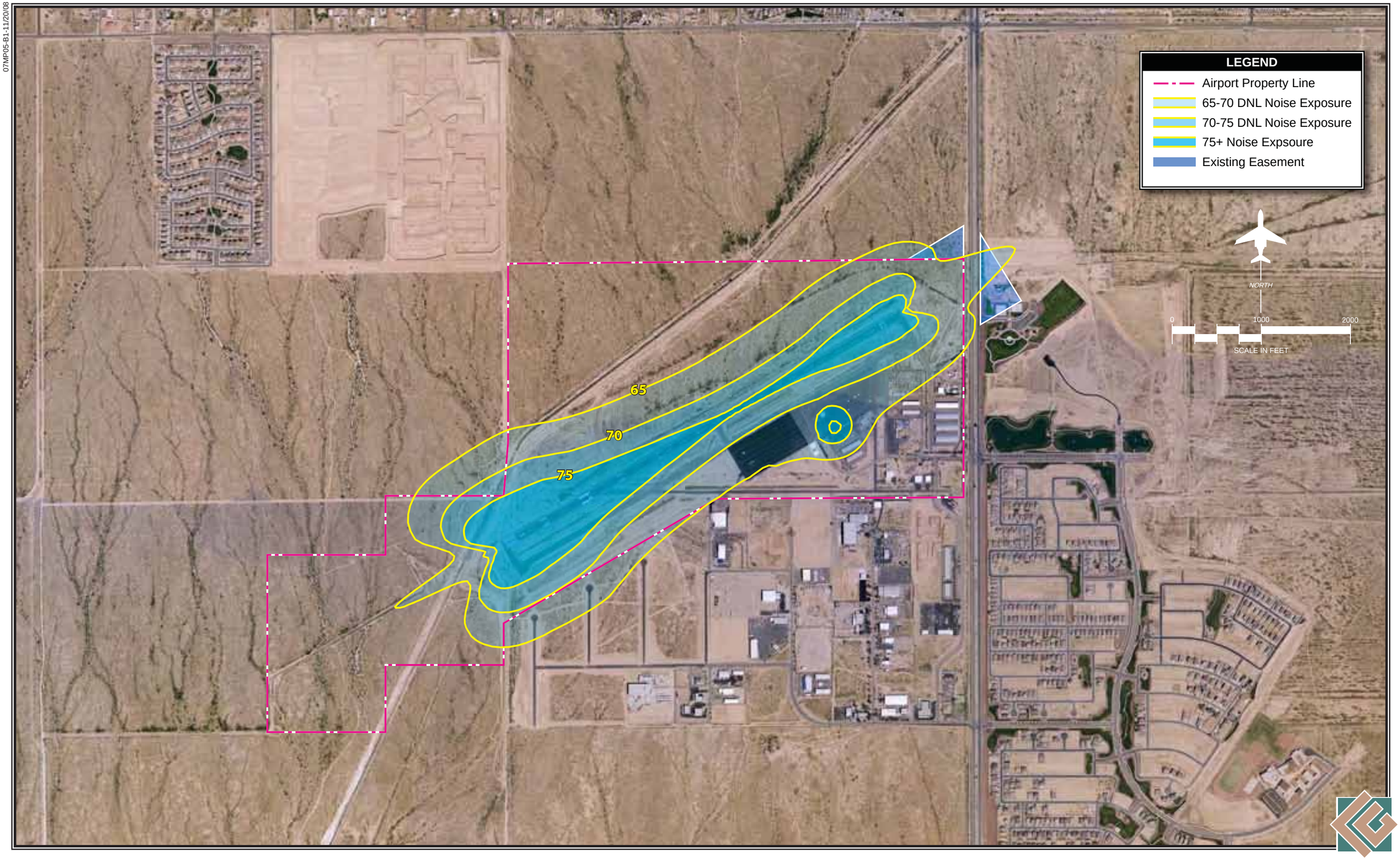

Exhibit B1
2007 AIRCRAFT NOISE EXPOSURE

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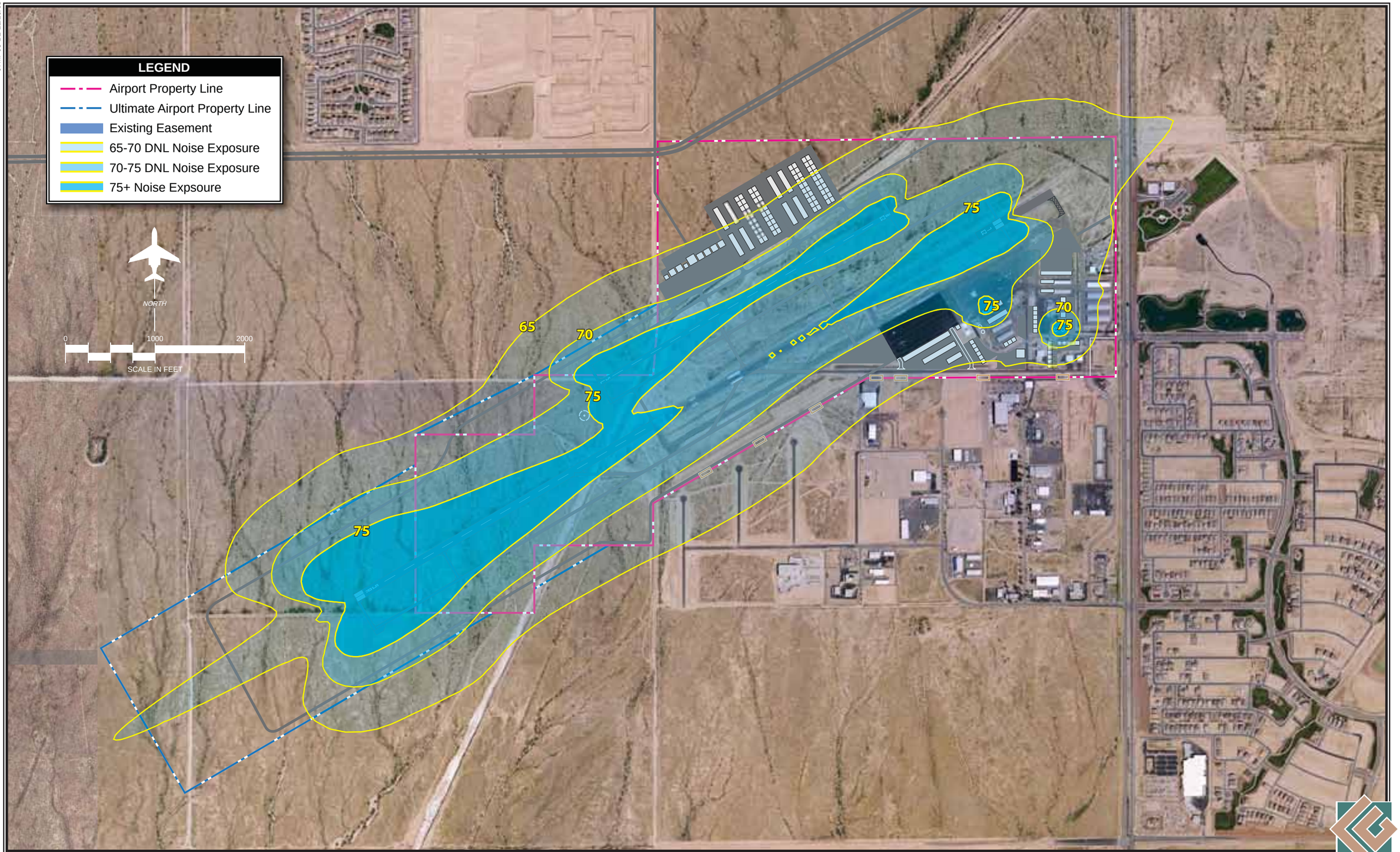

Exhibit B2
2027 AIRCRAFT NOISE EXPOSURE

tion of an airport perimeter service road. The acquisition will not include the relocation of residents or businesses. The airport perimeter service road will be located entirely on airport property and will not be accessible to the public.

WATER QUALITY

The airport will need to continue to comply with an AZPDES operations permit. With regard to construction activities, the airport and all applicable contractors will need to obtain and comply with the requirements and procedures of the construction-related AZPDES General Permit number AZG2003-001, including the preparation of a *Notice of Intent* and a *Stormwater Pollution Prevention Plan,* prior to the initiation of product construction activities.

As development occurs at the airport, the AZPDES permit will need to be modified to reflect the additional impervious surfaces and any stormwater retention facilities. The addition and removal of impervious surfaces may require modifications to this permit should drainage patterns be modified.

A drainage canal currently enters airport property from the north, running parallel to the runway, and extending southwest beyond airport property. The airport plans include the realignment of this drainage canal to allow for the extension of Runway 5-23, the construction of a parallel runway and other airfield and landside developments. In addition, a review of the aerial photography for the airport indicates the presence of a number of washes within the planned development area.

Additional study will need to be undertaken during the preliminary design phase to determine the impact of the airport development projects and the relocation of the drainage canal on the existing washes. Disturbance of these areas may require the issuance of a Section 404 Permit from the U.S. Army Corps of Engineers. Prior to development, field surveys should be undertaken to delineate potential jurisdictional areas.

Appendix C

AIRCRAFT TRAFFIC COUNT

07MP05-C1-4/7/09

Casa Grande Municipal Airport

Aircraft Traffic Count

Casa Grande Municipal Airport Traffic Count, June 2008

DATE	SE Local	SE Itinerant	ME Local	ME Itinerant	TP Local	TP Itinerant	Jet Itinerant	Rotor Local	Rotor Itinerant	Med/Mil Gvt. Local	Med/Mil Gvt Itinerant	Other Local	Other Itinerant	Total	Purchased Fuel 100LL	Purchased Fuel Jet
6/1/2008	115	85		25				9	6	2				242	15	1
6/2/2008	54	116				3		10	13	4				200	5	1
6/3/2008	5	184		9		1		2	18	2				221	11	4
6/4/2008	34	163							24	8				229	12	
6/5/2008	27	163		12		3		4	21	2				232	11	5
6/6/2008	21	223		6					22	4				276	18	
6/7/2008	14	152		14		2	8	10	16	2				218	23	
6/8/2008	20	162							4					186	33	1
6/9/2008	5	233	4	9				2	47	13				313	7	1
6/10/2008	20	187		32		4			27		2			272	12	2
6/11/2008	16	146		43					55	7				267	18	2
6/12/2008	15	200	35	35		6		2	15	3				311	17	1
6/13/2008	10	215		25					48	6				304	17	2
6/14/2008	28	174	2	28			2	2	12					248	18	1
6/15/2008	27	130		40					7		4			208	15	
6/16/2008	27	257		60			1	8	37					390	10	2
6/17/2008	8	230		41		8	5		27		6			325	10	2
6/18/2008	28	163		32		6	12	2	24					267	9	1
6/19/2008	12	191		34		2	4		23	14				280	8	3
6/20/2008	10	182		25	2	2	34			4				259	13	1
6/21/2008	29	178		14		6		5	11					243	9	3
6/22/2008	42	152		20				10	4	4				232	16	1
6/23/2008	30	172		46		2		12	20	7				289	12	3
6/24/2008	16	169		34		3	2		22	4				250	12	2
6/25/2008	20	118		26		3	1		41	6				215	17	2
6/26/2008	5	214		22		2			42	4	2			291	18	1
6/27/2008	30	177		37		2			37	7				290	20	2
6/28/2008	35	163	2	32					27	5				264	16	
6/29/2008	24	122	4	27		2			21	2				202	19	1
6/30/2008	22	188		26			4		24	4				268	6	1
TOTAL	749	5209	47	754	2	57	73	78	695	114	14	0	0	**7792**	**412**	**45**

= Saturday
= Sunday
= Holiday

Average Multi Engine Per Day	27	Average Jets Per Day	2.4		
Average Turbo Prop Per Day	2.0	Average Rotorcraft Per Day	26	Gallons Sold ####	5896
Average Med Evac, Mil, Gvt.	4.4	Average SEL Per Day	199	AV Gal Per AC 28	131
Average Other	0	**Average Operations Per Day**	**260**		

Annaul Averages Based June 2008: **AC** 94803 **100LL** 139783 **Jet A** 70752

Actual traffic count done with the generous and volunteer assistance from the members of EAA Chapter 1445 and the KCGZ daily users.

Total Airplanes Fueled 457

Average Airplanes Fueled Per Day 15

Steve Hulland
Airport Manager
Monday, June 30, 2008

Typically, June is one of the slowest months each year due to high daily temperatures and the price of this years fuel.

Exhibit C1
AIRCRAFT TRAFFIC COUNT

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