Marana Regional Airport

Airport Master Plan

MARANA RESOLUTION NO. 2006-148

RELATING TO THE MARANA REGIONAL AIRPORT; APPROVING AND ADOPTING THE MARANA REGIONAL AIRPORT MASTER PLAN UPDATE AND NOISE COMPATIBILITY STUDY; AUTHORIZING THE AIRPORT DIRECTOR TO FILE ALL PAPERWORK AND EXECUTE ALL DOCUMENTS RELATED TO THE STUDIES.

WHEREAS A.R.S. § 28-8411 authorizes the Town Council of the Town of Marana to undertake all activities necessary to construct, own, control, lease, equip, improve, maintain, operate and regulate Marana Regional Airport, including approving or disapproving airport studies and planning documents; and

WHEREAS A.R.S. § 28-8413 authorizes the Town of Marana to take all actions necessary or prudent to accept and receive federal and other aid for Marana Regional Airport; and

WHEREAS the Town Council finds that authorizing Town Staff to file paperwork and execute documents related to Town Studies and Planning documents for Federal and State agencies is consistent with the Town's authority under A.R.S. § 28-8413 and is in the Town's best interest; and

WHEREAS Town Staff has presented a Marana Regional Airport Master Plan Update ("Airport Master Plan") and an Airport Noise Compatibility Study for approval and adoption; and

WHEREAS the Airport Master Plan is a planning document that provides systematic guidelines for the airport's overall development and operation; and

WHEREAS the Airport Noise Compatibility Study outlines specific approaches to managing airport noise and land use compatibility with the airport and establishes a noise compatibility program to allow the airport to establish itself as a good neighbor to existing and future development while maintaining the needed aviation services within the community; and

WHEREAS approval and adoption of the Airport Master Plan and the Airport Noise Compatibility Study are in the best interests of and will greatly benefit the Town of Marana, the Marana Regional Airport, the Citizens of Marana and the surrounding communities.

NOW, THEREFORE, BE IT RESOLVED by the Mayor and Council of the Town of Marana, Arizona, that the Airport Master Plan and the Airport Noise Compatibility Study are hereby approved and adopted, and the Town's Airport Director is hereby authorized to file all paperwork and execute all documents with all appropriate federal, state and other agencies and entities relating the Airport Master Plan Update and the Airport Noise Compatibility Study.

PASSED AND ADOPTED by the Mayor and Council of the Town of Marana, Arizona, this 3rd day of October, 2006.

Mayor Ed Honea

ATTEST:

Jocelyn C. Bronson, Town Clerk

APPROVED AS TO FORM:

Frank Cassidy, Town Attorney

AIRPORT MASTER PLAN

FOR

MARANA REGIONAL AIRPORT
Marana, Arizona

Prepared For
THE TOWN OF MARANA, ARIZONA

September 2007
(Final Printing)

Prepared By
COFFMAN ASSOCIATES
AIRPORT CONSULTANTS

In Association With
Z&H ENGINEERING

AThe 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 appropriate public laws.@

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Marana, Arizona

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INTRODUCTION

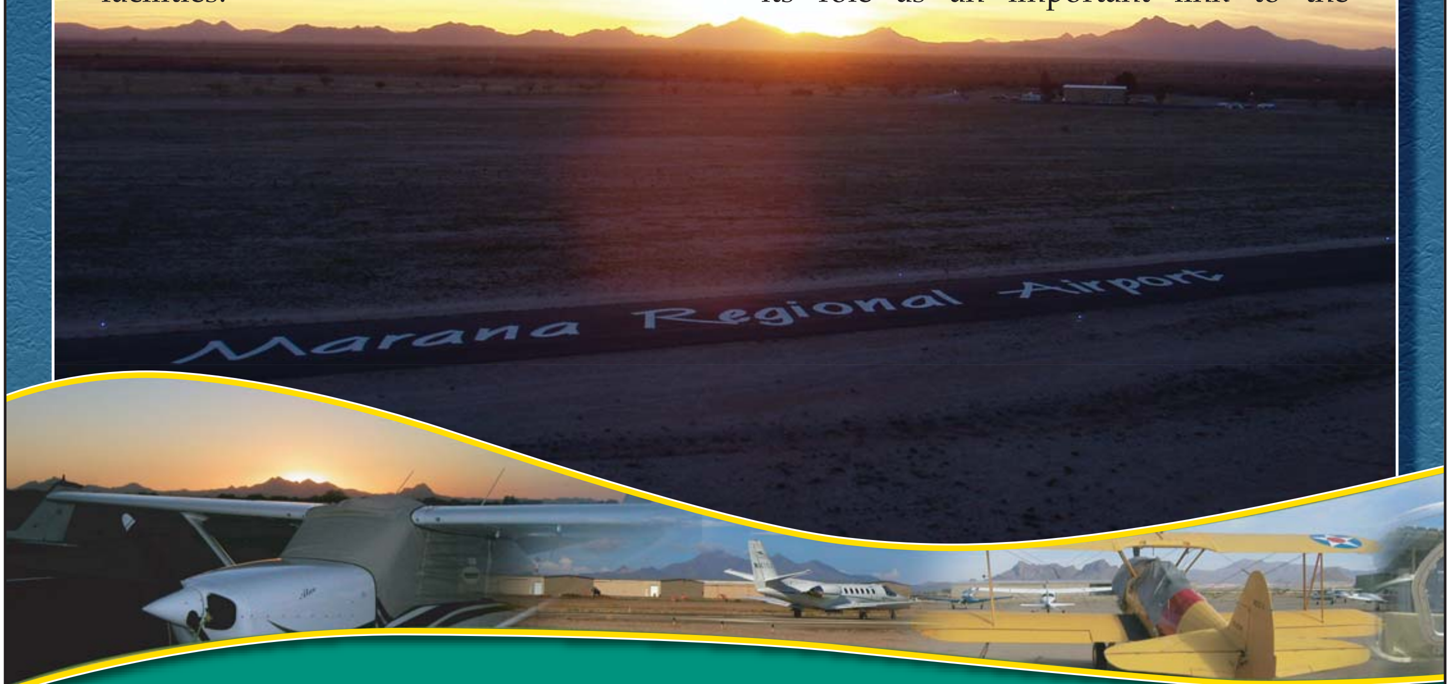
Introduction

The Marana Regional Airport (AVQ) Master Plan Study has been undertaken to evaluate the airport's capabilities and role, to forecast 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 maintenance, development, 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 Town of Marana 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 needs. The intended result is a detailed land use concept which outlines specific uses for all areas of airport property.

The preparation of this master plan is evidence that the Town of Marana recognizes the importance of air transportation to the 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, Marana Regional 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 OBJECTIVES

The primary objective of the master plan is to provide the community and public officials with guidance for future development in a manner that will satisfy 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 to meet the general aviation needs of the area. This master plan will provide an outline of necessary development and give those responsible advance notice of future airport funding needs so that appropriate steps can be taken to ensure that adequate funds are budgeted and planned.

Specific objectives of the Marana Regional Airport Master Plan 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.

The master plan will accomplish these objectives by carrying out the following:

& Determining projected needs of airport users through the year 2025;

& Identifying existing and future facility needs;

& Evaluating future airport facility development alternatives which will optimize airport capacity and aircraft safety; and

% Developing a realistic, commonsense plan for the use and/or expansion of the airport.

MASTER PLAN ELEMENTS AND PROCESS

The Marana Regional Airport Master Plan is being prepared in a systematic fashion following FAA guidelines and industry-accepted principles and practices. The master plan for Marana Regional Airport 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 utilizes 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 Marana Regional Airport through the year 2025. 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 this analysis 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 general aviation terminal, hangar, apron, 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 single direction for development.

Chapter Five - Airport Plans 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 includes the official Airport Layout Plan (ALP) and detailed technical drawings depicting related airspace, land use, and property data. These drawings are used by the Federal Aviation Administration (FAA) in determining grant eligibility and funding. A capital improvement program is also included which defines the schedules, costs, and funding sources for the recommended development projects.

COORDINATION

The Marana Regional Airport Master Plan is of interest to many within the local community. This includes local citizens, community organizations, airport users, airport tenants, area-wide planning agencies, and aviation organizations. As an important component of the regional, state, and national aviation systems, the Marana Regional 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 Town of Marana has 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) will review phase reports and provide comments throughout the study to help ensure that a realistic, viable plan is developed. The list of committee members is included at the end of this introduction.

To assist in the review process, draft working papers will be prepared at the various milestones in the planning process. The working paper 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 series of public information workshops will also be held as part of the plan coordination. The public information workshops are designed to allow any and all interested persons to become informed and provide input concerning the master plan. Notices of meeting times and locations will be advertised through the media as well as local neighborhood associations. The draft working papers will also be made available to the public online at www.marana.com.

SUMMARY AND RECOMMENDATIONS

The proper planning of a facility of any type must consider the demand that may occur in the future. For the Marana Regional 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 to 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 airport management 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
Marana Regional Airport

	2004	Short Term (± 5)	Intermediate Term (± 10)	Long Term (± 20)
ANNUAL OPERATIONS				
Military	2,000	2,000	2,000	2,000
General Aviation				
Itinerant	27,090	45,937	59,500	96,250
Local	72,310	85,313	110,500	178,750
TOTAL OPERATIONS	101,400	133,250	172,000	277,000
Based Aircraft	295	350	400	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 Master Plan completed in 1999. Since the completion of that plan, a new development containing eight T-hangars has been constructed north of the crosswind runway near the west end of Runway 3. A partial parallel taxiway, Taxiway E, has been constructed northeast of the Runway 30 end. An environmental assessment process is nearing completion for the 500-foot extension of Runway 3-21 to the northeast. 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 A** depicts the updated plan.

With two runways, the longest measuring 6,901 feet, the airport currently operates as a general aviation reliever airport. In order to serve the projected corporate aircraft as well as existing and future training activity, the plan identified the ultimate layout of Runway 12L-30R measuring 7,200 feet and extending Runway 3-21 from 3,893 feet to the ultimate length of 4,700 feet for training and small aircraft operations. In order to accommodate the forecast demand, a parallel runway will be required to increase the airport's capacity. Parallel Runway 12R-30L is planned to have a length of 4,700 feet and to be used for training and small aircraft operations.

The development of additional aircraft storage hangars, parking apron, fueling facilities, general aviation terminal, airport traffic control tower, and other aviation services at the airport have been planned to provide an alternative location for aircraft owners in Pima County, especially those living in northwest Tucson metropolitan area, to base their aircraft.

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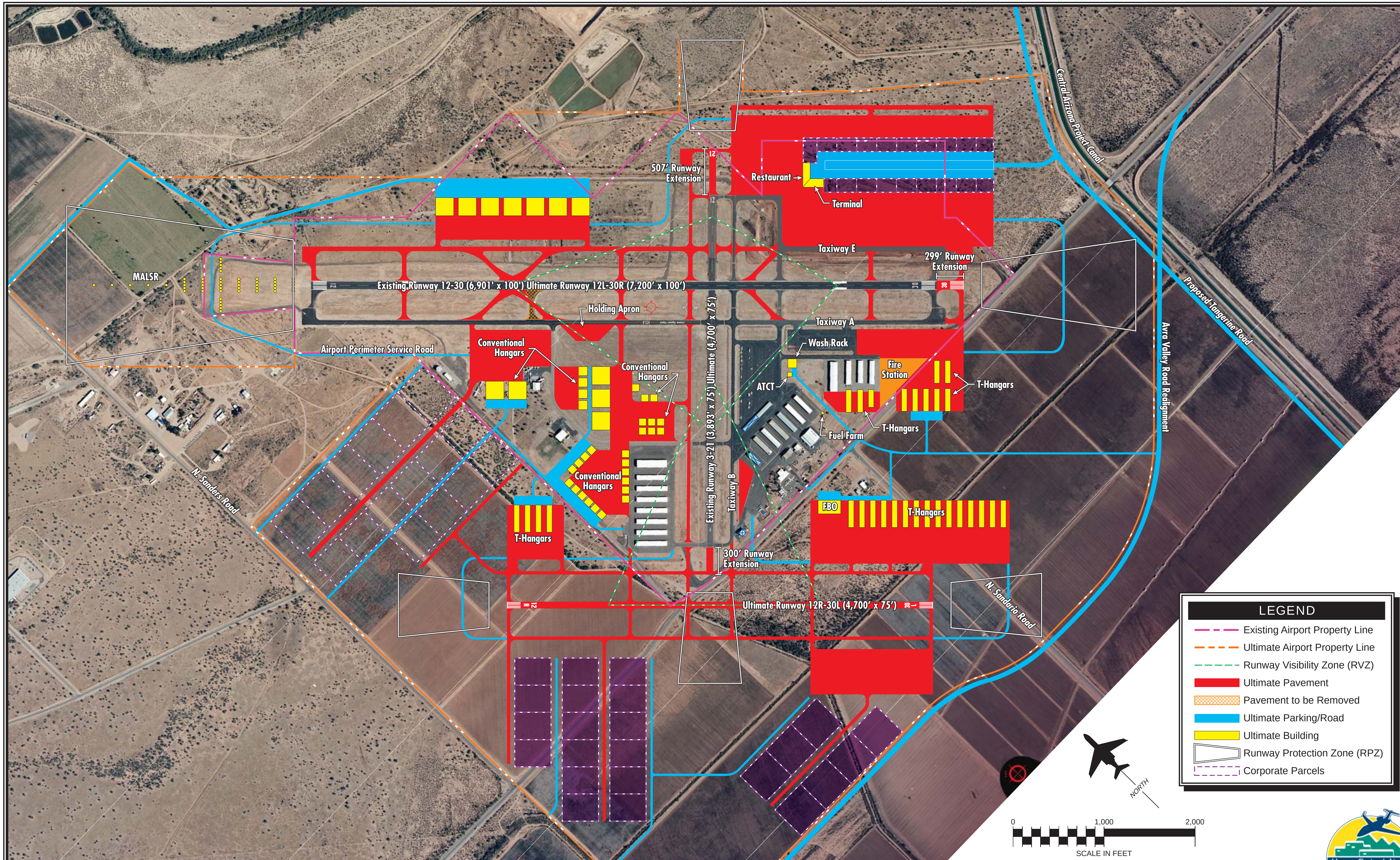

Exhibit A
MASTER PLAN CONCEPT

SHORT TERM PLANNING HORIZON IMPROVEMENTS

- Property acquisition for runway protection zones and facility expansion
- Construct additional aircraft parking apron
- Construct new airport terminal
- Construct additional hangar facilities
- Extend Runway 3-21 507 feet northeast
- Construct aircraft wash rack
- Relocate fuel farm
- Construct airport traffic control tower
- Construct exit taxiways for Runway 12-30

INTERMEDIATE TERM PLANNING HORIZON IMPROVEMENTS

- Realign Avra Valley Road
- Extend Runway 12L-30R 299 feet southeast
- Construct additional aircraft parking apron
- Construct parallel Runway 12R-30L
- Extend Runway 3-21 300 feet southwest
- Construct additional hangar facilities
- Construct exit taxiways for Runway 12L-30R
- Pavement preservation

LONG RANGE PLANNING HORIZON IMPROVEMENTS

- Construct additional hangar facilities
- Construct additional aircraft parking apron
- Construct high-speed exit taxiways for Runway 12L-30R
- Construct taxiway to allow runway system access for corporate parcels
- 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 $74.5 million dollars over the long-term planning horizon. Nearly 95 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
Marana Regional Airport

PLANNING HORIZON	Total Costs	FAA Share	ADOT Share	Local Share
Short Term Program	$48,515,250	$31,996,238	$14,193,506	$2,325,506
Intermediate Program	$25,450,000	$18,743,500	$5,393,750	$1,312,750
Long Range Program	$10,000,000	$9,120,000	$240,000	$640,000
TOTAL PROGRAM COSTS	**$83,965,250**	**$59,859,738**	**$19,827,256**	**$4,278,256**

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 airport management will require to meet the challenges of the future. By providing a safe and efficient facility, the Marana Regional Airport will continue to be a valuable asset to the Town of Marana and the surrounding community.

MARANA AIRPORT MASTER PLAN & PART 150 NOISE COMPATIBILITY STUDY PLANNING ADVISORY COMMITTEE (PAC) *			
Name and Title	**Representing**	**Address**	**Phone/Fax Number**
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Mr. Jim Blake Councilmember	**Town of Marana**	Marana Town Hall 11555 W. Civic Center Drive Marana, AZ 85653	Ph: 520-382-1900 Fax: 520-382-1901 Email: jblake@marana.com
Ms. Carol McGorray Councilmember	**Town of Marana**	Marana Town Hall 11555 W. Civic Center Drive Marana, AZ 85653	Ph: 520-382-1900 Fax: 520-382-1901 Email: cmcgor-ray@marana.com
Mr. Ed Stolmaker Executive Director	**Marana Chamber of Commerce**	13881 N. Casa Grande Hwy. Marana, AZ 85653	Ph: 520-682-4314 Fax: 520-682-2303 Email: estol-maker@comcast.net
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Ms. Michelle Simmons Environmental Specialist	**Federal Aviation Administration-AWP-611.4 Western-Pacific Region Airports Division**	15000 Aviation Blvd. Lawndale, CA 90261	Ph: 310-725-3614 Fax: 310-725-6847 Email: mi-chelle.simmons@faa.gov

MARANA AIRPORT MASTER PLAN & PART 150 NOISE COMPATIBILITY STUDY PLANNING ADVISORY COMMITTEE (PAC) *			
Name and Title	**Representing**	**Address**	**Phone/Fax Number**
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Mr. Richard Corbett Transportation Systems & Inter-modal Manager	**Pima Association of Governments**	177 N Church Ave, Suite #405 Tucson, AZ 85701	Ph: 520-792-1093 Fax: 520-620-6981 Email: rcorbett@pagnet.org
Mr. Bill Gillies Chairman	**Arizona Military Airspace Working Group**	7224 N. 139th Dr. Luke AFB, AZ 85309-1934	Ph: 623-856-5855 Fax: 623-856-7096 Email: William.Gillies@LUKE.AF.MIL
Mr. Dan Burkhart Regional Representative Environmental Services	**National Business Aviation Association**	10164 Meadow Glen Way, E. Escondido, CA 92026	Ph: 760-749-6303 Fax: 760-749-6313
Ms. Stacy Howard Regional Representative	**AOPA**	41695 N. Coyote Road Queen Creek, AZ 85242	Ph: 480-987-9165 Fax: 480-987-0352 Email: stacy.howard@aopa.org
Mr. James Timm Executive Director	**Arizona Pilots Association (APA)**	220 E. Ellis Drive Tempe, AZ 85282	Ph: 480-839-9187 Email: jtimm@amug.org
Mr. Gary Abrams President	**Pima Aviation, Inc.**	11700 W. Avra Valley Road #86 Marana, AZ 85653	Ph: 520-682-4300 Fax: 520-682-4303 Email: gary@abrams.com
Stephen D. Phinny Chief Executive Officer	**Saguaro Ranch Development Corporation**	P.O. Box 70207 Tucson, AZ 85737	Ph: 520-498-2300 Fax: 520-498-2311 Email: stephen@saguaroranch.net

* 16 Member Maximum

Chapter One

INVENTORY

Inventory

The initial step in the preparation of the Airport Master Plan for Marana Regional Airport (AVQ) 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 and 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 the Town of Marana and regional area, including descriptions of the regional climate, surface transportation systems, Marana Regional 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 Town 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

Marana Regional Airport is located south of downtown on the western side of the jurisdictional boundaries of the Town of Marana, Arizona. As shown on **Exhibit 1A**, Marana is located approximately 15 miles northwest of Tucson. The Town of Marana is located in Pima County. Pima County covers a total area of 9,189 square miles, and contains five incorporated cities. Pima County ranges in elevation from 1,200 feet to the peak of Mount Lemmon at 9,185 feet above mean sea level (MSL). Approximately 16 percent of the population of Arizona resides in Pima County.

The Marana Regional Airport site encompasses approximately 570 acres, and is located at an elevation of 2,031 feet MSL. The airport is located to the west of Interstate Highway 10 off Avra Valley Road.

AIRPORT HISTORY

Marana Regional Airport, formerly known as Avra Valley Airport and Marana Auxiliary No. 2, was built during World War II by the U.S. Army as part of a system of auxiliary airfields to Pinal Airpark (originally Marana Airbase). Primarily a flight training base for military aviators during World War II, Pinal Airpark also served as the home base for operations. The related system of auxiliary fields acted as remote facilities to alleviate flight congestion at Pinal Airpark.

Original development at the airfield at Marana consisted of four 3,000-foot-long runways. This runway configuration included two sets of parallel runways set 1,000 feet apart at right angles to each other. A perimeter taxiway encircled the runways and the infield area was paved. The sole purpose of the airfield was for practicing takeoffs and landings, and no other facilities were provided. After World War II, the airfield was abandoned and the pavement fell into disrepair.

A businessman from Tucson leased the airport in 1968 from the Bureau of Land Management (BLM) and reactivated it for personal and public use. He then formed Avra Air to revive and operate the airport. Avra Air rehabilitated both runways and 75 percent of the perimeter taxiway that served as the basic airfield configuration for the next twenty years. This activity spurred interest from other aircraft owners and spawned additional development. Further improvements made at this time included construction of a large conventional hangar, two T-hangar units, and the installation of two 10,000-gallon aboveground fuel storage tanks. Water was supplied to the airport by a newly drilled well and additional utilities were extended onto the airport.

In 1974, the BLM authorized the assignment of the original lease from Avra Air to Pima County. In making

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Exhibit 1A
LOCATION MAP

this transfer, the airport owner included his interest in the improvements at the airport as a gift to Pima County. Pima County maintained this public-use airport, but subleased part of the airport to private enterprise. The main Fixed Base Operator (FBO) was Avra Valley Aviation, which performed most aircraft services found at an airport of this size and type. By 1982, the county had acquired fee simple interest in the airport and Avra Valley Aviation continued its sublease with regard to airport operations and aircraft servicing. Avra Valley Aviation was responsible for many additional airport improvements. These improvements ranged from a new FBO/Terminal building to four additional T-Hangars and a new maintenance hangar. Also, opening at this time was an on-site restaurant facility.

In 1999, a master plan was prepared for the Avra Valley Airport. This master plan suggested long-term improvements such as constructing a parallel runway south of Runway 12-30, new T-hangar facilities, and the construction of a northeast parallel taxiway for Runway 12-30.

Later in 1999, the airport was purchased by the Town of Marana, and renamed the Marana Regional Airport. Currently, the airport is owned, operated, and maintained by the Town of Marana. An airport manager conducts administrative duties from an office in one of the T-hangar facilities. Airport maintenance is presently performed by a single maintenance employee and three prisoners from the Marana State Prison on a work-release program.

RECENT CAPITAL IMPROVEMENTS

To assist in funding capital improvements, the Federal Aviation Administration (FAA) has provided funding assistance to Marana Regional 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 FAA AIP grants for Fiscal Year (FY) 2002 through FY 2005. The FAA has provided almost $4.9 million for airport improvements at Marana Regional Airport, over the past three years.

Between 2000 and 2005, the Arizona Department of Transportation invested $5.2 million in improvements at Marana Regional Airport. **Table 1B** summarizes these projects and their total expenditures over this five-year period.

TABLE 1A Grants Offered to Marana Regional Airport			
Fiscal Year	**AIP Grant Number**	**Project Description**	**Total Grant Funds**
2002	3-04-0058-07	Rehabilitate Runway 3/21 and Improve Runway Safety Area – Phase I	$939,172
2002	3-04-0058-08	Prepare Environmental Assessment for Runway 3/21 Extension	$366,161
2003	3-04-0058-09	Security Fence	$150,000
2004	3-04-0058-10	Rehabilitate Runway 12/30, Rehabilitate Taxiway, Acquire Land for Approaches	$300,000
2005	3-04-0058-11	Improve Runway Safety Area (Acquire 75 Acres of Land)	$836,000
2005	3-04-0058-12	Part 150 Noise Study	$150,000
2005	3-04-0058-13	Construct Taxiway E	$2,157,395
Total Grant Funds			$4,898,728
Source: Airport Records			

TABLE 1B State Grants Offered to Marana Regional Airport			
Fiscal Year	**ADOT Grant Number**	**Project Description**	**Total Grant Funds**
2000	ADOT E0110	Fire Protection; Fencing (Security Upgrade)	$1,008,000
2001	ADOT E1112	Fire Protection	$624,000
2002	ADOT E2S10	Fire Protection, Phase – II: Install Water Lines, Pumps and Hydrants	$450,000
2002	ADOT E2F29	Match to FAA – 07 – Rehabilitate Runway 3/21 and Improve Runway Safety Area Phase – I	$46,102
2003	ADOT E3S09	Medium Intensity Runway Lights/High Intensity Runway Lights Upgrade, Runway 3/21 Lighting/Electrical Vault Upgrade; Runway 12/30 Extension/Strengthen	$550,000
2003	ADOT E3F64	Match to FAA – 08 – Prepare EA for Runway 3/21 Extension.	$17,974
2003	ADOT E4F13	Match to FAA – 09 – Security Fence	$7,363
2004	ADOT E5F71	Match to FAA – 10 – Rehabilitate Runway 12/30, Rehabilitate Taxiway	$4,606
2004	ADOT E5F72	Match to FAA – 10 – Land Acquisition	$3,290
2004	ADOT E5S09	Update Master Plan	$180,000
2004	ADOT E5S10	Extend Tiedown Apron	$450,000
2004	ADOT E5S80	Land Acquisition	$465,000
2005	ADOT E6S24	Construct Security Fence	$315,000
2005	ADOT E6S26	Airfield Signage Upgrades, Taxiway B and Runway 3-21 Electrical Upgrades	$1,080,000
Total State Grant Funds			$5,201,335
Source: Airport Records			

HISTORICAL BASED AIRCRAFT

Table 1C summarizes historical based aircraft for Marana Regional Airport beginning in 1984. As shown in the table, based aircraft levels have grown steadily over most of the past 21 years, from a low of 95 in 1985 and 1986, to a high of 295 in 2005.

TABLE 1C
Historical Based Aircraft
Marana Regional Airport

Year	Based Aircraft
1984	120
1985	95
1986	95
1987	107
1988	120
1989	120
1990	123
1991	126
1992	139
1993	151
1996	182
1997	206
2000	218
2005	295

Sources:
1984 – 1993 Pima Association of Governments (PAG) Aviation System Plan, 1995;
1996 – FAA 5010 Form, Airport Master Record, 1996;1997 – Tucson Aeroservice Center, Inc., 1998;
2000 – Pima Association of Governments (PAG) Aviation System Plan, 2002;
2005 – Airport Records

Based aircraft are also classified according to type. **Table 1D** summarizes the mix of aircraft based at Marana Regional Airport in 2005. Aircraft type categories include single-engine piston, multi-engine piston, turboprop, turbojet, and rotorcraft. The single-engine piston includes all fixed wing aircraft that have a single piston-powered engine. This category represents 77.6 percent of based aircraft at Marana Regional Airport in 2005. The multi-engine piston category includes all piston-powered fixed wing aircraft with more than one power plant. This category of aircraft represents 9.5 percent of based aircraft in 2005. The turboprop category includes fixed wing turbine-powered aircraft with propellers. The turboprop category represents 4.1 percent of 2005 based aircraft. The jet category, which includes 17 retired A-4 fighter jets, three BD5 mini-jets, one Fouga CM-170 Magister, and one Beechcraft Hawker, comprises 7.5 percent of the 2005 based aircraft. Finally, the rotorcraft category includes all helicopters. Rotorcraft aircraft represented 1.4 percent of the based aircraft in 2005.

OWNERSHIP AND MANAGEMENT

Marana Regional Airport is owned, operated, and maintained by the Town of Marana. The Town Council is responsible for the administration of the airport. The Town Council is made up of seven members who serve four-year terms and is headed by the Mayor who also serves a four-year term. The Town of Marana currently employs an airport manager and a single airport maintenance worker. The airport manager handles the administrative duties at the airport.

TABLE 1D 2005 Based Aircraft Fleet Mix Marana Regional Airport					
Total Based Aircraft	**Single-Engine Piston**	**Multi-Engine Piston**	**Turboprop**	**Turbojet**	**Rotorcraft**
295	229	28	12	22	4
Source: Airport Records					

AIRPORT'S ROLE

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

Regionally, Marana Regional Airport is included in the Pima Association of Governments' (PAG) *2002 Regional Aviation System Plan* (RASP). The RASP provides an overview for airport planning in the region, reflecting the overall plans for each airport in the region, and assesses proposed project costs and the proper phasing of each project. Marana Regional Airport is one of six public-use airports included in the RASP. The RASP classifies public-use airports as either Level I or Level II. Level I airports are those that are essential to meeting the regions transportation and economic needs, whereas Level II airports are thought of as support facilities. Marana Regional Airport is classified as a Level I airport in the PAG RASP.

At the state level, Marana Regional 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 airports' capital improvement needs, and identify resources and strategies to implement the plan. Marana Regional Airport is one of 112 airports included in the 2000 SANS, which includes all public and private airports and heliports in Arizona that are open to the public, including American Indian and recreational airports.

At the national level, the airport is included in the National Plan of Integrated Airport Systems (NPIAS). The NPIAS includes a total of 3,489 airports (both existing and proposed) which are important to national air transportation. Marana Regional Airport is one of 59 airports in Arizona that is included in the NPIAS and one of nine airports in Arizona classified as a Reliever General Aviation Airport. An airport must be included in the NPIAS to be eligible for federal funding.

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, lighting, and navigational aids. Airside facilities are depicted on **Exhibit 1B. Table 1E** summarizes airside facility data.

TABLE 1E
Airside Facility Data
Marana Regional Airport

	Runway 12-30		**Runway 3-21**	
Length (ft.)	6,901		3,893	
Width (ft.)	100		75	
Surface Material	Asphalt		Asphalt	
Load Bearing Strength				
Single Wheel Loading	30,000 lbs		20,000 lbs	
Double Wheel Loading	60,000 lbs		N/A	
Dual Tandem Wheel Loading	140,000 lbs		N/A	
Instrument Approach Procedures	None		None	
Approach Aids	**Rwy 12**	**Rwy 30**	**Rwy 3**	**Rwy 21**
	PAPI	PAPI	PAPI	PAPI
	REIL	REIL		
Pavement Edge Lighting	Medium Intensity Runway Lighting		Medium Intensity Runway Lighting	
Pavement Markings	Non-Precision		Basic	
Weather Reporting	AWOS III			
Fixed Wing Aircraft Traffic Pattern	Left	Right	Right	Left

Source: Airport/Facility Directory Southwest U.S. Edition; May 12, 2005
PAPI - Precision Approach Path Indicators
VASI – Visual Approach Slope Indicators
REIL - Runway End Identifier Lights
AWOS – Automated Weather Observing System

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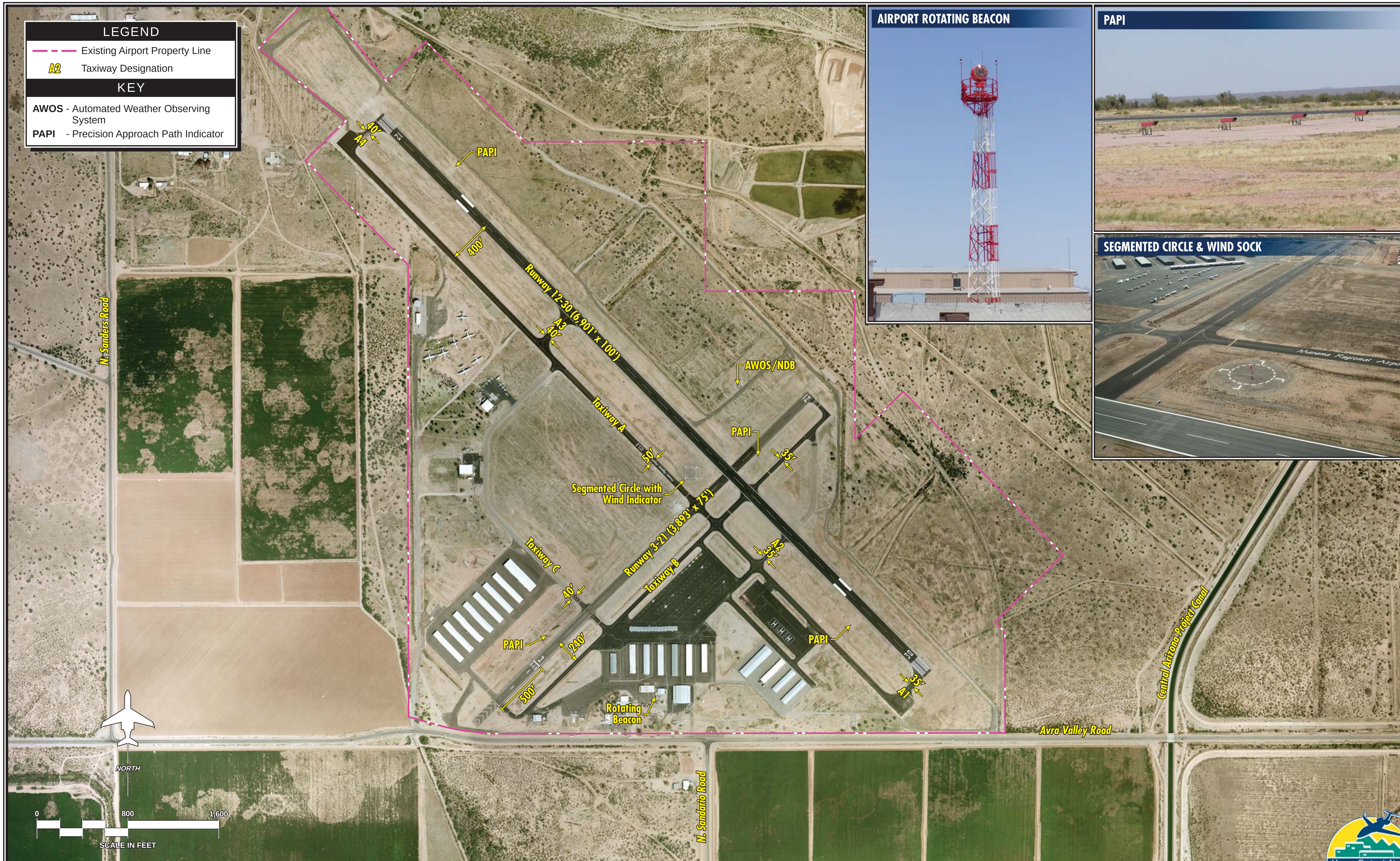

Exhibit 1B
EXISTING AIRSIDE FACILITIES

Runways

Marana Regional Airport has two runways, as shown on **Exhibit 1B**. Runway 12-30 is 6,901 feet long by 100 feet wide. Runway 12-30, the primary runway at the airport, is oriented northwest to southeast and is constructed of asphalt. The crosswind runway, Runway 3-21, is oriented southwest to northeast and intersects Runway 12-30 at a right angle. Runway 3-21 is 3,893 feet long by 75 feet wide and is constructed of asphalt. Runway 3 is displaced 500 feet to meet extended safety area requirements.

The load bearing strengths of each runway are shown in **Table 1E**. Single wheel loading (SWL) refers to the design of certain aircraft landing gear which has a single wheel on each main landing gear strut. Dual wheel landing (DWL) refers to the design of certain aircraft landing gear which has two wheels on each main landing gear strut. Dual tandem wheel loading (DTWL) refers to the aircraft landing gear struts with a tandem set of dual wheels (four wheels) on each main landing gear strut.

The runway gradient describes average slope of a runway. The gradient is determined by dividing the runway's high and low points by its length. Runway 12-30 slopes upward to the southeast and has a 0.3 percent gradient. Runway 3-21 slopes upward to the northeast and has a 0.2 percent gradient.

Pavement Condition

The Federal Aviation Administration has mandated that any airport sponsor receiving and/or requesting federal funds for pavement improvement projects must have implemented a pavement maintenance management program.

Part of the pavement maintenance management program is to develop a Pavement Condition Index (PCI) rating. 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 January 2003, a pavement inspection was conducted at the Marana Regional Airport by the Arizona Department of Transportation. Runway 12-30 was found to have a PCI rating of 92 out of a possible 100. The runway had only minor cracking and weathering in certain areas. Runway 3-21, along with Taxiway B, the general aviation apron, and the transport category apron, have been resurfaced since the inspection was conducted; therefore, PCI ratings are unknown for these areas.

Exhibit 1C identifies the 2003 PCI ratings of the pavements at Marana Regional Airport that have not been resurfaced recently. This information, along with the Town's management information, will be used later in the report to identify pavement maintenance strategies and cost.

Taxiways

There are two full-length parallel taxiways: Taxiway A, located 400 feet from the centerline of Runway 12-30, and Taxiway B located 240 feet of the centerline of Runway 3-21. Since the previous master plan, Taxiway A and a small section of Taxiway B between Runway 12-30 and Taxiway A were widened to 50 feet. Taxiway A's exit taxilanes and the remaining sections of Taxiway B and its associated exit taxilanes have a width of 35 feet. Taxiway C provides access to both runways for ATW Aviation Inc. and Marana Skydiving on the west side of the airport, and is 40 feet in width.

The taxiways at Marana Regional, in general, are in fair condition, as depicted on **Exhibit 1C**. Taxiway A is in the best condition with a PCI rating of 93. Taxiway C has a PCI rating of 79.

Airfield Lighting and Signage

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 for this purpose. They are categorized by function as follows:

Identification Lighting: The location of the 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. The airport beacon is located to the east of the Tucson Aeroservice Center facility. When low-visibility operations occur during the daytime, the airport beacon will also be turned on to make the airport more visible.

Pavement Edge Lighting: Pavement edge lighting utilizes light fixtures placed near the edge of the pavement to define the lateral limits of the pavement. This lighting is essential for safe operations during night and/or times of low visibility, in order to maintain safe and efficient access to and from the runway and aircraft parking areas. Both Runway 12-30 and Runway 3-21 have medium intensity runway lighting (MIRL) systems. All major taxiways, A, B, C and the apron edge taxilanes, as well as associated connector taxiways, are equipped with medium intensity taxiway lights (MITL).

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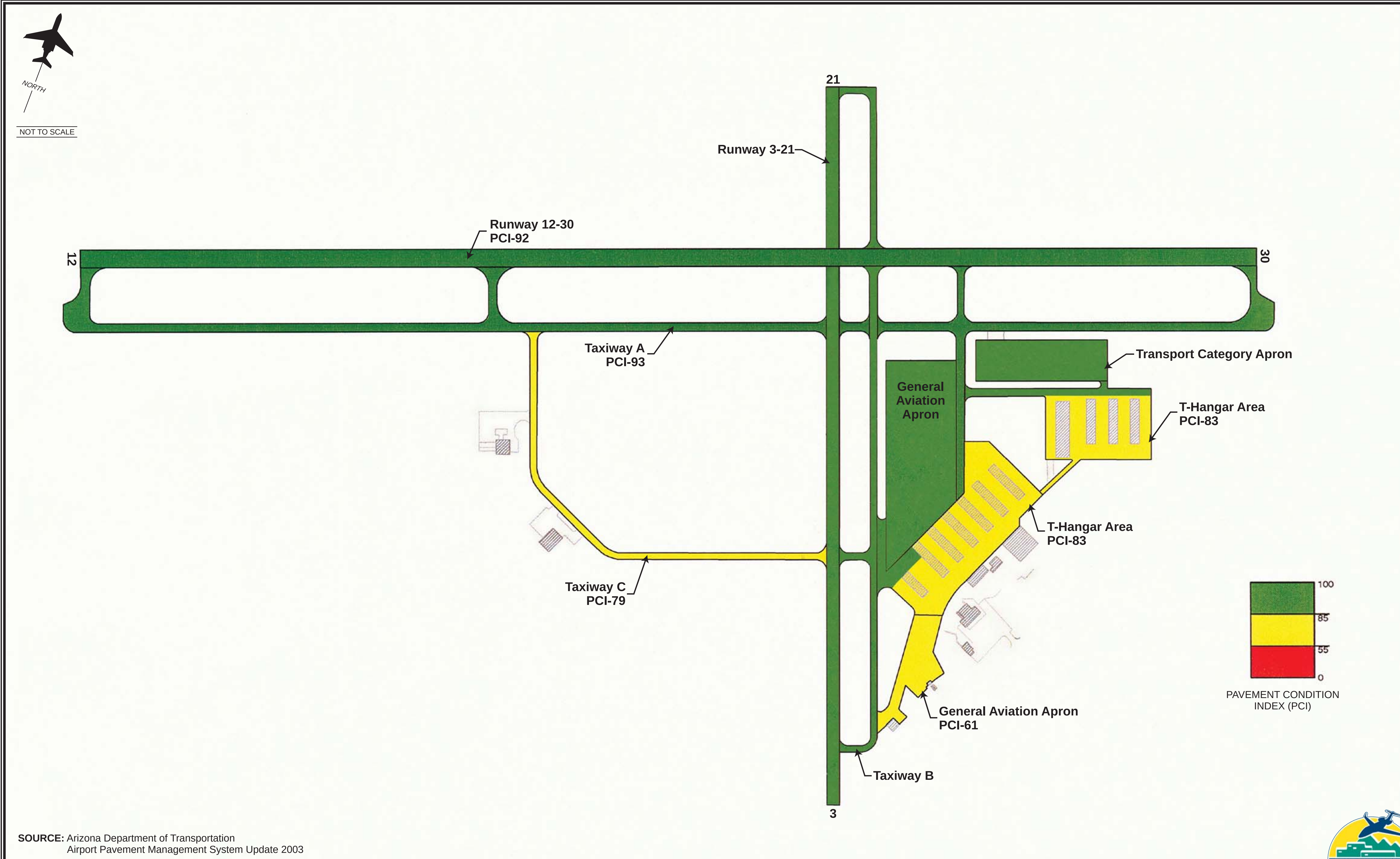

SOURCE: Arizona Department of Transportation
Airport Pavement Management System Update 2003

Exhibit 1C
PAVEMENT CONDITION

Obstruction Lighting: Objects which obstruct the Federal Aviation Regulation (FAR) Part 77 imaginary surfaces are marked with red lights. Obstructions marked at Marana Regional Airport include: all wind cones, all navigational aids, all approach aid systems, and apron light poles.

Airfield Signs: Airfield identification signs assist pilots in identifying their location on the airfield and directing them to their desired location. Lighted signs are installed at all taxiway and runway intersections. These signs also identify the aircraft holding position. All of these signs are lighted for operations at night and during low-visibility periods.

Visual Approach Lighting: A number of visual aids have been installed at the airport to assist pilots in determining the correct descent path to the runway end during an approach to the airport. A precision approach path indicator (PAPI-4) is available for Runways 12 and 30, and Runways 3 and 21 are equipped with a PAPI-2. The PAPIs provide approach path guidance with a series of light units. The four-unit PAPIs and two-unit PAPIs give the pilot an indication of whether their approach is above, below, or on-path, through the pattern of red and white light visible from the light units.

Runway End Identification Lighting: Runway end identifier lights (REILs) provide rapid and positive identification of the approach end of a runway. REILs are typically used on runways with no other approach lighting system. The REIL system consists of two synchronized flashing lights, located laterally on each side of the runway threshold facing the approaching aircraft. REILs are installed at the end of Runways 12 and 30.

The airport lighting and signage system are powered through the airfield electrical vault building located south of the airport beacon and adjacent to the Tucson Aeroservice Center facility. The MIRLs and REILs can be activated by pilots using the common traffic advisory frequency (CTAF) on 123.0 megahertz, from dusk until dawn.

Airport Markings

Pavement markings aid in the movement of aircraft along airport surfaces and identify closed or hazardous areas on the airport. Nonprecision runway markings identify the runway centerline, threshold, designation, and aircraft holding positions. Runway 12-30 is equipped with nonprecision runway markings. Basic runway markings identify the runway centerline, designation and aircraft holding positions. Runway 3-21 is equipped with basic runway markings. Runway 3 also has markings designating the 500-foot displaced threshold. This includes arrows and a landing threshold marking.

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. Aircraft hold positions are also marked on all taxiway surfaces. Pavement markings identify aircraft parking positions.

A segmented circle is located at the center of the airport, between Runway 12-30 and Taxiway A. Wind cones are located near each runway end. The segmented circle identifies the traffic pattern to pilots, and the wind cones indicate wind direction and approximate speed.

Weather Reporting

Marana Regional Airport is equipped with an Automated Weather Observing System (AWOS). The AWOS-III provides automated aviation weather observations 24-hours-a-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 west of the Runway 21 threshold.

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 Auncontrolled.@ 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 1D**. 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 Marana Regional Airport is depicted on **Exhibit 1E**.

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

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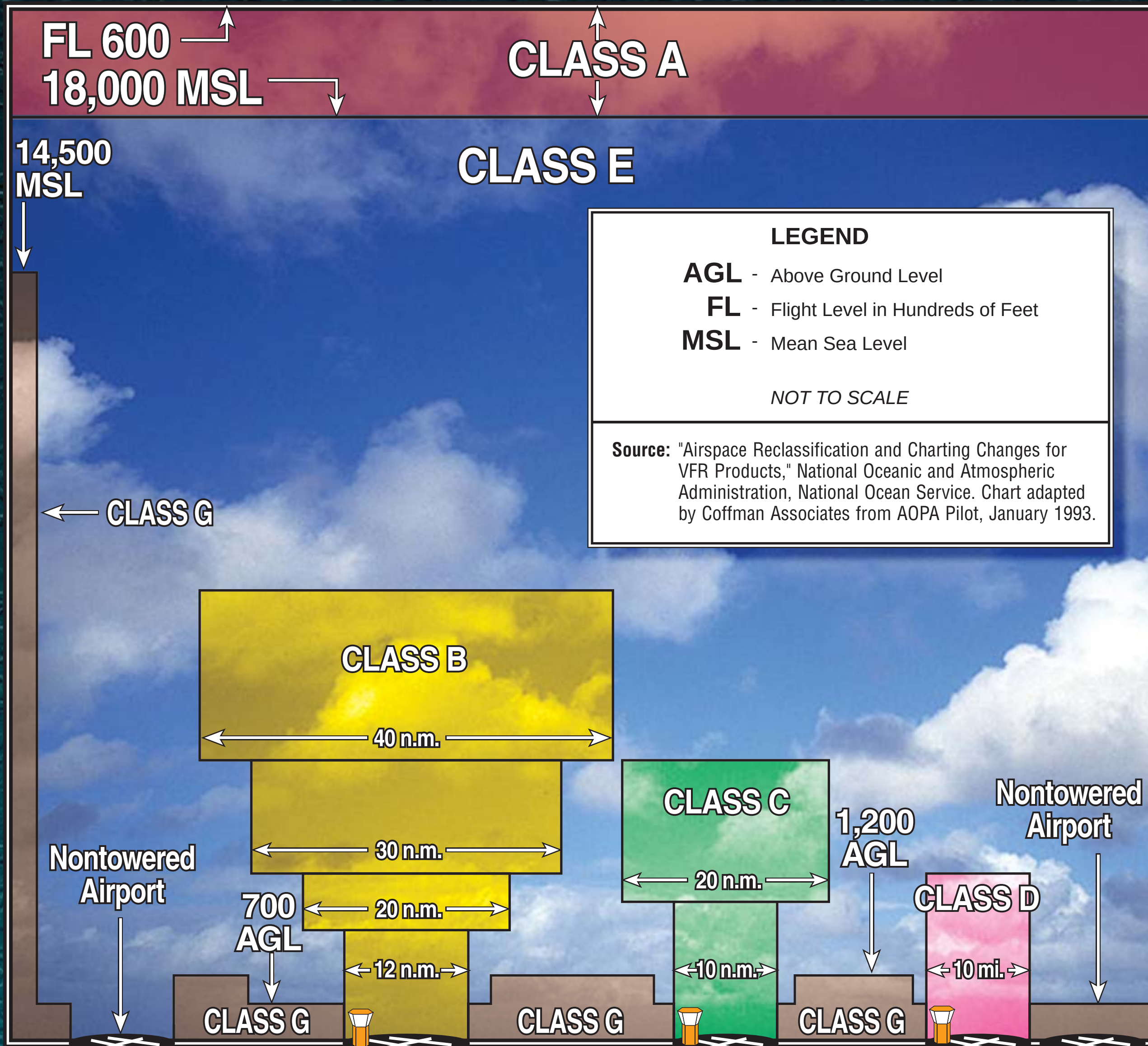

CLASSIFICATION	DEFINITION
CLASS A	Generally airspace above 18,000 feet MSL up to and including FL 600 .
CLASS B	Generally multi-layered airspace from the surface up to 10,000 feet MSL surrounding the nation's busiest airports.
CLASS C	Generally airspace from the surface to 4,000 feet AGL surrounding 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.

Exhibit 1D
AIRSPACE CLASSIFICATION

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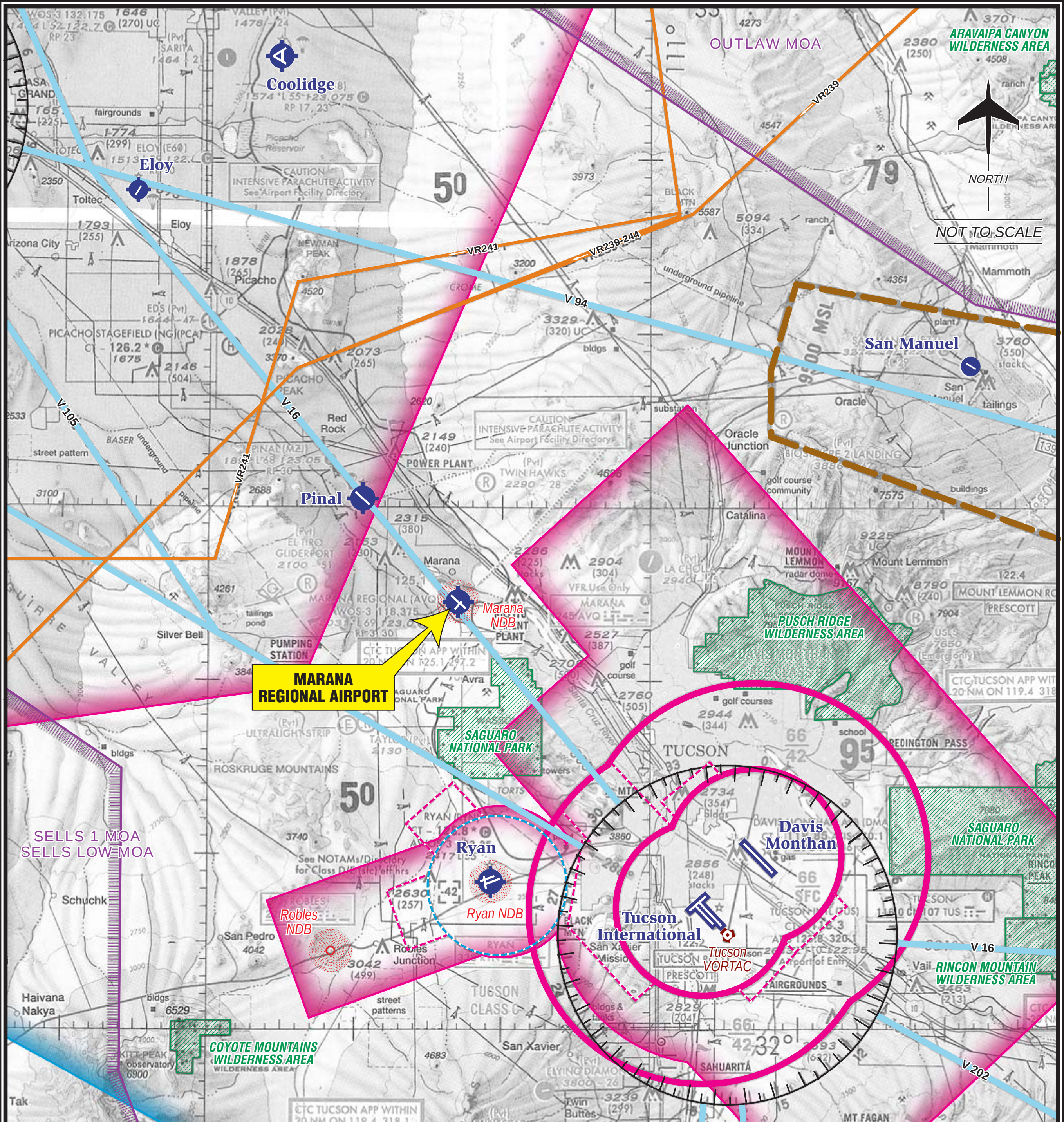

LEGEND

- 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'
- Non-Directional Radiobeacon (NDB)
- VORTAC
- Compass Rose
- Class C Airspace
- Class D Airspace
- Class E Airspace
- Class E Airspace with floor 700 ft. above surface
- Class E Airspace with floor 1,200 ft. or greater above surface
- Differentiates floors of Class E Airspace or greater than 700 ft. above surface
- Victor Airways
- Military Training Routes
- Wilderness Area
- MOA - Military Operations Area

Source: Phoenix Sectional Chart, US Department of Commerce, National Oceanic and Atmospheric Administration 5/12/05

Marana Regional Airport

Exhibit 1E
VICINITY AIRSPACE

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, such as Phoenix Sky Harbor International Airport, 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 VFR in an uncontrolled environment. There is no Class B airspace in the immediate vicinity of Marana Regional Airport.

In order to fly within Class B airspace, an aircraft must be equipped with special radio and navigation 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 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.

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. Tucson International Airport and Davis Monthan Air force Base are Class C airspace airports.

Exhibit 1E shows the Tucson International Airport and Davis Monthan Air force Base Class C airspace. The Class C airspace consists of controlled airspace extending upward from the surface to 6,600 feet above ground level (AGL), within which all aircraft are subject to the operating rules and pilot equipment requirements specified in **FAR Part 91**. Tucson International Airport's and Davis Monthan Air Force Base's Class C airspace consists of two colliding cylinders centered on each airport. The inner cylinder of each airport has a radius of five nautical miles and extends from the surface of the airport up to 6,600 feet AGL. The outer cylinders have a radius of ten nautical miles that extend from 4,200 AGL to 6,600 feet AGL, between the five and ten nautical mile rings.

Class D Airspace: Class D airspace is controlled airspace surrounding airports with an 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.

Ryan Field Airport is a Class D airspace airport. The Class D airspace extends for approximately four nautical miles around the airport, from the surface to but not including 4,200 feet MSL. The Ryan Field Airport Class D airspace is effective only during the time the ATCT is operational, which is from 6:00 a.m. to 8:00 p.m., daily. At all other times, the airport is in Class E airspace.

Class E Airspace: Class E airspace consists of controlled airspace designed to contain 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 communications with air traffic control facilities, visual flight can only be conducted if minimum visibility and cloud ceilings exist.

Marana Regional Airport is a Class E airspace airport. This area of controlled airspace has a floor of 700 feet above the surface and extends to Class A airspace, except for the areas of Class D 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 at the Marana Regional Airport.

While aircraft may technically operate within this 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 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 1E** by purple-hatched lines, as well as with the use of green shading.

Military Operating Areas: Military Operations Areas (MOAs) are depicted in **Exhibit 1E** with the purple-hatched lines. The two MOAs in the vicinity of Marana Regional are the Outlaw MOA to the northeast, and the Sells 1 MOA to the southwest. These MOAs are relatively distant from the Marana Regional Airport and have little effect on air traffic in the Marana Regional area.

Military Training Routes: Military training routes near the Marana metropolitan area 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 1E**, the Saguaro National Park and a number of wilderness areas are located in the Marana area. Saguaro National Park, located southeast of the airport, is home to large saguaro cacti and all sorts of desert wildlife. 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 1E**. V16 and V105 are located in the Marana Regional Airport vicinity, extending to the Tucson VORTAC.

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 Air Route Traffic Control Center (ARTCC) controls aircraft operating in Class A airspace. The Albuquerque ARTCC located in Albuquerque, New Mexico, controls IFR aircraft entering or leaving the Marana 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.

The Tucson Terminal Radar Approach Control (TRACON) facility, based at Tucson International Airport, controls aircraft operating within the Class C and Class E airspace. The TRACON uses direct radio communications and the latest Automated Radar Terminal System (ARTS) to control air traffic within its jurisdiction. Air traffic control services provided by Tucson TRACON include radar vectoring, sequencing, and separation of IFR aircraft, and traffic advisories for all aircraft.

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 Marana Regional Airport include: the VOR, the nondirectional beacon (NDB), global positioning system (GPS), and Loran-C.

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 Tucson VORTAC serves the Tucson metropolitan area including Marana Regional Airport. The Tucson VORTAC is located approximately 24 nautical miles southeast of Marana Regional Airport. This facility is identified on **Exhibit 1E**.

The NDB transmits nondirectional radio signals, whereby the pilot of properly equipped aircraft can determine the bearing to or from the NDB facility and then Ahome@ or track to or from the station. Pilots flying to or from the airport can utilize the Marana NDB located north of where Runway 12-30 and 3-21 intersect.

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.

A 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 development of the Wide Area Augmentation System (WAAS), which was launched on July 10, 2003. The WAAS uses a system of reference stations to correct signals from the GPS satellites, for improved navigation and approach capabilities. The present GPS provides for enroute navigation and instrument approaches with both course and vertical navigation. The WAAS upgrades are expected to allow for the development of approaches to most airports with cloud ceilings as low as 250 feet above the ground and visibilities restricted to three-quarters mile, after 2015.

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.

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. There are currently five published non-precision instrument approaches into Marana Regional Airport. Non-precision approaches only provide course guidance to the pilot.

The capability of an instrument 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 1F** summarizes instrument approach minima for Marana Regional Airport.

TABLE 1F
Instrument Approach Data

	WEATHER MINIMUMS BY AIRCRAFT TYPE							
	Category A		Category B		Category C		Category D	
	CH	VIS	CH	VIS	CH	VIS	CH	VIS
NDB RWY 12								
Straight-In	1,500	1.25	1,500	1.5	1,500	3.0	N/A	N/A
Circling	1,500	1.25	1,500	1.5	1,500	3.0	N/A	N/A
RNAV (GPS) –E								
Circling	800	1.0	800	1.25	800	2.25	N/A	N/A
RNAV (GPS) RWY 3								
LNAV MDA	500	1.0	500	1.0	500	1.25	N/A	N/A
Circling	500	1.0	500	1.0	600	1.5	N/A	N/A
RNAV (GPS) RWY 12								
LNAV MDA	500	1.0	500	1.0	500	1.25	N/A	N/A
Circling	500	1.0	500	1.0	600	1.5	N/A	N/A
RNAV (GPS) RWY 21								
LNAV MDA	700	1.0	700	1.0	700	1.75	N/A	N/A
Circling	700	1.0	700	1.0	700	1.75	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)

CH – Cloud Height (in feet above ground level)
VIS – Visibility (in statute miles)
Source: U.S. Terminal Procedures

Visual Flight Procedures

Most flights at Marana Regional Airport are conducted under VFR. Under VFR flight, the pilot is responsible for collision avoidance. Typically, the pilot will make radio calls announcing the position of the aircraft relative to the airport, and the intentions of the pilot.

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 which side of the runway aircraft will operate. For example, at Marana Regional Airport, Runway 30 and Runway 3 have an established right-hand traffic pattern. For these runways, aircraft make a right turn from base leg to final for landing. Therefore, aircraft operating to Runway 30 remain northeast of the runway. For Runway 3, aircraft remain southeast of the runway. When landing to Runway 12 or 21, aircraft make left-hand turns. This also allows these aircraft to remain northeast of Runway 12-30, and southeast of Runway 3-21.

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 metrological conditions. The actual ground location of each leg of the traffic pattern varies from aircraft operation to aircraft operation for the reasons of safety, navigation and sequencing 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 FAA has established that piston-powered aircraft operating in the traffic pattern, fly at 1,000 feet above the ground (or 3,000 feet MSL) when on the downwind leg. Turbine-powered aircraft fly the downwind leg at 4,000 feet MSL. The traffic pattern altitude is established so that aircraft have a predictable descent profile on base leg to final for landing.

Regional Airports

A review of public-use airports within the vicinity of Marana Regional 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.

Pinal Airpark is located approximately 8 miles northwest of Marana Regional Airport. Pinal Airpark is owned by Pinal County and leased to Evergreen Air Center, Inc. A single runway 6,850 feet long by 150 feet wide is available for use. Pinal Airpark does not have an operating ATCT. There are approximately 58 based aircraft at Pinal Airpark. A full range of general aviation services are available at Pinal Airpark**.** A major function on this airport is the storage of commercial service aircraft.

Ryan Field Airport is located approximately 16 miles south of Marana Regional Airport. Ryan Field Airport is owned and operated by the Tucson Airport Authority. There are three runways available for use. Runway 6R-24L is 5,500 feet long and 75 feet wide, Runway 6L-24R is 4,900 feet long and 75 feet wide, and Runway 15-33 is 4,000 feet long and 75 feet wide. The ATCT at Ryan Field Airport is operated from 6:00 a.m. to 8:00 p.m. There is one published ILS instrument approach, one NDB/DME or GPS instrument approach, and one NDB or GPS instrument approach into Ryan Field Airport. There are approximately 255 based aircraft at Ryan. A full range of general aviation services are available at the airport.

Tucson International Airport is located approximately 23 miles southeast of Marana Regional Airport. Tucson International Airport is owned and operated by the Tucson Airport Authority. There are three runways available for use. Runway 11L-29R is 10,996 feet long and 150 feet wide, Runway 11R-29L is 8,408 feet long and 75 feet wide, and Runway 3-21 is 7,000 feet long and 150 feet wide. The ATCT at Tucson International Airport is operated continuously. There is one published ILS instrument approach; six GPS instrument approaches, one LOC/DME instrument approach, and two VOR instrument approaches into Tucson International Airport. There are approximately 376 based aircraft. A full range of general aviation services are available at the airport.

Eloy Municipal Airport is located approximately 30 miles northwest of Marana Regional Airport. Eloy Municipal Airport is owned and operated by the City of Eloy. There is a single runway available for use. Runway 2-20 is 3,900 feet long and 60 feet wide.

Eloy Municipal does not have an operating ATCT. There are no published instrument approaches into Eloy Municipal. There are approximately 46 based aircraft at Eloy Municipal. Avgas and Jet A fuel services are available.

San Manuel Airport is located approximately 32 miles east of Marana Regional Airport. San Manuel Airport is privately owned by Magma Copper Co. and leased to Pinal County. There is a single runway available for use. Runway 11-29 is 4,200 feet in length and 75 feet in width. There is no operating ATCT and there are no published instrument approaches into San Manuel Airport. There are approximately eight based aircraft at San Manuel Airport. There are no general aviation services provided at San Manuel Airport.

Coolidge Municipal Airport is located approximately 33 miles north of Marana Regional Airport. Coolidge Municipal Airport is owned and operated by the City of Coolidge. There are two runways available for use. Runway 5-23 is 5,528 feet long and 150 feet wide, and Runway 17-35 is 3,861 feet long and 75 feet wide. Coolidge Municipal Airport does not have an operating ATCT. There is one published VOR/DME instrument approach and one published GPS instrument approach into Coolidge Municipal Airport. There are approximately two based aircraft at Coolidge Municipal Airport. Fuel services are available, as well as minor airframe and power plant repair services.

Davis Monthan Air Force Base is located approximately 22 miles southeast of Marana Regional Airport. Davis Monthan AFB is a military base with a single runway. Runway 12-30 has a length of 13,643 feet and a width of 200 feet. There is an operating ATCT at the air base.

LANDSIDE FACILITIES

Landside facilities are the facilities that support the aircraft and pilot/passenger handling functions. These facilities typically include a terminal building, aircraft storage/maintenance hangars, aircraft parking aprons, and support facilities such as fuel storage, automobile parking, roadway access, and aircraft rescue and firefighting. The landside facilities at Marana Regional Airport are identified on **Exhibit 1F**.

Terminal Building

The existing terminal building is located in the airport's south building area, adjacent to Avra Valley Road. The terminal building was constructed in 1982 and encompasses approximately 9,480 square feet. Tucson Aeroservice Center currently occupies the terminal building, using it to conduct FBO services.

There are plans in place to construct a new terminal building, which would be located southwest of the easternmost T-hangars. This terminal building would be 20,000 square feet.

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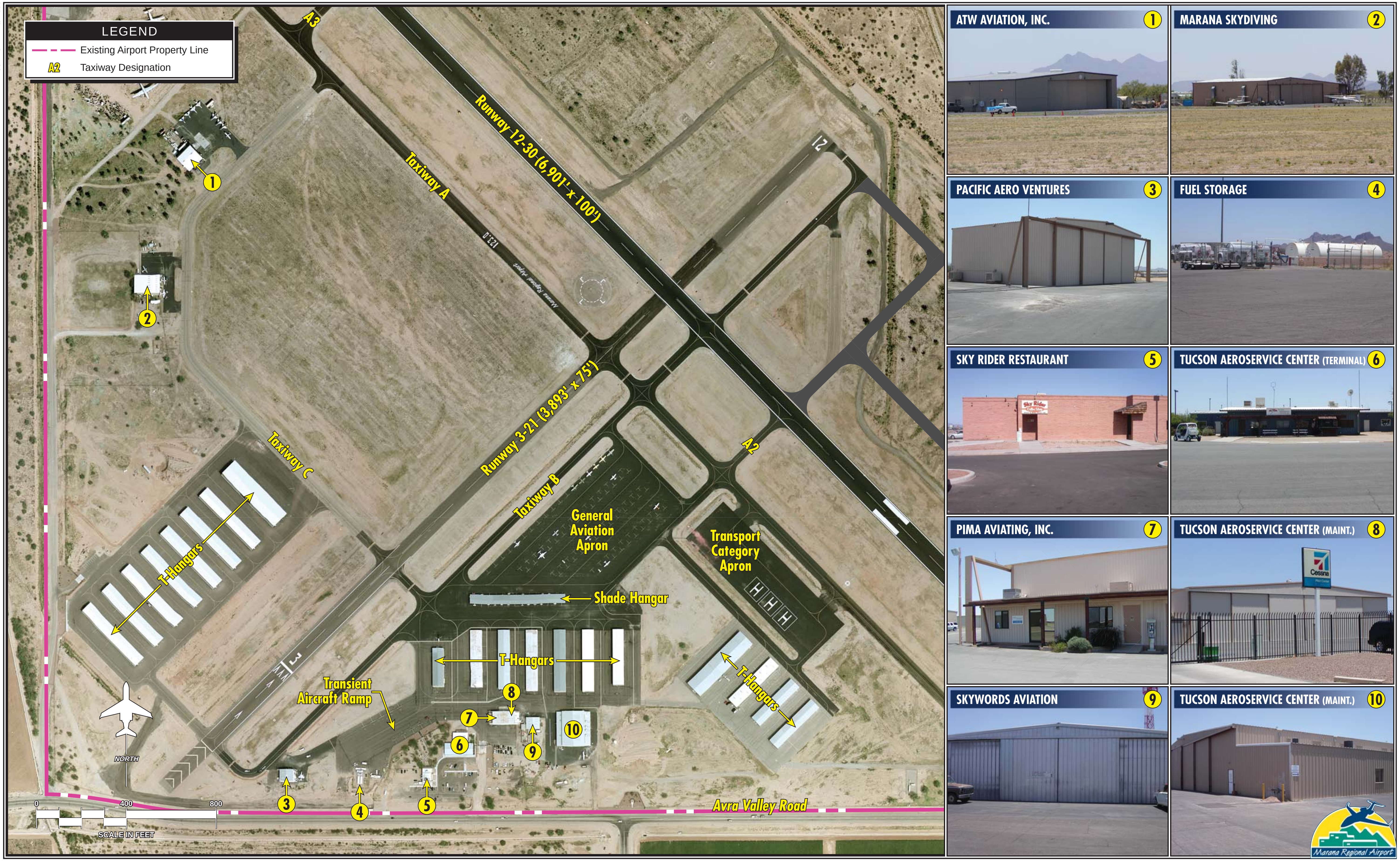

Exhibit 1F
EXISTING LANDSIDE FACILITIES

12,000 square feet of the building would be used in the same manner as the existing terminal building. The remaining 8,000 square feet would be used as a restaurant. Construction of the new terminal building is scheduled to begin in January 2006.

Aprons and Aircraft Parking

There are three aircraft apron areas at Marana Regional Airport, totaling approximately 59,641 square yards, and 110 aircraft parking spaces. The apron areas include the general aviation apron, the transport category apron, and the transient aircraft apron.

The general aviation apron is located southeast of Runway 3-21. It has approximately 31,654 square yards of pavement for aircraft parking. There are approximately 94 aircraft parking spaces on the terminal apron. The apron is adjacent to the main T-hangar area.

The transport category apron is located southwest of Runway 12-30 and covers 20,432 square yards. This apron is used mainly for larger transport aircraft and for helicopter landing and training operations. There are three parking spaces for large aircraft, and three helicopter landing pads on the transport category apron.

The transient aircraft parking ramp is located north of the airport restaurant and has an approximate area of 7,555 square yards. When non-based aircraft arrive at the airport, they will generally park on one of this apron's 10 aircraft parking spots.

Aircraft Hangar Facilities

There are 25 separate hangar facilities enclosing approximately 368,288 square feet at Marana Regional Airport. Hangar space is comprised of T-hangars, shade hangars, and conventional hangars. T-hangars provide for separate, single-aircraft storage areas. Shade hangar structures are very similar to T-hangar structures. The shade hangar structure provides individual aircraft locations within a single structure; however, the shade hangar only provides a roof to protect the aircraft from excess sunshine and other weather elements. Conventional hangars provide a large enclosed space, typically accommodating more than one aircraft. Square footage for each type of hangar facility is shown in **Table 1G**.

There are a total of 19 T-hangars facilities located on the airport, providing approximately 299,667 square feet of storage. Seven of these hangars are located to the north of the terminal building, four are located to the east near the transport category apron, and eight are located to the north of the Runway 3 end. There are a total of 232 individual T-hangar units.

Shade hangar space totals approximately 17,069 square feet, in one facility, with a total of 27 individual shade hangar units. The shade hangar facility is located at the southern edge of the general aviation apron. This facility is owned by Pima Aviation.

There are six different conventional hangars located at Marana Regional Airport, totaling approximately 51,552 square feet. This includes the 3,077 square foot conventional hangar southeast of the Runway 3 end used by Pacific Aero Ventures, LLC. Two conventional hangars, with areas of approximately 6,536 square feet and 22,395 square feet are located east of Tucson Aeroservice Center's main terminal facility. Both hangars are used by Tucson Aeroservice Center for maintenance purposes. The Marana Skydiving Center's conventional hangar facility has an area of approximately 9,127 square feet and is located at the west end of the airport off Taxiway C. The ATW Aviation, Inc.'s conventional hangar facility has an area of approximately 6,745 square feet and is located north of the Marana Skydiving Center facility. Skywords Aviation's 3,672 square foot conventional hangar is located in between the two Tucson Aeroservice Center Maintenance hangars.

TABLE 1G
Hangar Description
Marana Regional Airport

	T-Hangars	Shade Hangars	Conventional Hangars	Total
Number of Units	232	27	6	265
Area (s.f.)	299,667	17,069	51,552	368,288

Source: Airport Records

Fixed Base Operator (FBO) and Specialty Operators

Marana Regional Airport currently has one full-service Fixed Base Operator – Tucson Aeroservice Center. The following is a list of services provided by Tucson Aeroservice Center.

<u>Tucson Aeroservice Center</u>

- Aviation Fuel (100LL and Jet A)
- Oxygen Service
- Passenger Terminal and Lounge
- Aerial Tours
- Aircraft Charters
- Aircraft Rental
- Aircraft Maintenance
- Flight Training
- Avionics Sales and Services

Tucson Aeroservice Center's administrative building currently serves as the airport terminal building. Maintenance operations are performed in two conventional hangars located east of the terminal building. Tucson Aeroservice Center's line personnel operate out of a 400-square-foot building located west of the main administrative building. There are currently 30 full-time employees including certified flight instructors, aircraft mechanics, and certified pilots. On average, Tucson Aeroservice Center has 20 students in the flight training program. Students in the flight training program range from beginners to more advanced pilots working on instrument and commercial ratings.

Pima Aviation, Inc. is a specialty operator and the master lease holder at Marana Regional Airport. Pima Aviation, Inc. currently leases all facilities at the airport with the exception of five acres of land at the northwest corner of the airport which is used by Maricopa Aircraft Services. Pima Aviation, Inc. currently has three employees. Along with leasing facilities, Pima Aviation, Inc. also leases all tie-down spaces, T-hangar units and shade hangar units. Pima Aviation, Inc.'s offices are located in the westernmost conventional hangar to the northeast of Tucson Aeroservice Center's main terminal facility. This conventional hangar is also used by Tucson Aeroservice Center for maintenance purposes.

Marana Skydiving, located in a conventional hangar off Taxiway C on the west side of the airport, is a specialty operator offering mainly parachute sales, chute materials sales, sport chute repacking, and jump instruction. Currently, Marana Skydiving operates seven aircraft including four Cessna 182s, a Piper Tomahawk, a Beechcraft Baron, and a King Air 100. Most of the skydiving operations are conducted with the Cessna 182s, or for larger groups, the King Air 100.

Skyrider Restaurant, located to the southwest of the Tucson Aeroservice Center facility, is open seven days a week from 6:30 a.m. to 3:00 p.m. They are also open on Friday for dinner until 9:00 p.m. The Skyrider Restaurant building is approximately 2,868 square feet and located southwest of the Tucson Aeroservice Center's main terminal facility.

Skywords Aviation, located between Tucson Aeroservice Center's maintenance hangars and just north of the airport rotating beacon, specializes in the repair and maintenance of classic, metal, wood, fabric, antique, and experimental aircraft. There are currently three full-time employees working for Skywords Aviation.

ATW Aviation, Inc. is a specialty operator specializing in vintage aircraft restoration. ATW has ten employees who generally work on 10 to 20 aircraft in a year. ATW is located in a 6,745 square foot conventional hangar at the northwest end of the airport, north of the Marana Skydiving facility.

Pacific Aero Ventures, LLC is a specialty operator specializing in the repair, restoration and sales of aircraft. Pacific Aero Ventures has three employees and is located in a conventional hangar east of the Runway 3 threshold.

Aerial Productions is another specialty operator located in Suite 15 of a T-hangar facility. It is a contractor for the Air Force, specializing in mini-jet operations. Aerial Productions owns three 500-pound jets which they use to participate in war games for the Air Force, all around the world. These jets were not included as based aircraft because they are not consistently housed on the airport. Aerial Productions currently has six full-time employees.

Jet Dream Charter, LLC is an aircraft management and charter company. Currently, Jet Dream Charter, LLC has nine clients, for which they provide services such as hiring pilots, training pilots, and general management of aircraft. Their office is located in Suite 1B of the T-hangar facility north of Tucson Aeroservice Center. Jet Dream Charter has five full-time employees and an additional office located in Phoenix.

Airport Management, Maintenance, and Airport Rescue and Fire Fighting

The airport management office is located at the south end of one of the central T-hangar buildings, north of the Pima Aviation, Inc. facility. There is not a specific airport maintenance building or office located on the airport, however maintenance equipment is located in several different storage rooms located in the T-hangar facilities.

There are no airport rescue and fire fighting (ARFF) facilities located on the airport. The local northwest fire station responds to on-airport emergencies.

Fueling Facilities

Tucson Aeroservice Center currently owns and operates the only fuel facility on the airport. This fuel facility consists of two 12,000-gallon tanks. One tank holds 100LL Avgas, and the other holds Jet A fuel. Fuel is distributed to aircraft via four fuel trucks, also owned and operated by Tucson Aeroservice Center. There are plans to develop a self-fueling island for 100LL Avgas near the general aviation apron.

Utilities

Utilities companies serving the airport are the Town of Marana Water Department for water and sanitary sewer, Trico Electric Cooperative, Inc. provides electrical service, and Southwest Gas Corporation provides natural gas.

Security Fencing and Gates

The entire airport is surrounded by security-type fencing. The fence is FAA-standard 8-foot chain-link with three strands of barbwire. There is a single gate access to the airport located to the east of the Tucson Aeroservice Center facility.

ACCESS & CIRCULATION

GENERAL ACCESS TO MARANA REGIONAL AIRPORT – SURROUNDING ROADS

Marana Regional Airport is accessible from Avra Valley Road which runs east to west along the south side of the airport. The airport is approximately two miles west of Interstate 10, which is accessible from Avra Valley Road at Exit 242. Avra Valley Road is currently a rural two lane-road in good condition with no curbs, sidewalks or stoplights in the vicinity of the airport.

Sanders Road runs north to south along the west side of the airport. Sanders Road is also a rural two-lane road with no curbs, stoplights or sidewalks near the airport. Sandario Road is the principal access from the south. It intersects with Avra Valley Road near the airport's main entrance.

PARKING

Terminal Parking Lot: The main parking area located south of Tucson Aeroservice Center has a total area of 5,401 square yards. This lot is accessible via the main airport entrance drive on Avra Valley Road. These parking spaces may be used by visitors to the terminal building and employees and customers of the FBOs and the Sky Rider Restaurant located near the terminal building. Other unpaved parking is available south of Marana Skydiving.

Rental Cars: Budget offers rental car services to Marana Regional Airport. Budget does not have a service counter at the airport; however, rental cars can be reserved and delivered to the airport as requested.

SOCIOECONOMIC PROFILE

The socioeconomic profile provides a general look at the socioeconomic makeup of the community that utilizes Marana Regional Airport. It also provides an understanding of the dynamics for growth and the potential changes that may affect aviation demand. 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 Pima Association of Governments (PAG), the Town of Marana, and the 1990 and 2000 census reports.

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. **Table 1H** shows the total population growth since 1990 for the State of Arizona, Pima County, and for the Town of Marana. Arizona has grown at an annual average rate of 3.4 percent since 1990. Since 1990, the State of Arizona population has increased by 2.1 million. The population of the Town of Marana grew at an average annual rate of 18.5 percent between 1990 and 2004, increasing by more than 21,000 residents. During the same period, Pima County's population grew by more than 260,000 for an average annual rate of 2.4 percent.

Population growth in Marana has been far ahead of Pima County and the State of Arizona historically. Between 1990 and 2004, the State population grew by 59 percent and the County population grew by 39 percent, whereas the Marana population grew by 975 percent in the same time frame.

TABLE 1H
Historical Population
State of Arizona, Pima County, Town of Marana

Year	State of Arizona	Percent Change	Pima County	Percent Change	Town of Marana	Percent Change
1990	3,665,228	N/A	668,840	N/A	2,187	N/A
2000	5,130,632	39.3%	843,746	26.9%	13,556	519.8%
2001	5,319,895	3.7 %	870,610	2.6%	15,765	16.3%
2002	5,472,750	2.9%	890,545	2.3%	17,770	12.7%
2003	5,629,870	2.9%	910,950	2.3%	20,600	15.9%
2004	5,833,685	3.6%	931,210	2.2%	23,520	14.2%

Arizona State Population Growth Rates	
1990 – 2004 Change in Total Population 2,168,457	**1990 – 2004 Average Annual Population Growth Rate 3.4%**
Pima County Population Growth Rates	
1990 – 2004 Change in Total Population 262,370	**1990 – 2004 Average Annual Population Growth Rate 2.4%**
Marana Population Growth Rates	
1990 – 2004 Change in Total Population 21,333	**1990 – 2004 Average Annual Population Growth Rate 18.5%**

Source: Arizona Department of Economic Security, 2005

EMPLOYMENT

Employment opportunities affect migration to the metropolitan area and population growth. The Marana metropolitan area has consistently been below the national and state average unemployment rate, as shown in **Table 1J**.

Table 1K summarizes total employment by sector for the Tucson Metropolitan Area from 1990 to May 2005. As shown in the table, the Tucson Metropolitan Area recorded growth in total employment over the 15-year time period. Total employment grew by 118,300, a 47 percent increase. The sectors that experienced the greatest average annual growth rate were the Construction sector at 3.6 percent, Services and Miscellaneous at 3.3 percent, and Financial Activities at 2.8

percent. The only sector with a negative annual growth rate over the 15-year time period was Mining and Quarrying at -2.5 percent a year.

TABLE 1J
Unemployment Rates
Town of Marana, Pima County, State of Arizona, The United States

Year	Town of Marana	Pima County	State of Arizona	United States
1995	2.4%	3.3%	5.1%	5.6%
1996	2.8%	3.8%	5.5%	5.4%
1997	2.4%	3.3%	4.6%	4.9%
1998	2.0%	2.7%	4.1%	4.5%
1999	2.3%	3.1%	4.4%	4.2%
2000	2.1%	2.9%	4.0%	4.0%
2001	2.6%	3.5%	4.7%	4.7%
2002	3.6%	4.9%	6.2%	5.8%
2003	3.2%	4.3%	5.6%	6.0%
2004	2.7%	3.7%	5.1%	5.6%

Source: Arizona Department of Economic Security, 2004

TABLE 1K
Employment By Sector (Non-Farm)
Tucson Metropolitan Area

Sector	1990	1995	2000	2005*	Avg. Annual Growth Rate
Manufacturing	25,500	27,400	32,900	28,300	0.7%
Mining and Quarrying	2,200	2,200	1,800	1,500	-2.5%
Construction	14,900	20,600	22,900	25,500	3.6%
Transportation and Public Utilities	5,700	7,700	8,800	8,400	2.6%
Retail/Wholesale Trade	39,600	43,900	46,200	50,500	1.6%
Information	5,100	6,500	7,900	7,200	2.3%
Financial Activities	11,900	11,600	14,800	18,000	2.8%
Services and Miscellaneous	90,900	114,300	138,400	148,200	3.3%
Government	55,900	68,400	76,300	82,400	2.6%
Total Employment*	**251,700**	**302,600**	**350,000**	**370,000**	**2.6%**

Source: Arizona Department of Economic Security, 2005
* Through May 2005

PER CAPITA PERSONAL INCOME

Per capita personal income (PCPI) for the Tucson metropolitan area, which includes Marana, is summarized in **Table 1L.** 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 has grown significantly since 1992, growing at an average annual rate of 3.9 percent between 1992 and 2003. The State of Arizona has also seen an increase in PCPI; at 4.0 percent annually over the same time period.

TABLE 1L
Per Capita Personal Income (PCPI) (1996 $)
Tucson Metropolitan Area and Arizona

Year	Tucson Metropolitan Area	Arizona
1992	$17,074	$17,777
1993	$17,935	$18,293
1994	$18,804	$19,212
1995	$19,275	$19,929
1996	$20,120	$20,823
1997	$20,812	$21,861
1998	$22,133	$23,216
1999	$22,995	$24,057
2000	$24,175	$25,660
2001	$24,828	$26,214
2002	$25,151	$26,680
2003	$25,906	$27,232
Average Annual Growth Rate		
1992-2003	3.9%	4.0%

Source: U.S. Department of Commerce

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 visibility is impaired due to cloud coverage is a major factor in determining the use of instrument approach aids.

Precipitation in Marana is generally more plentiful in the summer months than the winter months. Approximately 44 percent of the annual total occurs in the months of July through September. Precipitation is mostly in the form of rain, as the average low rarely drops below freezing. The winter season is marked by mild temperatures and a few more cloudy days than the summer months. Summer produces high temperatures, while fall and spring are transitional in nature. May and June average the least amount of precipitation during the year with only three percent of the annual total. **Table 1M** summarizes typical temperature and precipitation data for the region.

TABLE 1M **Temperature and Precipitation Data** **Marana, Arizona**	**Temperature (Fahrenheit)**		
	Mean Maximum	**Mean Minimum**	**Precipitation (inches)**
January	67.0	34.2	0.74
February	71.0	36.6	0.79
March	76.0	41.0	0.81
April	84.7	47.1	0.40
May	93.6	54.5	0.07
June	102.4	65.8	0.28
July	102.7	73.1	2.26
August	100.3	70.8	2.05
September	98.1	64.9	1.07
October	88.4	53.0	0.87
November	76.0	41.9	0.71
December	68.0	35.3	1.14
Annual	85.7	51.5	11.18
Source: Western Regional Climate Center			

As shown in **Table 1N**, on average, rain falls on 39 days each year. Visibility is restricted on 81 days each year.

TABLE 1N **Mean Number of Days by Month with Precipitation or Obstructions to Vision**		
	Precipitation (Days)	**Obstruction to Vision (Days)***
January	3	10
February	3	9
March	3	9
April	2	6
May	1	4
June	1	3
July	7	9
August	7	7
September	3	4
October	3	5
November	2	6
December	4	10
Annual Total	39	81
Source: Western Regional Climate Center * Tucson Metropolitan Area		

LAND USE

Exhibit 1G depicts the existing land use around the airport as derived from the Marana General Plan in 2003. The majority of the land surrounding the airport is designated as vacant. West of the airport, there are sections of public and institutional use, and detached housing. North and east of the airport there are larger sections of public and institutional use. Most of the developed areas in Marana are located north and southeast of the airport.

Exhibit 1H depicts the future land use from the 2003 Marana General Plan. The future land use map depicts the Marana Regional Airport on a larger section of land labeled as an airport activity center. Marana Regional Airport is bordered to the north by public use, recreation/open space, and medium-density residential land uses. To the south, there are sections of industrial/general use, medium-density residential and low-density residential. To the east, there are sections of recreation/open space, medium-density residential, and industrial/general land use. To the west there are sections of industrial/general, public, and rural-density residential land uses.

PUBLIC AIRPORT DISCLOSURE MAP

Arizona Revised Statute (ARS) 28-8486, *Public Airport Disclosure*, provides for a public airport owner to publish a map depicting the "territory in the vicinity of the airport". The territory in the vicinity of the airport is defined as the traffic pattern airspace and the property that experiences 60 day-night noise level (DNL) or higher in counties with a population of more than 500,000, and 65 DNL or higher in counties with less than 500,000 residents. The DNL is calculated for the 20-year forecast condition. ARS 28-8486 provides for the State Real Estate Office to prepare a disclosure map in conjunction with the airport owner. The disclosure map is recorded with the County Recorder. The Marana Regional public airport disclosure lines can be seen on **Exhibit 1J**.

HEIGHT AND HAZARD ZONING

Height and hazard zoning establishes height limits for new construction near an airport and within the runway approaches. Height and hazard zoning ordinances are typically based on Federal Aviation Regulation (FAR) Part 77, which defines imaginary surfaces surrounding the airport that are to remain free of obstructions for the purpose of safe air navigation. Currently, the Town of Marana has no height and hazard zoning restrictions specific to new construction near the airport or within the runway approaches.

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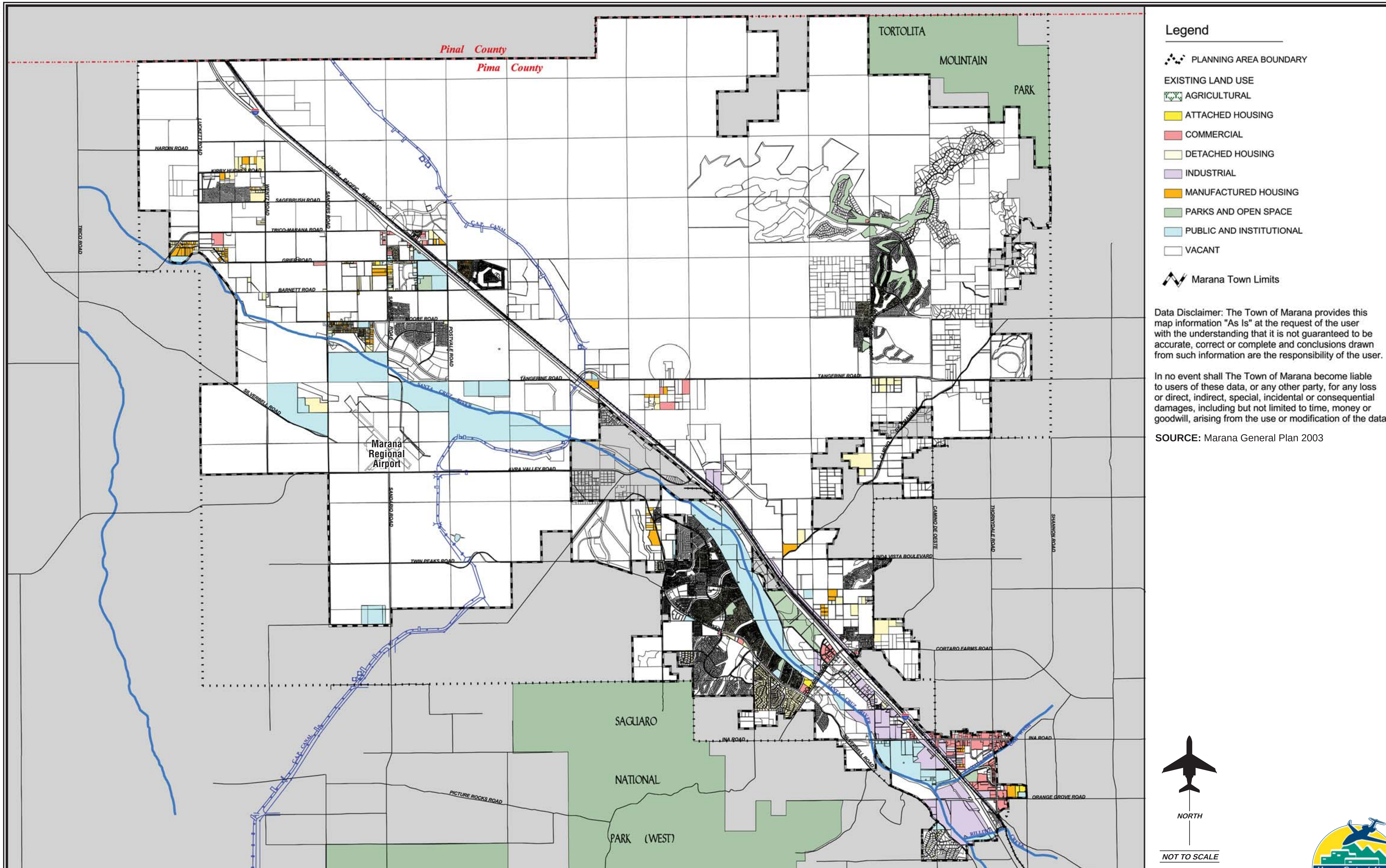

Exhibit 1G
EXISTING LAND USE

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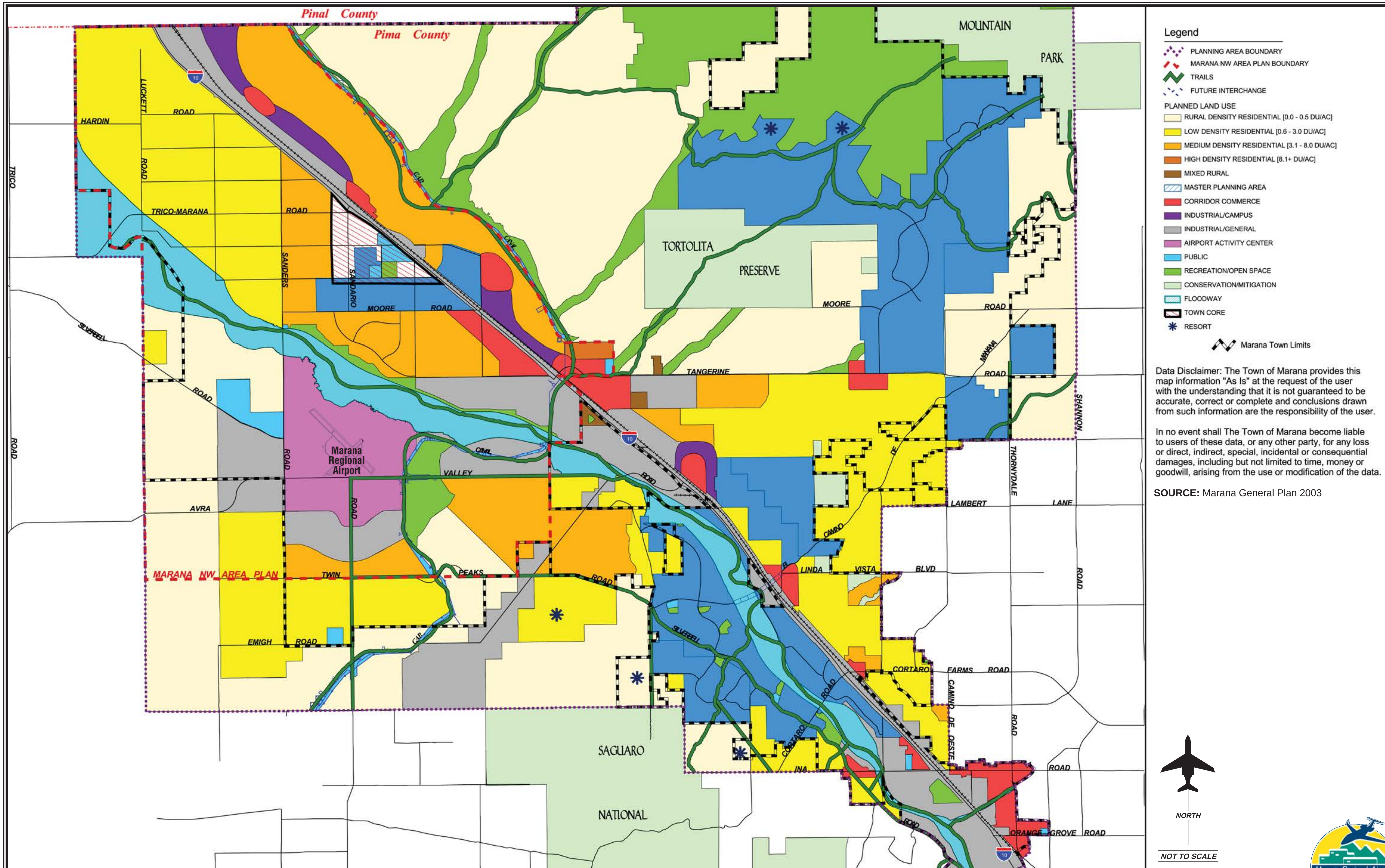
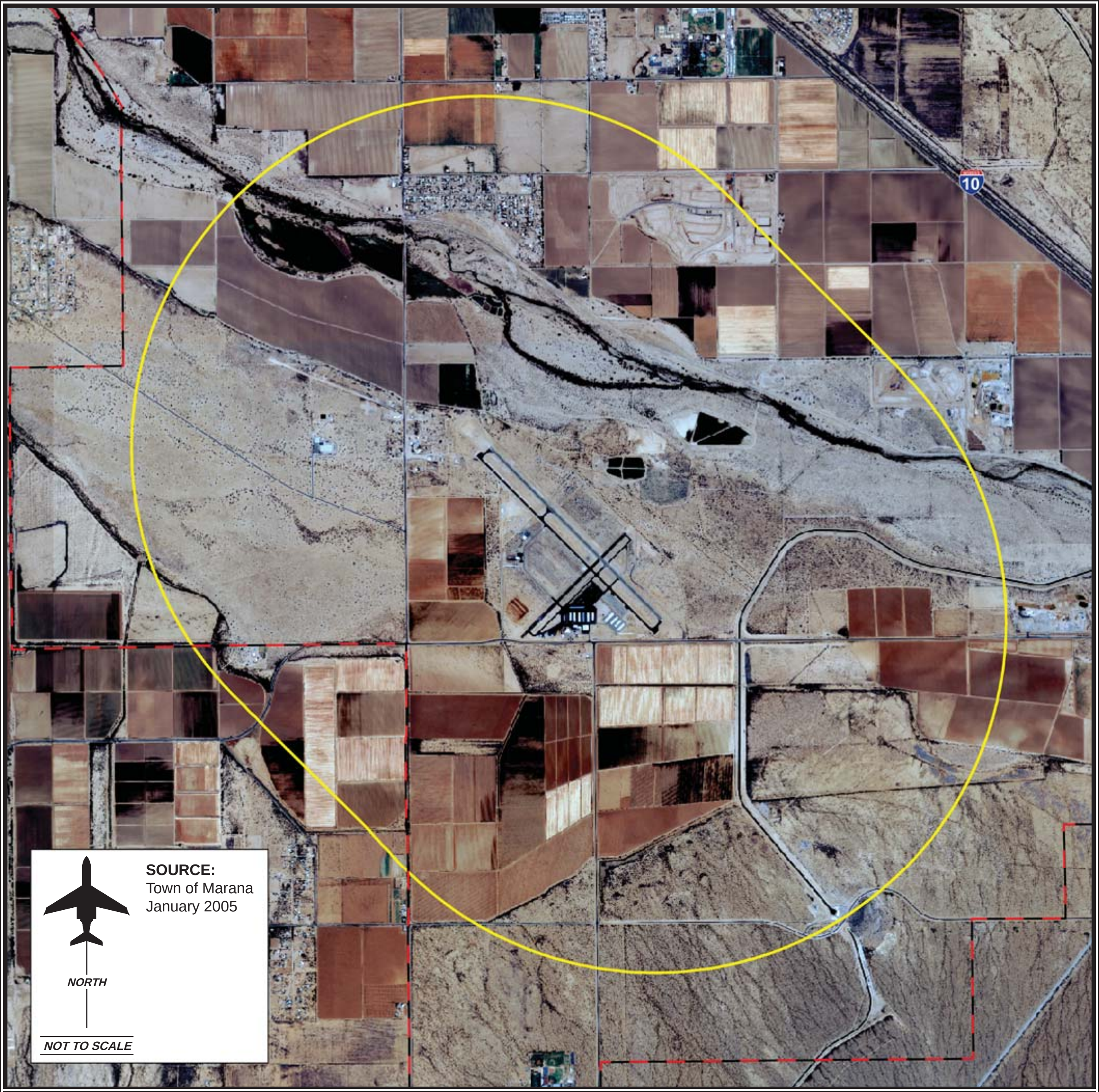


Exhibit 1H
FUTURE LAND USE

04MP14-1J-10/20/05



LEGEND

- Public Airport Disclosure Map Limits
- Pima - Pinal County Line
- Marana Town Limits

Marana Regional Airport

Exhibit 1J
TOWN OF MARANA
AIRPORT INFLUENCE AREA

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 during the inventory process. The following listing reflects a partial compilation of these sources. In addition, considerable information was provided directly to the consultant by the Marana Regional Airport.

AirNAV Airport information, website: www.airnav.com

Airport/Facility Directory Southwest U.S. Edition; May 12, 2005

Arizona Department of Economic Security; 2004

Arizona State Aviation Needs Study; 2000

FAA 5010 Form, Airport Master Record, 1996

FAA 5010 Form, Airport Master Record, 2005

Marana Town General Plan; 2003

National Plan of Integrated Airport Systems; 2005

Phoenix Sectional Chart, US Department of Commerce, National Oceanic and Atmospheric Administration; May 12, 2005

Pima Association of Governments (PAG) *Aviation System Plan*; 1995

Pima Association of Governments (PAG) *Regional Aviation System Plan;* 2002

U.S. Department of Commerce

Western Regional Climate Center; 2005

Chapter Two

AVIATION DEMAND FORECASTS

Aviation Demand Forecasts

Facility planning must begin with a definition of the demand that may reasonably be expected to occur at the facility over a specific period of time. For Marana Regional Airport, this involves forecasts of aviation activity indicators through the year 2025. In this master plan, forecasts of based aircraft, based aircraft fleet mix, and annual aircraft operations will serve as the basis for facility planning.

It is virtually impossible to predict with certainty year-to-year fluctuations of activity when looking twenty years into the future. Because aviation activity can be affected by many influences at the local, regional, and national level, it is important to remember that forecasts are to serve only as guidelines, and planning must remain flexible enough to respond to unforeseen facility needs.

Recognizing this, it is intended to develop a master plan for Marana Regional Airport that will be demand-based rather than time-based. As a result, the reasonable levels of activity potential that are derived from this forecasting effort will be related to the planning horizon levels rather than dates in time. These planning horizons will be established as levels of activity that will call for consideration of the implementation of the next step in the master plan program.

The following forecast analysis examines recent developments, historical information, and current aviation trends to provide an updated set of

aviation demand projections for Marana Regional Airport. The intent is to permit the Town of Marana to make the planning adjustments necessary to ensure that the facility meets projected demands in an efficient and cost-effective manner.

NATIONAL AVIATION TRENDS

Each year, the Federal Aviation Administration (FAA) publishes its national aviation forecast. Included in this publication are forecasts for air carriers, regional air carriers, general aviation, and military activity. The forecasts are prepared to meet 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 Aviation Forecasts - Fiscal Years 2005-2016*. The forecast uses the economic performance of the United States as an indicator of future aviation industry growth.

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 manufacturing 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 September 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. Some U.S. airports in and around Washington, D.C. and New York City remain closed to visual flight rules (VFR) traffic. This, in addition to the economic recession that began in early 2001, had a negative impact on the general aviation industry.

While the recession ended a seven-year period of growth in the aviation industry, it was early in 2002 before the severity of the recession was realized. The domestic economy declined for three consecutive quarters in 2001. In 2002 the recovery was underway, and although weak, it has picked up in the last three years. The FAA projects the U.S. economy to continue to recover strongly through 2005 into 2006, and then grow moderately thereafter. This will positively influence the aviation industry, leading to passenger, air cargo, and general aviation growth throughout the forecast period (assuming that there will not be any new successful terrorist incidents against either U.S. or world aviation).

According to the General Aviation Manufacturers Association (GAMA), aircraft shipments in 2004 were up 10.2 percent from 2003 to 2,355. This followed a static level of growth between 2002 and 2003. The number of general aviation hours flown is forecast to increase by 1.6 percent annually over the forecast period.

After a recent slowdown in business jet shipments (down 31.9 percent in 2003), the business/corporate segment of general aviation began to grow again in 2004 and offers the most growth potential. For 2004, business jet shipments were up 4.9 percent. The FAA expects this segment will continue to expand at a faster rate than personal/sport flying. Safety concerns, combined with increased processing time at commercial terminals, make business/corporate flying an attractive alternative.

In 2004, there were an estimated 211,295 active general aviation aircraft, representing an increase of 695 aircraft (0.33 percent). **Exhibit 2A** depicts the FAA forecast for active general aviation aircraft in the United States. The FAA forecasts general aviation aircraft to increase at an average annual rate of 1.1 percent over the 12-year forecast period, to 240,070. Piston-powered aircraft are expected to grow at an average annual rate of 0.2 percent. This is due in part to declining numbers of multi-engine piston aircraft, while single-engine and rotorcraft increase at rates of 0.2 and 1.2 percent, respectively.

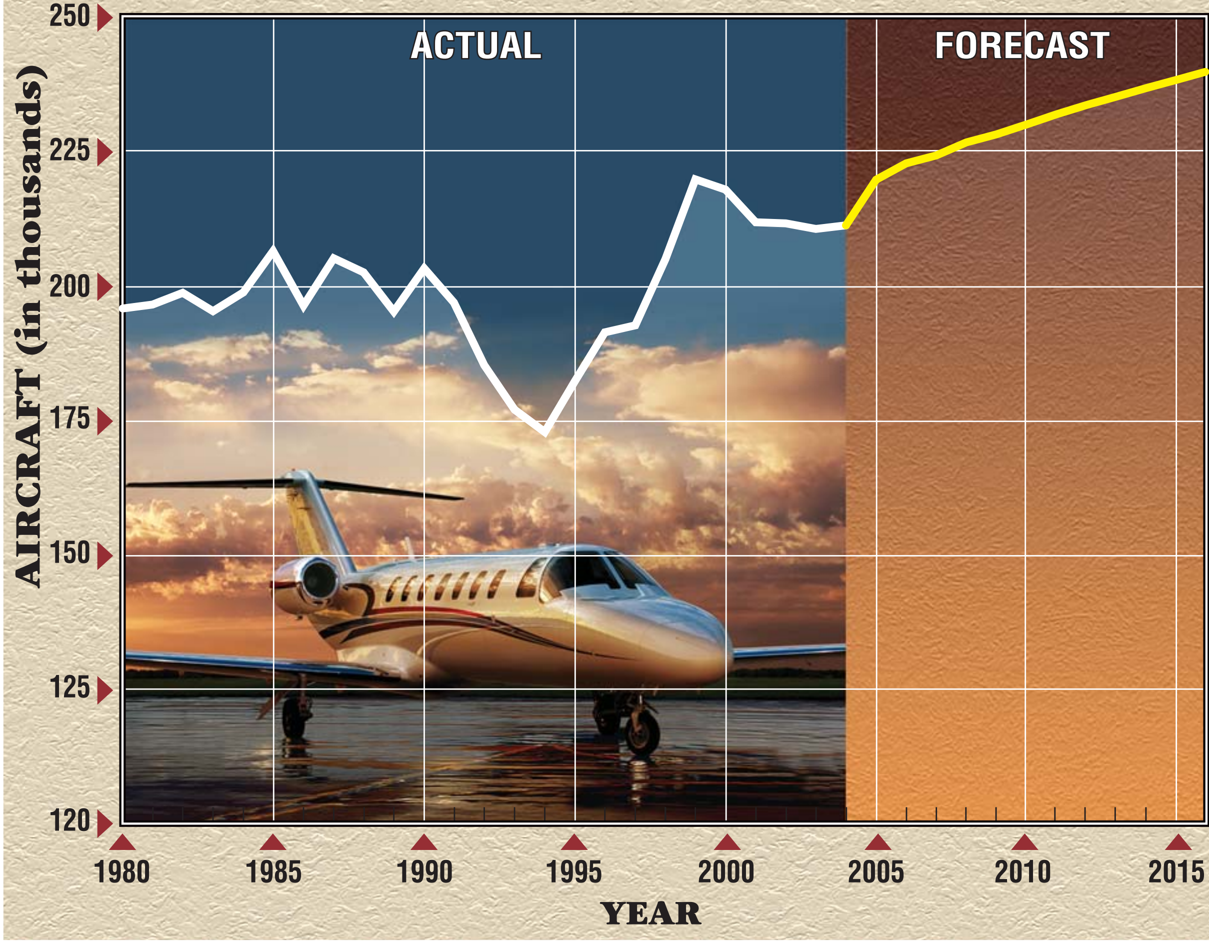
Turbine-powered aircraft (turboprop and jet) are expected to grow at an average annual rate of 3.7 percent over the forecast period. Even more significantly, the jet portion of this fleet is expected to grow at an average annual growth rate of 5.4 percent. This growth rate for jet aircraft can be attributed to growth in the fractional ownership industry, new product offerings (which include new entry-level aircraft and long-range global jets), and the shift away from commercial travel by many travelers and corporations.

In summary, business aviation, by nature of its ownership and use, will experience cyclical movements in activity relating to economic conditions. Over the long term, however, it is anticipated to continue to be the strongest growth market in general aviation.

FORECASTING APPROACH

The development of aviation forecasts proceeds through both analytical and judgmental processes. A series of mathematical relationships are tested to establish statistical logic and rationale for projected growth. However, the judgment of the forecast analyst, based upon professional experience, knowledge of the aviation industry, and their assessment of the local situation, is important in the final determination of the preferred forecast.

It is important to note that one should not assume a high level of confidence in forecasts that extend beyond five years. Facility and financial planning usually require at least a ten-year preview, since it often takes more than five years to complete a major facility development program. However, it is important to use forecasts which do not overestimate revenue-generating capabilities or understate demand for



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

Year	FIXED WING									
	PISTON		TURBINE		ROTORCRAFT					
	Single Engine	Multi-Engine	Turboprop	Turbojet	Piston	Turbine	Experimental	Sport Aircraft	Other	Total
2004 (Est.)	144.0	17.7	7.3	8.4	2.2	4.7	20.8	N/A	6.2	211.3
2008	145.5	17.5	7.7	10.5	2.4	4.9	21.3	10.8	6.1	227.7
2012	147.0	17.4	8.1	13.3	2.5	5.1.	21.4	13.2	5.9	233.9
2016	148.0	17.2	8.4	15.9	2.6	5.3	21.4	15.4	5..8	240.1

Source: FAA Aerospace Forecasts, Fiscal Years 2005-2016.

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

Marana Regional Airport

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

facilities needed to meet public (user) needs.

A wide range of factors are known to influence the aviation industry and can have significant impacts on the extent and nature of air service provided in both the local and national market. Technological advances in aviation have historically altered and will continue to change the growth rates in aviation demand over time. The most obvious example is the impact of jet aircraft on the aviation industry, which resulted in a growth rate that far exceeded expectations. Such changes are difficult, if not impossible to predict, and there is simply no mathematical way to estimate their impacts. Using a broad spectrum of local, regional, and national socioeconomic and aviation information, and analyzing the most current aviation trends, forecasts are presented in the following sections.

To determine the types and sizes of facilities that should be planned to accommodate general aviation activity, certain elements of this activity must be forecast. Indicators of general aviation demand include:

- Based aircraft
- Based aircraft fleet mix
- General aviation operations

The remainder of this chapter will examine historical trends with regard to these areas of general aviation and project future demand for these segments of general aviation activity at the airport.

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. In addition, Marana Regional Airport is one of several airports serving the general aviation needs of the Tucson metropolitan area. Therefore, the process of developing forecasts of based aircraft for Marana Regional Airport begins with a review of historical aircraft registrations in the area.

REGISTERED AIRCRAFT FORECASTS

Historical records of aircraft ownership in the Tucson Metropolitan Statistical Area (MSA) (Pima County), presented on **Table 2A**, were obtained from the U.S. Census of Civil Aircraft for the years 1985 through 1992, Aviation Goldmine for the years 1993 through 2000, and Avantext, Inc., Aircraft & Airmen for the years 2001 to 2004. Since 1985, registered general aviation aircraft in the county have grown from 922 to 1,301, for an annual average growth rate of 1.8 percent.

Table 2A also compares registered aircraft to active general aviation aircraft in the United States. The Pima County share of the U.S. market of general aviation aircraft has fluctuated around 0.600 percent. **Table 2A** presents a projection of registered aircraft in Pima County based upon an increasing percentage of the market share in the future.

Two time-series extrapolations of registered aircraft were developed based upon the periods 1985 to 2004 and 1993 to 2004. The correlation coefficient, (r^2), was determined to be 0.926 for 1985 to 2004, and 0.939 for 1993 to 2004. 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. **Table 2B** presents the resulting projections for comparison with the market share projection. The market share projection results in a forecast that is lowest of these three projections.

TABLE 2A
Registered Aircraft and Independent Variables
Tucson MSA

				Tucson MSA	
Year	**Registered GA Aircraft (Pima County)**	**U.S. Active Aircraft**	**% of U.S. Market**	**Population**	**PCPI (1996 $)**
1985	922	N/A	N/A	611,471	18,294
1986	878	N/A	N/A	630,560	18,659
1987	940	N/A	N/A	646,054	18,565
1988	919	N/A	N/A	654,566	18,512
1989	949	N/A	N/A	655,251	18,903
1990	918	N/A	N/A	666,880	18,596
1991	909	N/A	N/A	663,179	18,603
1992	932	185,650	0.502	674,075	18,611
1993	1,033	177,120	0.583	702,315	19,108
1994	1,074	172,935	0.621	723,199	19,620
1995	1,102	182,605	0.603	744,004	19,690
1996	1,101	187,312	0.588	767,144	20,120
1997	1,131	189,328	0.597	784,784	20,467
1998	1,127	205,700	0.548	802,501	21,572
1999	1,165	219,500	0.531	824,852	22,046
2000	1,260	217,500	0.579	843,746	22,612
2001	1,279	211,400	0.605	870,610	22,582
2002	1,284	211,200	0.608	890,545	22,837
2003	1,298	210,600	0.616	910,950	23,040
2004	1,301	211,295	0.616	931,210	23,324
PROJECTED					
2010	1,381	230,335	0.600	1,058,496	25,009
2015	1,436	238,645	0.602	1,170,958	26,538
2025	1,569	253,300	0.619	1,403,080	30,042

Sources: Registered Aircraft: (1985-1992) U.S. Census of Civil Aircraft; (1993-2000) Aviation Goldmine; (2001-2004), Avantext Inc., Aircraft & Airmen.
U.S. Active Aircraft: FAA Aerospace Forecasts
Population: Draft Projections from Pima Association of Governments, 2005
PCPI: Woods & Poole Economic and Demographic Forecasts, 2005

Next, further regression analyses were conducted to evaluate potential statistical fits between registered aircraft and a pair of independent, socioeconomic variables often linked to general aviation demand - population and per capita personal income. **Table 2A** includes the historical and projected population of the Tucson MSA, as well as the MSA per capita personal income (PCPI) in 1996 dollars.

The same periods were explored as with the time series analysis. A single variable regression with the MSA population resulted in an r^2 of 0.956 for the period of 1985 to 2004 and 0.922 for 1993 to 2004. The only other socioeconomic regression with an r^2 greater than 0.900 was MSA PCPI for 1985 to 2004. This value was 0.938. The resultant projections from these three regressions are depicted for comparison on **Table 2B.**

A multiple regression was then performed using population and PCPI over the last twenty years. This resulted in an even stronger correlation of 0.962. The resulting projection as depicted on **Table 2B** was selected as the preferred forecast.

TABLE 2B
Registered Aircraft Forecasts
Pima County

	r^2	2004	2010	2015	2025
Time-Series (1985-2004)	0.926	1,301	1,456	1,578	1,823
Time-Series (1993-2004)	0.939	1,301	1,483	1,615	1,879
Market Share U.S. Active Aircraft		1,301	1,381	1,436	1,569
Regression Analysis vs. MSA Population (1985-2004)	0.956	1,301	1,541	1,711	2,064
Regression Analysis vs. MSA Population (1993-2004)	0.922	1,301	1,535	1,701	2,044
Regression Analysis vs. MSA PCPI (1985-2004)	0.938	1,301	1,451	1,572	1,850
Multiple Regression **vs. MSA Population & PCPI* (1985-2004)**	**0.962**	**1,301**	**1,516**	**1,671**	**2,003**

* Selected Forecast

Exhibit 2B graphically depicts the selected forecast in comparison with the other projections.

BASED AIRCRAFT FORECAST

The number of based aircraft is the most basic indicator of general aviation demand at an airport. By first developing a forecast of based aircraft, the growth of other general aviation activities and demands can be projected. According to the 1995 Pima Association of Governments' (PAG) Regional Aviation System Plan (RASP), there were 118 based aircraft at Marana Regional Airport in 1985. The number of based aircraft has since increased, with 295 reported by the airport in 2004.

Table 2C examines based aircraft as a percentage of aircraft ownership in Pima County. As shown in the table, the airport's based aircraft were equivalent to 12.8 percent of aircraft registered in the County in 1985, 16.5 percent in 1996, and 17.3 percent in 2000. The airport's share increased to

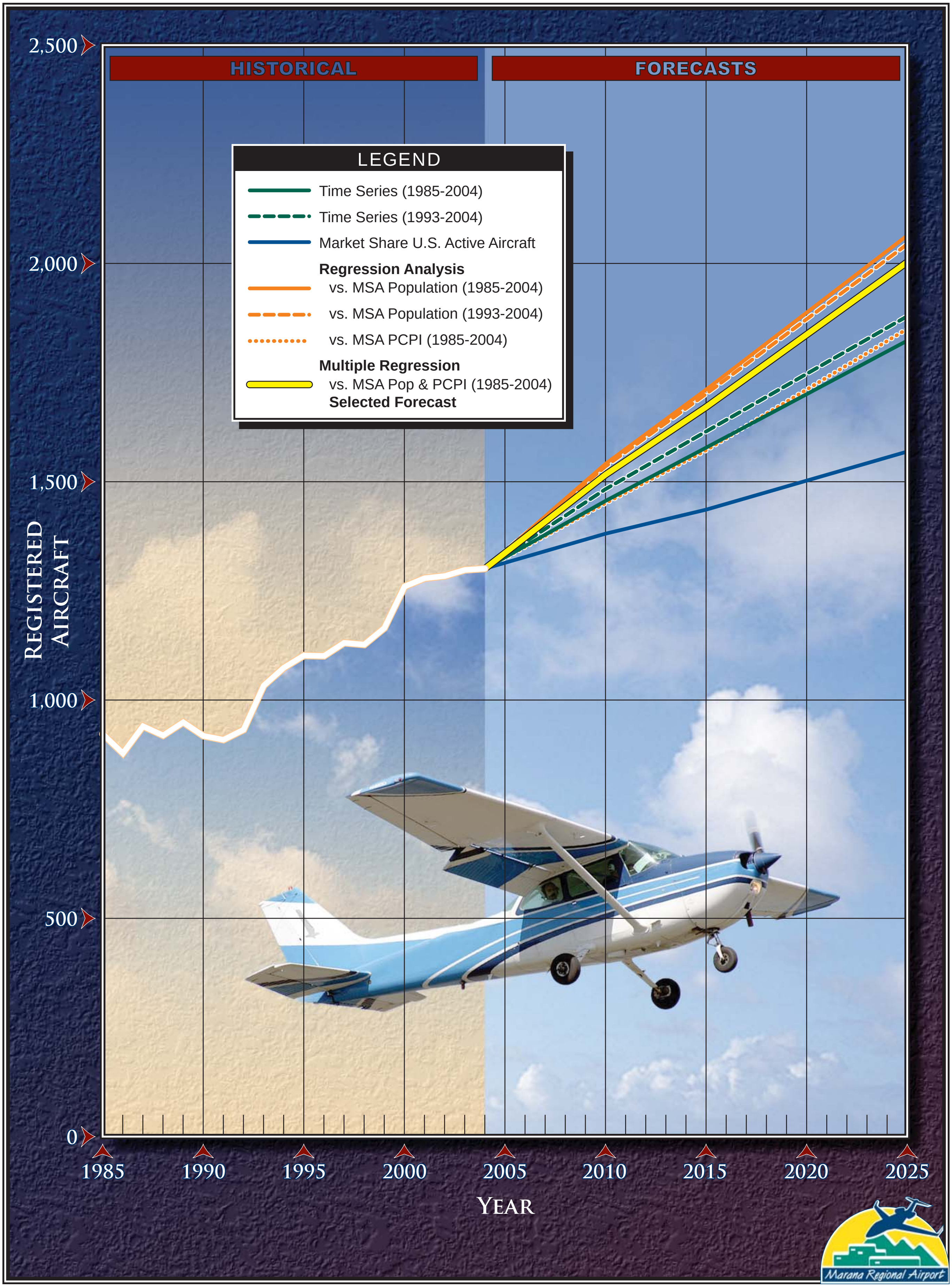


Exhibit 2B
REGISTERED AIRCRAFT & INDEPENDENT VARIABLES

22.7 percent in 2004. This is the result of based aircraft at Marana Regional Airport growing faster than the aircraft in the county (4.9 percent annually for the airport versus 1.8 percent annually for the county since 1985).

Projections of based aircraft were developed by estimating the Marana Regional Airport's share of registered aircraft through 2025. The constant share forecast assumes the 2004 share will remain constant at 22.7 percent through the planning period. This would yield 455 based aircraft by 2025, with based aircraft growing at the same rate (2.1 percent annually) as registered aircraft in the County.

The increasing share forecast assumes the Marana Regional share of Pima County registered aircraft will gradually increase to 25.0 percent through the planning period. This would yield 501 based aircraft by 2025, with based aircraft growing at an average rate of 2.6 percent annually.

TABLE 2C
Share of Registered Aircraft

Year	Marana Regional Based Aircraft	Pima County Registered Aircraft	Marana Regional Share of Registered Aircraft
Historical			
1985	118	922	12.8%
1996	182	1,101	16.5%
2000	218	1,260	17.3%
2004	295	1,301	22.7%
Constant Share Projection			
2010	344	1,516	22.7%
2015	379	1,671	22.7%
2025	455	2,003	22.7%
Increasing Share Projection			
2010	355	1,516	23.4%
2015	401	1,671	24.0%
2025	501	2,003	25.0%

Source for historical based aircraft: 1985, 1995 Pima Association of Governments Aviation System Plan; 1996, FAA 5010 Form; 2000, 2002 Pima Association of Governments' Aviation System Plan; 2004, Airport Records
Source for Historical Pima County Registered Aircraft: 2000 - Aviation Gold Mine CD; 2004 – Avantext, Inc.

For comparative purposes, projections for the 2005 FAA *Terminal Area Forecast* (TAF), 2002 *Pima Association of Governments' Regional Aviation System Plan* (PAG RASP), the 2000 *Arizona State Aviation System Needs Study* (SANS), and the 1999 *Avra Valley Airport Master Plan* have also been examined. The FAA TAF projected a base year total of 218 based aircraft, remaining constant through 2020. The PAG RASP projection years did not match those used in this master plan; therefore, those figures were interpolated by Coffman Associates. The interpolated projections indicated based aircraft growing to 315 by 2025. The SANS projects based aircraft at

Marana Regional Airport growing to 276 by 2015. The previous 1999 Master Plan for Marana Regional Airport (formerly the Avra Valley Airport) projected based aircraft to grow to 392 by the year 2015.

Table 2D and **Exhibit 2C** provide a summary of these general aviation based aircraft forecasts. The current based aircraft of 295 has already exceeded the FAA TAF, PAG RASP, and the SANS 2015 forecasts. With the growing share of county registrations being experienced at Marana Regional Airport, and Marana's population expected to grow at an average annual rate of 25 percent in the future, the increasing market share was selected as closest to what could be expected. This planning forecast allows for 205 new based aircraft by 2025. Based aircraft are projected to grow at 2.5 percent annually.

TABLE 2D
Based Aircraft Forecast Summary

Forecast	2005	2010	2015	2025
Constant Share of Registered Aircraft	--	344	379	455
Increasing Share of Registered Aircraft	--	355	401	501
Avra Valley Master Plan (1999)	290	341	392	N/A
FAA Terminal Area Forecast (2004)	218	218	218	N/A
PAG Regional Aviation System Plan (2002)	235	252	271*	315*
Arizona State Aviation Needs Study (2000)	234	254	276	N/A
Selected Master Plan Forecast	**295**	**350**	**400**	**500**

* Interpolated by Coffman Associates

BASED AIRCRAFT FLEET MIX

The aircraft fleet mix expected to utilize the airport is necessary to properly plan facilities that will best serve the level of activity and type of activities occurring at the airport. The existing based aircraft fleet mix is comprised primarily of single-engine piston aircraft, but also includes 28 multi-engine piston aircraft, 12 turboprop aircraft, 22 jets, and four rotorcraft. Nationally, the general aviation fleet mix is around 80 percent single-engine aircraft; at Marana Regional Airport single-engine aircraft only comprise 78 percent of the fleet.

Table 2E outlines the projected fleet mix. The national trend is toward a larger percentage of sophisticated aircraft and helicopters in the fleet mix. Growth within each category at the airport has been determined by comparison with national projections which reflect current aircraft in production.

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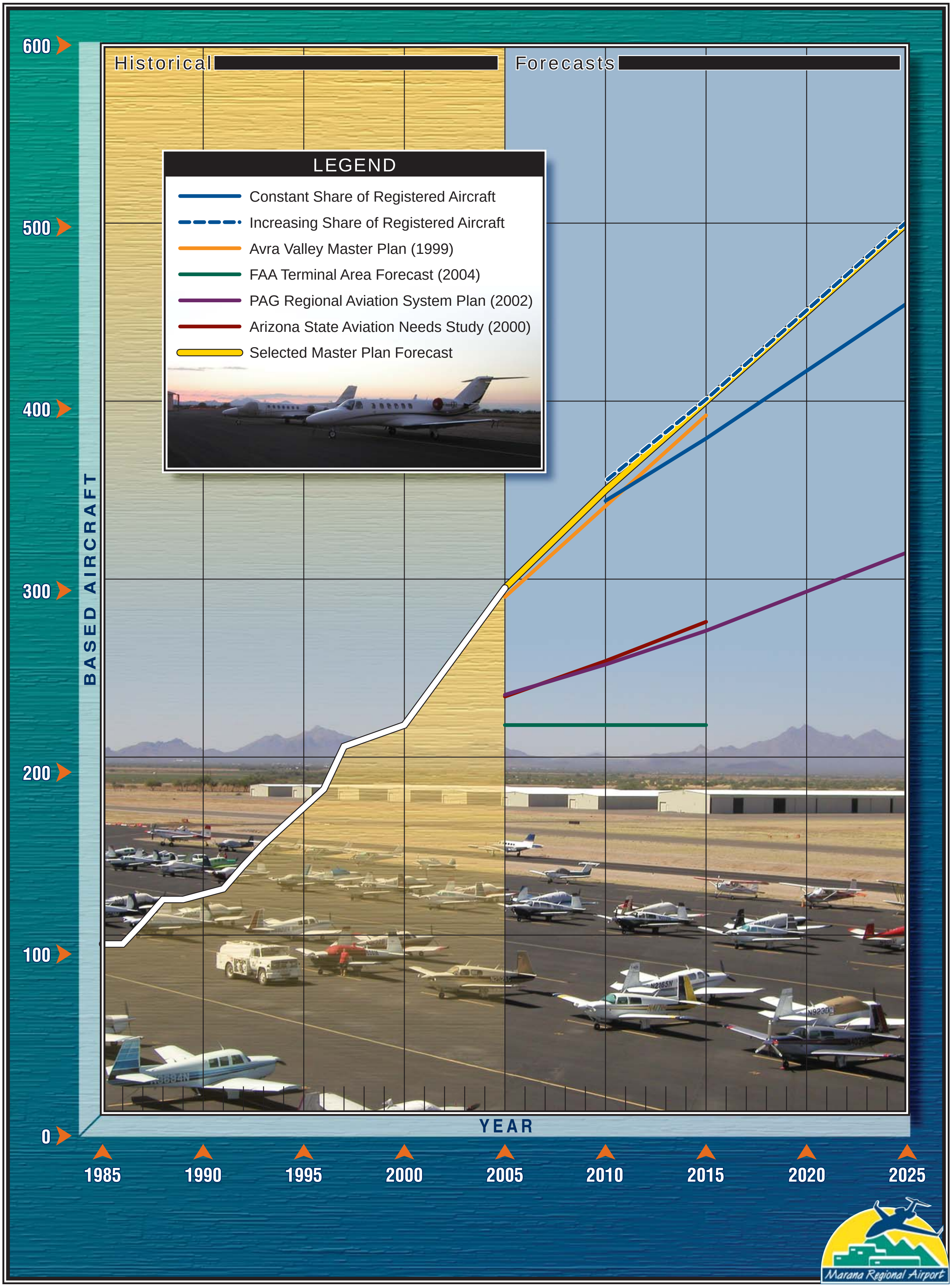


Exhibit 2C
BASED AIRCRAFT

TABLE 2E Based Aircraft Fleet Mix Marana Regional Airport		Piston		Turbine		
Year	Total	Single-Engine	Multi-Engine	Turboprop	Jet	Rotorcraft
ACTUAL						
2004	295	229	28	12	22	4
FORECAST						
2010	350	270	33	16	26	5
2015	400	307	36	20	31	6
2025	500	381	44	27	41	7

AIRCRAFT OPERATIONS

Aircraft operations at airports are classified as either local or itinerant. A local operation is a take-off or landing performed by an aircraft that operates within site 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 industrial use, since business aircraft are used primarily to carry people from one location to another.

Marana Regional Airport operations are comprised of general aviation and military operations. The following subsections discuss the operations forecasts.

GENERAL AVIATION OPERATIONS

According to the FAA TAF, there were an estimated 71,300 general aviation operations at Marana Regional Airport in 2004. Forecasts in the FAA TAF project operations to remain stagnant through the year 2020. However, without an airport traffic control tower, a method for estimating general aviation operations which uses local variables was examined.

This method, the *Model for Estimating General Aviation Operations at Non-Towered Airports,* was prepared for the FAA Statistics and Forecast Branch in July 2001. This report develops and presents a regression model for estimating general aviation operations at non-towered airports. The model was derived using a combined data set for small towered and non-towered general aviation airports and incorporates a dummy variable to distinguish the two airport types. In addition, the report applies the model to estimate activity at 2,789 non-towered general aviation airports contained in the FAA *Terminal Area Forecasts*. The forecasts of annual operations at Marana Regional Airport were computed using the recommended equation (#15) for non-towered airports. Independent variables used in the equation include airport characteristics (i.e., number of based aircraft, number of flight schools), population totals, and geographic location.

This equation yields an annual operations total of 77,400 for 2004. An estimated 22,000 annual operations conducted by Marana Skydive were added for a total of 99,400 general aviation operations in 2004. This equates to 337 operations per based aircraft. Using a static level of operations per based aircraft (337) yields 168,500 annual operations by the year 2025. An increasing ratio projection was also done and yields 275,000 operations by the year 2025. The constant ratio projection and the preferred planning forecast are presented in **Table 2F**.

TABLE 2F
General Aviation Operations Forecast
Marana Regional Airport

Year	Based Aircraft	Itinerant Operations	Local Operations	Total Operations	Operations Per Based Aircraft
2004	295	27,090	72,310	99,400	337
Constant Ratio Projection					
2010	350	41,282	76,668	117,950	337
2015	400	47,180	87,620	134,800	337
2025	500	58,975	109,525	168,500	337
Preferred Planning Forecast					
2010	350	45,937	85,313	131,250	375
2015	400	59,500	110,500	170,000	425
2025	500	96,250	178,750	275,000	550

* Annual operations estimated using Equation #15 for non-towered airports.

The preferred planning forecast, increasing to 550 operations per based aircraft by 2025, was selected. This ratio will grow to a number similar to towered Arizona airports such as Glendale at 442 operations per based aircraft, and Ryan Airfield at 606 operations per based aircraft. The preferred planning forecast yields 131,250 annual operations by 2010; 170,000 annual operations by 2015; and 275,000 annual operations by 2025. Itinerant operations were estimated to account for approximately 35 percent of total operations, while local operations were estimated to account for 65 percent. This is a ratio similar to that at Ryan Airfield. Annual general aviation operations at the airport are projected to increase at an average annual rate of 5.0 percent through the end of the planning period, which is higher than the growth in general aviation hours flown (1.6 percent) and operations (1.2 percent) anticipated by the FAA.

MILITARY OPERATIONS

Military activity accounts for the smallest portion of the operational traffic at Marana Regional Airport. Military operations consist of Apache Longbow helicopter operations from the Western Army Aviation Training

Site and the Silverbell Army Heliport at Pinal Airpark. In 2004, military operations accounted for an estimated 2,000 itinerant operations. There have been no local military operations. Unless there is an unforeseen mission change in the area, a significant change from these average figures is not anticipated. Therefore, annual military operations have been projected at 2,000 annual operations throughout the planning period. This is consistent with typical industry practices for projecting military operations.

SUMMARY

This chapter has outlined the various aviation demand levels anticipated over the planning period. In summary, general aviation activity at Marana Regional Airport has shown strong growth. The airport still has good growth potential for both based aircraft and general aviation operations due to a growing local economy and population.

Table 2G provides a summary of the aviation activity planning horizons for Marana Regional Airport. Activity for 2004 is included in the table as a baseline reference. In subsequent chapters, these forecasts will be converted to planning horizon milestones to emphasize that the master plan will be developed according to a demand-based schedule rather than a time-based one.

The next step in the master plan will be to assess the capacity of existing facilities to accommodate forecast demand and determine which facilities will need to be improved to meet these demands. This will be examined in the next chapter, Chapter 3, Facility Requirements.

TABLE 2G
Forecasts Summary
Marana Regional Airport

	2004	2010	2015	2025
ANNUAL OPERATIONS				
Itinerant Operations				
General Aviation	27,090	45,937	59,500	96,250
Military	2,000	2,000	2,000	2,000
Local Operations				
General Aviation	72,310	85,313	110,500	178,750
Total Operations	101,400	133,250	172,000	277,000
BASED AIRCRAFT				
Single-Engine Piston	229	270	307	381
Multi-Engine Piston	28	33	36	44
Turboprop	12	16	20	27
Jet	22	26	31	41
Rotorcraft	4	5	6	7
Total Based Aircraft	295	350	400	500

Chapter Three

FACILITY REQUIREMENTS

Facility Requirements

To properly plan for the future of the Marana Regional 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 conducted 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 and 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

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.

It is important to consider that over time, the actual activity at the airport may be higher or lower than what the

annualized forecast portrays. By planning according to activity milestones, the resultant plan can accommodate unexpected shifts or changes in the aviation demand. It is important to plan for these milestones so that airport officials can respond to unexpected changes in a timely fashion. As a result, these milestones provide flexibility while potentially extending this plan's useful life should aviation trends slow over the period.

The most important reason for utilizing milestones is to allow the airport to develop facilities according to need generated by actual demand levels. 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
Marana Regional Airport

	2004	Short Term (± 5)	Intermediate Term (± 10)	Long Term (± 20)
ANNUAL OPERATIONS				
Military	2,000	2,000	2,000	2,000
General Aviation				
Itinerant	27,090	45,937	59,500	96,250
Local	72,310	85,313	110,500	178,750
TOTAL OPERATIONS	101,400	133,250	172,000	277,000
Based Aircraft	295	350	400	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 passenger 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.

Itinerant Operations Peak Periods

Without an airport traffic control tower, adequate operational information is not available to directly determine peak operational activity at the airport. Therefore, peak period forecasts have been determined according to trends experienced at similar airports. Typically, the peak month for activity at general aviation airports approximates 10 to 15 percent of the airport's annual operations. Peak month general aviation itinerant operations and total operations were estimated at 12 percent of total annual operations. The forecast of busy day operations was calculated as 1.23 times design day activity. Design hour operations were estimated at 18 percent of design day operations in 2004, but can be expected to decline slightly as activity increases over the long term. **Table 3B** summarizes peak operations forecast for the airport.

TABLE 3B
Peaking Characteristics
Marana Regional Airport

	2004	Short Term (± 5)	Intermediate Term (± 10)	Long Term (± 20)
OPERATIONS				
Civilian Itinerant				
Annual	27,090	45,937	59,500	96,250
Peak Month	3,251	5,512	7,140	11,550
Design Day	105	178	230	373
Busy Day	129	219	283	459
Design Hour	19	28	35	52
Total Airport				
Annual	101,400	133,250	172,000	277,000
Peak Month	12,168	15,990	20,640	33,240
Design Day	393	516	666	1,072
Design Hour	71	83	100	150

AIRFIELD CAPACITY

Airfield capacity is measured in a variety of different ways. The **hourly capacity** of a runway 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 (AC) 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 Marana Regional Airport:

- **Runway Configuration** – The airfield includes two runways: primary Runway 12-30 and crosswind Runway 3-21; both with full length

Exhibit 3A
AIRFIELD CAPACITY FACTORS

parallel taxiways and no instrument approaches.

- **Runway Use** – Runway use in capacity conditions will be controlled by wind and/or airspace conditions. Winds are considered calm below three miles per hour (mph). According to wind data from the National Climatic Data Center, the airport is under calm wind conditions 16 percent of the time. Winds favor Runway 12 (northwest flow) approximately 42 percent of the time, Runway 30 (southeast flow) approximately 18 percent of the time, Runway 3 (southwest flow) 6 percent of the time, and Runway 21 (northeast flow) 18 percent of the time.

- **Exit Taxiways -** Based upon mix, only taxiways between 2,000 feet and 4,000 feet count in the exit rating. There are two exit taxiways for both Runway 3 and Runway 21 available within this range. Runway 12 and Runway 30 each have one exit available within this range.

- **Weather Conditions -** The airport operates under visual meteorological conditions (VMC) over 99.8 percent of the time. Instrument meteorological conditions (IMC) occur when cloud ceilings are between 500 and 1,000 feet. Poor visibility conditions (PVC) apply for minimums below 500 feet and one mile. Because IMC and PVC occur less than one percent combined, they are considered negligible for this analysis.

- **Aircraft Mix -** Description of the classifications and the percentage mix for each planning horizon is presented on **Table 3C**.

- **Percent Arrivals** – Operations generally follow the typical 50-50 percent split of arrivals and departures during the design hour.

- **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 peak hour currently averages 18 percent of the operations in a day and will decline to 14 percent as operations increase in the long term planning horizon.

TABLE 3C
Aircraft Operational Mix - Capacity Analysis
Marana Regional Airport

Aircraft Classification	Current	Short Term (± 5)	Intermediate Term (± 10)	Long Term (± 20)
VFR				
Classes A & B	98.4%	97.6%	96.9%	95.8%
Class C	1.6%	2.4%	3.1%	4.2%
Class D	0%	0%	0%	0%
Touch-and-Go Activity	57%	51%	51%	51%

Definitions:
Class A: Small single-engine aircraft with gross weights of 12,500 pounds or less.
Class B: Small twin-engine aircraft with gross weights 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

Based upon the input factors, current and future hourly capacities for the various operational scenarios at Marana Regional Airport were determined. As the mix of aircraft operating at an airport changes to include a higher percentage of large aircraft (weighing over 12,500 pounds), the hourly capacity of the system declines slightly. As indicated on **Table 3C**, the percentages of Class C aircraft will increase with the planning horizon activity milestones.

The current and future hourly capacities are depicted in **Table 3D**. At Marana Regional Airport, the current hourly capacity is 130 operations. This is expected to fluctuate between 130 and 127 operations in the long term. This will be exceeded by the long term planning horizon milestone. The long term design hour operations of 150 will exceed the hourly capacity by nearly 20 percent.

TABLE 3D
Airfield Demand/Capacity Summary
Marana Regional Airport

	PLANNING HORIZON			
	Base Year (2004)	Short Term (± 5)	Intermediate Term (± 10)	Long Term (± 20)
Operational Demand				
Annual	101,400	133,250	172,000	277,000
Design Hour	71	83	100	150
Capacity				
Annual Service Volume	188,000	208,000	222,000	234,000
Weighted Hourly Capacity	130	130	129	127
Delay				
Per Operation (Minutes)	0.35	0.55	0.85	4.5
Total Annual (Hours)	592	1,221	2,437	20,775

ANNUAL SERVICE VOLUME

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

ASV = C x D x 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) yields 258 for Marana Regional Airport. This is expected to remain relatively constant over the long term planning period. The ratio of average daily demand to average peak hour demand (H) yields 5.6. This ratio was also projected to increase to 7.14 by the long term planning horizon.

The current ASV was determined to be 188,000 operations. With the increasing ratio H, the annual service volume will increase to 234,000 operations over the long term. With operations in 2004 totaling 101,400, the airport is currently at 54 percent of its annual service volume. The airport will reach its ASV just beyond the intermediate planning horizon. Long term annual operations are forecast to reach nearly 277,000, which would be 118 percent of the airport's ASV. **Table 3D** summarizes the airport's ASV over the long term planning horizon.

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 of the airport traffic area. Departing aircraft delays result in aircraft holding at the runway end.

Table 3D also summarizes the aircraft delay analysis conducted for Marana Regional Airport. Current annual delay is estimated at 592 hours. As an airport's operations increase toward the annual service volume, delay increases exponentially. Analysis of delay factors for the long range planning horizon indicate that annual delay can be expected to reach 20,774 hours, which is a significant level of delay.

CAPACITY ANALYSIS CONCLUSIONS

Exhibit 3B compares annual service volume to existing and forecast operational levels at Marana Regional Airport. The current operations level represents 54 percent of the airfield's annual service volume. By the end of the planning period, total annual operations are expected to be at 118 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. Marana Regional Airport will reach this range within the short term planning horizon, will exceed 75 percent of its annual service volume by the intermediate planning horizon, and will begin to experience significant delays if capacity improvements are not undertaken. For this airport to accommodate the projected levels of activity, a capacity enhancement such as a parallel runway will be needed. This and other capacity enhancement alternatives will be considered and evaluated in the next chapter.

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 operations per year at the airport. Planning for future aircraft use is of particular im-

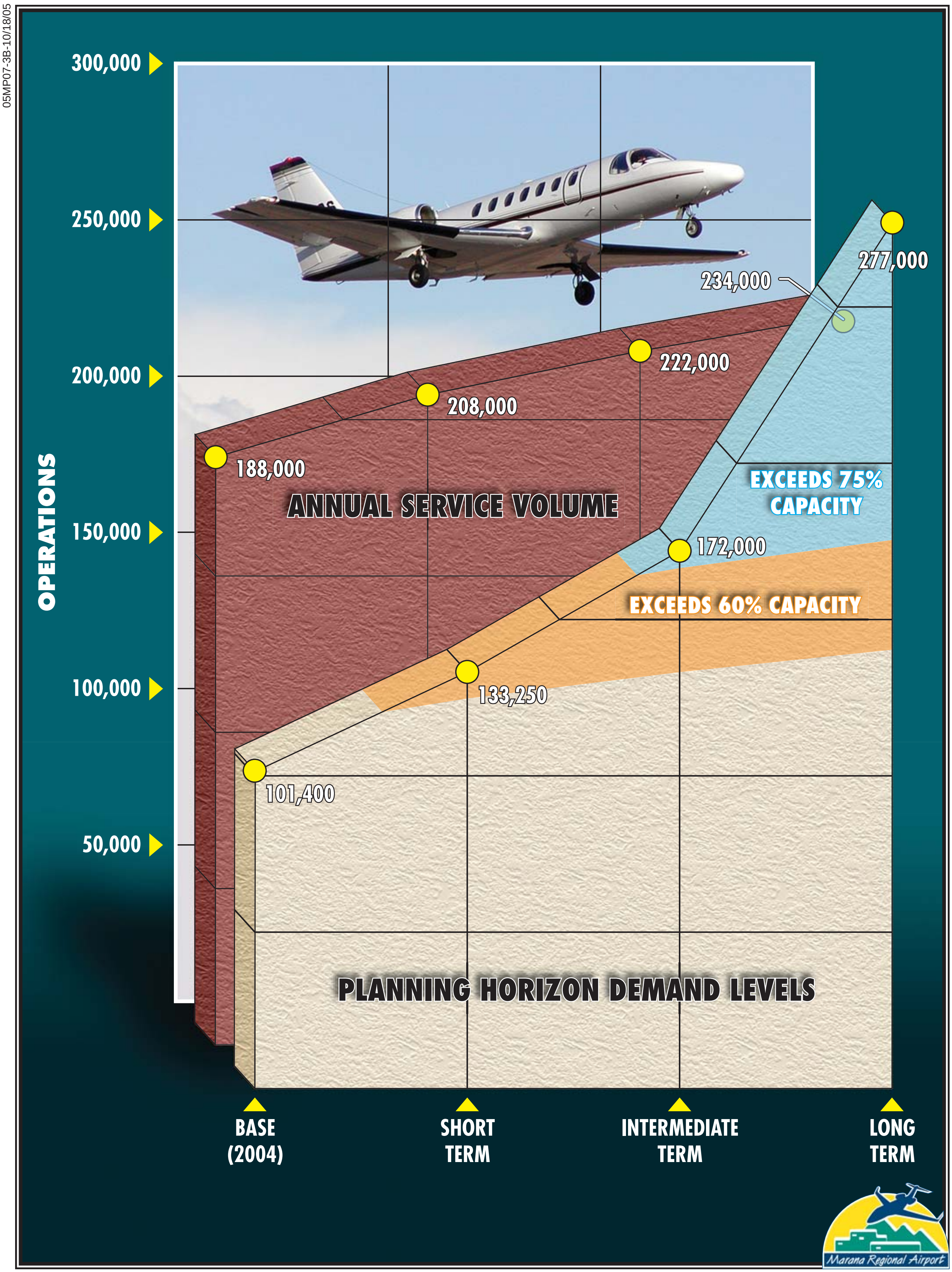


Exhibit 3B
AIRFIELD DEMAND VS. CAPACITY

portance 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.

In order to determine several airfield design requirements, the critical aircraft and critical ARC should first be determined, and then appropriate airport design criteria can be applied. This begins with a review of the type of aircraft using and expected to use Marana Regional Airport. **Table 3E** provides a projected breakdown of planning horizon operations by airport reference code.

05MP07-3C-10/18/05

A-I

- Beech Baron 55
- **Beech Bonanza**
- Cessna 150
- Cessna 172
- Piper Archer
- Piper Seneca

C-I, D-I

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

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

C-II, D-II

- Cessna Citation X
- **Gulfstream** II, III, **IV**
- Canadair 600
- Canadair Regional Jet
- Embraer Regional Jet
- Lockheed JetStar
- Super King Air 350

B-II less than 12,500 lbs.

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

C-III, D-III

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

B-I, 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

C-IV, D-IV

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

A-III, B-III

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

D-V

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

Note: Aircraft pictured is identified in bold type.

Marana Regional Airport

Exhibit 3C
AIRPORT REFERENCE CODES

TABLE 3E
Airport Reference Code (ARC) Mix
Marana Regional Airport

		ANNUAL OPERATIONS		
Reference Code	**2004**	**Short Term (± 5)**	**Intermediate Term (± 10)**	**Long Term (± 20)**
A, B-I	99,700	129,300	164,900	264,000
A, B-II	1,100	2,000	3,500	6,500
A, B-III	0	500	700	1,000
C-I	552	1,200	2,000	3,500
C-II	36	200	650	1,400
C-III	0	10	50	200
D-I	4	10	50	100
D-II	4	20	100	200
D-III	4	10	50	100
Total	**101,400**	**133,250**	**172,000**	**277,000**

Marana Regional Airport currently accommodates a wide variety of general aviation aircraft. The large majority of aircraft using the airport are small single and multi-engine aircraft (which fall within approach categories A and B and airplane design group I). The airport is also used less frequently by business turboprop, and business jet aircraft (which fall within approach categories B, C, and D and airplane design groups I, II, and III). The airport also has the potential to serve larger propeller aircraft, such as the Lockheed C-130 or C-54 used in aerial firefighting as well as skydiving. These aircraft fall within approach category B and airplane design group III.

At the present time, approach category C operations account for 588 annual operations, and design group II operations account for 1,140 annual operations. Therefore, the airport should currently be designed to accommodate ARC C-II.

In the future, small single and twin-engine aircraft will continue to comprise the majority of the operations at Marana Regional Airport; however, C-130 operations could exceed 500 annual operations. In addition, the airport can be expected to accommodate some business jet aircraft in ARC C-III. **Thus, Marana Regional Airport should be ultimately be planned to accommodate up to ARC C-III.**

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 by the end of the short term planning horizon. As a result, the Master Plan should consider capacity improvements before activity approaches the operational capacity of the airfield. This will be a factor considered during the formulation and evaluation of alternatives. For the level of activity expected, however, the need for a parallel runway is a strong probability.

FAA Advisory Circular 150/5300-13, Change 1, *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.

The most recent ten years of wind data specific to the Marana Regional Airport at the time of this analysis was 1995-2004. This data is graphically depicted on the wind rose in **Exhibit 3D**. The orientation of Runway 12-30 and crosswind Runway 3-21 provides a combined 99.13 percent coverage for 10.5 knot crosswinds. Thus, the existing runway configuration has adequate wind coverage for all sizes and speeds of aircraft. For this reason, an additional runway strictly for crosswind purposes should not be necessary. Runway 12-30 alone provides adequate coverage for C and D aircraft, so crosswind Runway 3-21 should be planned to ARC B-II.

RUNWAY DIMENSIONAL REQUIREMENTS

Runway dimensional standards include the length and width of the runway, as well as the dimensions associated 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. The dimensional standards are outlined for the planning period for the primary runway, the crosswind runway, as well as for a potential parallel runway to meet future capacity demand.

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 gra-

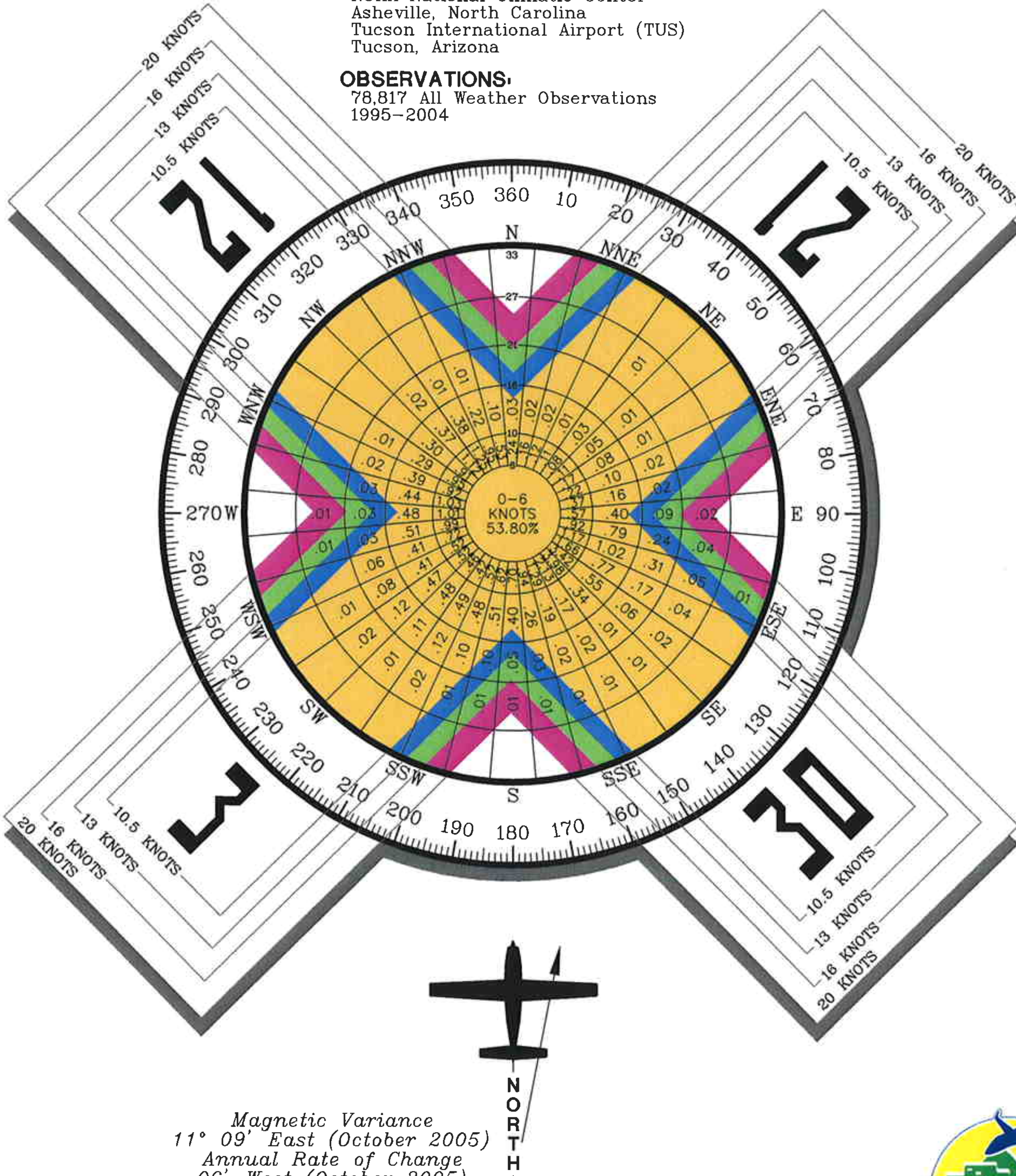
Draft 05MP07-3B-10/18/05

ALL WEATHER WIND COVERAGE

Runways	10.5 Knots	13 Knots	16 Knots	20 Knots
Runway 3-21	92.48%	95.90%	98.94%	99.77%
Runway 12-30	94.60%	97.16%	99.12%	99.79%
Combined	99.13%	99.79%	99.96%	100.00%

SOURCE:
NOAA National Climatic Center
Asheville, North Carolina
Tucson International Airport (TUS)
Tucson, Arizona

OBSERVATIONS:
78,817 All Weather Observations
1995-2004



Magnetic Variance
11° 09' East (October 2005)
Annual Rate of Change
06' West (October 2005)

Marana Regional Airport

Exhibit 3D
WINDROSE

dient of the runway, and the operating weight of the aircraft.

The airport elevation at Marana Regional Airport is 2,031 feet above mean sea level (MSL). The mean maximum daily temperature during the hottest month is 102.7 degrees Fahrenheit. The gradient for Runway 12-30 is 0.3 percent.

Table 3F outlines the runway length requirements for various classifications of general aviation aircraft at Marana Regional Airport. These were derived utilizing the FAA Airport Design Computer Program for *Runway Lengths Recommended 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 with at least 500 annual operations.

TABLE 3F
General Aviation Runway Length Requirements
Marana Regional Airport

AIRPORT AND RUNWAY DATA	
Airport elevation	2,031 feet
Mean daily maximum temperature of the hottest month	102.7 F
Maximum difference in runway centerline elevation	21 feet
Wet runway	
RUNWAY LENGTHS RECOMMENDED FOR AIRPORT DESIGN	
Small airplanes with approach speeds of less than 30 knots	400 feet
Small airplanes with approach speeds of less than 50 knots	1,000 feet
Small airplanes with less than 10 passenger seats	
75 percent of these small airplanes	3,400 feet
95 percent of these small airplanes	4,100 feet
100 percent of these small airplanes	**4,700 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	5,500 feet
75 percent of these large airplanes at 90 percent useful load	8,200 feet
100 percent of these large airplanes at 60 percent useful load	**7,200 feet**
100 percent of these large airplanes at 90 percent useful load	11,000 feet

REFERENCE: Chapter Two of AC 150/5325-4A, *Runway Length Requirements for Airport Design*, no Changes included.

Small aircraft are defined as aircraft weighing 12,500 pounds or less. Small airplanes make up the vast majority of general aviation activity at Marana Regional Airport and most other general aviation airports. In particular, piston-powered aircraft make up the majority of the small airplane operations. The runway length requirement for these aircraft is 4,700 feet.

Larger airplanes of 60,000 pounds or less are primarily comprised of business jets. The classifications listed on the table include 75 and 100 percent of the fleet. As indicated in the previous section, the airport hosts a wide range of business jets. **Table 3G** categorizes individual models of business jets under the appropriate family.

TABLE 3G
Business Jet Planning Statistics
Marana Regional Airport

Business Jet	ARC	MTOW #	Business Jet	ARC	MTOW #
12,500# and Under			**75% of Fleet Under 60,000#**		
Cessna 500 Citation I	B-I	11,850	Aerospatiale SN-601 Corvette	B-I	14,550
Cessna 501 Citation I/SP	B-I	10,600	Dassault Falcon 10	B-I	18,740
Cessna 525 Citation Jet (CJ-1)	B-I	10,400	Lear 28/29	B-I	15,000
Raytheon 390 Premier	B-I	12,500	Mitsubishi MU-300 Diamond	B-I	14,630
Cessna 525A Citation Jet (CJ-2)	B-II	12,500	Sabreliner 40	B-I	18,650
Cessna 551 Citation II/SP	B-II	12,500	Cessna 550 Citation II	B-II	13,300
Lear 23	C-I	12,500	Cessna 550 Bravo	B-II	14,800
100% of Fleet Under 60,000#			Cessna 552/T-47A	B-II	16,300
Dassault Falcon 2000	B-II	35,800	Cessna S550 Citation S/II	B-II	15,900
Dassault Falcon 900	B-II	45,500	Cessna 560 Citation V Ultra	B-II	16,300
Raytheon/Hawker 125-800	B-II	28,000	Cessna 560 Citation Encore	B-II	16,830
Lear 55	C-I	21,500	Cessna 560 Citation Excel	B-II	20,000
Sabreliner 75	C-I	23,300	Dassault Falcon 20	B-II	28,660
Bombardier CL-600 Challenger	C-II	41,250	Dassault Falcon 50	B-II	37,480
Bombardier CL-601 Challenger	C-II	41,250	Beechjet 400A	C-I	16,100
Bombardier CL-604 Challenger	C-II	47,600	IAI Jet Commander 1121	C-I	23,500
Cessna 650 Citation III/V	C-II	21,000	IAI Westwind 1123/1124	C-I	23,500
Cessna 750 Citation X	C-II	36,100	Lear 24	C-I	13,000
Dassault Falcon 900EX	C-II	48,300	Lear 25	C-I	15,000
Raytheon/Hawker 125-1000 Horizon	C-II	36,000	Lear 31	C-I	16,500
IAI Astra 1125	C-II	23,500	Lear 35/36	C-I	18,300
IAI Galaxy 1126	C-II	34,850	Lear 45	C-I	20,200
Sabreliner 65	C-II	24,000	Sabreliner 60	C-I	20,200
Lear 60	D-I	23,500	BAe 125-700	C-II	24,200
Over 60,000#			Cessna 650 Citation VII	C-II	23,000
Gulfstream III	C-II	68,700	Hawker-Siddeley 125-400	C-II	23,300
Bombardier CL-700 Global Express	C-III	96,000	Hawker-Siddeley 125-600	C-II	25,000
Gulfstream II	D-II	65,300	Sabreliner 75a/80	C-II	23,300
Gulfstream IV	D-II	71,780			
Gulfstream V	D-III	89,000			

ARC – Airport Reference Code
MTOW # - Maximum Certificated Takeoff Weight (pounds)

A runway length of 7,200 feet would accommodate the 100 percent fleet at 60 percent of their useful load. The useful load is the maximum certificated takeoff weight minus the operating empty weight. Sixty (60) percent loading will not generally permit aircraft in this category to fly nonstop to the east coast.

The existing Runway 12-30 length at Marana Regional Airport is 6,901 feet. A useful load of 60 percent will generally accommodate most business jet activity expected at the airport. A runway length of 7,200 feet will accommodate 100 percent of the fleet at 60 percent useful load. Runway 12-30 should be planned to be extended to 7,200 feet.

The crosswind runway is currently 3,893 feet long. A runway length of 4,700 feet will meet the needs of 100 percent of small airplanes with less than 10 passenger seats. These aircraft operations comprise more than

98 percent of the operations at the airport.

A parallel runway is the most probable means to meet the future capacity needs of the airfield. If the runway is needed for capacity purposes, the runway can be planned to a length equal to the crosswind runway. Over 90 percent of the aircraft using the airport will continue to be small aircraft, so a lesser parallel runway can provide most of the capacity benefits. For the primary purpose of relieving capacity constraints, a runway length of 4,700 feet should be planned.

Pavement Strength

An important feature of airfield pavement is the ability to withstand repeated use by aircraft of significant weight. Runway 12-30 is strength-rated at 30,000 pounds single wheel loading (SWL), 60,000 pounds dual wheel loading (DWL), and 140,000 pounds dual tandem loading (DTL).

Table 3G depicts the maximum takeoff weight of the range of business jets expected to use Marana Regional Airport. The Gulfstream V is the largest aircraft to use the airport currently. The Gulfstream V has a maximum takeoff weight of 89,000 pounds on dual wheel gear. Current operations are infrequent by this aircraft, but forecasts indicate that more demand for use of the airport by this aircraft can be anticipated. This would require a pavement strength of up to 89,000 pounds DWL.

The heaviest aircraft forecast to use the airport is the Lockheed C-130. The maximum takeoff weight of this aircraft is 140,000 pounds. As mentioned earlier, the C-130 could have sufficient operations in the future to require the primary runway to be strengthened to accommodate this aircraft.

Runway 3-21 is strength-rated at 20,000 pounds SWL. This strength is adequate to accommodate the aircraft that will need to use it.

Dimensional Design Standards

Runway dimensional design standards define the widths and clearances required to optimize safe operations in the landing and takeoff area. These dimensional standards vary depending upon the ARC for the runway. **Table 3H** outlines key dimensional standards for the airport reference codes most applicable to Marana Regional Airport now and in the future.

The primary runway should be planned to the standards of the critical ARC, which is C-III. The crosswind runway should be planned to the standards of ARC B-II aircraft. A potential parallel runway should be designed to meet at least B-II standards.

The following considers those areas where standards will need to be met on the existing Runway 12-30 and 3-21:

Runway Width – The current width of Runway 12-30 (100 feet) is adequate for both C-II and C-III design. A parallel runway will need to be 75 feet wide for B-II aircraft.

The current width of Runway 3-21 (75 feet) is adequate for B-II design and should be maintained through the planning period.

TABLE 3H
Airfield Design Standard
Marana Regional Airport

	Runway 12-30			Runway 3-21/ Potential Parallel	
Airport Reference Code (ARC)	**Available (ft.)**	**C-II (ft.)**	**C-III (ft.)**	**Available (ft.)**	**B-II (ft.)**
Runway Width	100	100	100	75	75
Runway Safety Area					
Width	500	400	500	120	120
Length Beyond End	**700**	1,000	1,000	300	300
Runway Object Free Area					
Width	800	800	800	500	500
Length Beyond End	**700**	1,000	1,000	300	300
Runway Blast Pad					
Width	**N/A**	120	140	**N/A**	95
Length	**N/A**	150	200	**N/A**	150
Runway Centerline to:					
Holding Position	250	250	250	**140**	200
Parallel Taxiway	400	300	400	240	240
Parallel Runway	N/A	700	700	N/A	700
Taxiway Width	50	35	50	35	35
Taxiway Centerline to:					
Fixed or Moveable Object	**65.5**	65.5	93	80	65.5
Parallel Taxilane	**105**	105	152	N/A	105
Taxilane Centerline to:					
Fixed or Moveable Object	**57.5**	57.5	81	N/A	57.5
Parallel Taxilane	**97**	97	140	N/A	97
Runway Protection Zones - One mile or greater visibility					
Inner Length	**250**	500	500	**250**	500
Length	**1,000**	1,700	1,700	1,000	1,000
Outer Width	**450**	1,010	1,010	**450**	700

* Boldface indicates standards not met.

Runway Safety Area - The runway safety area (RSA) is defined in FAA Advisory Circular 150/5300-13. Change 8, *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 purpose.

The RSA standard for all Category C and D aircraft is 500 feet wide and extends 1,000 feet beyond each runway end. The existing runway has at least 500 feet of safety area width; however, the existing RSA beyond the southeast end of Runway 30 does not extend for the full 1,000 feet. The perimeter fence, as well as Avra Valley Road, encroaches upon the RSA off the southeast end.

The RSA standard for Category B aircraft is 120 feet wide and extends 300 feet beyond each runway end. With the 500 foot displaced threshold on the Runway 3 end, Runway 3-21 meets the RSA standards.

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 runway safety area (RSA) edge elevation, unless the object is fixed by a function serving air or ground navigation.

Like the RSA for Category C aircraft, the OFA extends for 1,000 feet beyond the runway end, but it is 800 feet wide. Runway 12-30 meets the OFA width standard, but the perimeter fence and Avra Valley Road encroach upon the extended OFA off the southeast end.

The OFA for Category B aircraft extends for 300 feet beyond the runway end and has a width of 500 feet. Runway 3-21 meets both the OFA width and length standards.

Runway Blast Pad - The blast pad is a surface adjacent to the ends of the runways provided to reduce the erosive effect of jet blast and propeller wash. Category C-III standards require a blast pad with a length of 200 feet and a width of 140 feet. Runway 12-30 is not currently equipped with a blast pad and therefore does not meet design standards.

Category B-II standards require a blast pad with a length of 150 feet and a width of 95 feet. Runway 3 currently is equipped with a blast pad which meets these standards; however, the Runway 21 end is not equipped with a blast pad. Therefore, the runway does not meet design standards.

Parallel Runway Separation - The parallel runway at Marana Regional Airport should be planned to have at least a centerline separation of 700 feet. This meets the minimum standard for the existing and future critical aircraft under visual flight rules (VFR).

Holding Position Separation – The current hold positions on Runway 12-30 are marked 250 feet from the runway centerline. The standard for all Category C aircraft in Design Groups I through IV aircraft is 250 feet. These hold positions are adequate and should be maintained through the planning period.

Design standards for B-II runways require holding positions be marked 200 feet from the runway centerline. Runway 3-21 hold positions are currently marked 140 feet from the runway centerline. These hold positions should be moved back to 200 feet in the short term.

Runway Protection Zones – The runway protection zone (RPZ) is an area off the runway end to enhance 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 minimum associated with the runway. **Table 3H** depicts the requirements for runways with visibilities of one mile or more. The RPZs for both runways are currently undersized and the RPZs for Runway 30 and Runway 3 both extend beyond the current airport property boundaries.

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 12-30 is served by a full length parallel taxiway. Runway 12-30 has a total of five exit taxiways. **Table 3H** outlines the runway to taxiway centerline separation standards. Parallel Taxiway A has adequate separation for C-II and C-III standards. Any parallel taxiways along the potential parallel runway should be planned to at least 240 feet to allow for ultimate B-II design.

Runway 3-21 is also served by a full length parallel taxiway. Runway 3-21 has a total of four exit taxiways. Parallel Taxiway B meets separation requirements for B-II standards.

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 12-30 has a total of five exit taxiways on the southwest side of the runway. Runway 3-21 has a total of four on the southeast side of the runway.

Exit taxiways are most effective when planned at least 800 feet apart. Therefore, the five exits from Runway 12-30 are essentially equivalent to four. Right-angled exits require an aircraft to be nearly stopped before it can safely exit the runway. Angled 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 standards for the taxiways are depicted on **Table 3H**. The parallel taxiway for Runway 12-30 is 50 feet wide. This meets the Design Group III standard. However, the exit taxilanes for Runway 12-30 do not meet the 50-foot wide requirement. Each exit taxiway should be widened to meet this standard. The associated taxiways for Runway 3-21 currently meet the design requirements for Design Group II and should be maintained through the planning period.

The associated taxiways for a potential parallel runway should be planned at 35 feet, provided they are not located where they will need to serve larger aircraft.

Holding aprons and bypass taxiways can also improve the efficiency of the taxiway system. Currently, Runway 12-30 ends have holding aprons. Holding aprons should also be considered for Runway 3-21 and any potential parallel runway.

NAVIGATIONAL APPROACH AIDS

Navigational aids provide two primary services to airport operations: precision guidance to specific runway and/or non-precision guidance to a runway or the airport itself. The basic difference between a precision and non-precision navigational aid is that the former provides electronic descent, alignment (course), and position guidance, while the non-precision navigational aid provides only alignment and position location information. The necessity for such equipment is usually determined by design standards predicated on safety considerations and operational needs. The type, purpose, and volume of aviation activity expected at the airport are factors in the determination of the airport's eligibility for navigational aids.

The advancement of technology has been one of the most important factors in the growth of the aviation industry in the twentieth century. Many of the civil aviation improvements have been derived and enhanced from initial development for military purposes. The use of orbiting satellites to confirm an aircraft's location is one of the latest military developments to be made available to the civil aviation community.

Global positioning systems (GPS) use two or more satellites to derive an aircraft's location by a triangulation method. The accuracy of these systems has been remarkable, with initial degrees of error of only a few meters. As the technology improves, it is anticipated that GPS may be able to provide accurate enough position information to allow Category II and III precision instrument approaches, independent of any existing ground-based navigational facilities. In addition to the navigational benefits, it has been estimated that GPS equipment will be much less costly than existing precision instrument landing systems.

Currently, the best minimums to Marana Regional Airport are provided by the GPS approaches to Runway 3 and 12. These approaches provide weather minimums down to 500-foot AGL cloud ceilings and 1.0-mile visibility for Approach Categories A and B. The visibility minimums increase to 1.25 miles for Category C. Category D aircraft are currently unable to utilize these instrument approaches.

Increased business jet and air taxi operations at Marana Regional Airport could readily justify a precision instrument approach with minimums down to ½-mile. The capability to accommodate this type of approach is dependent upon the airport's ability to meet design standards, approach criteria, as well as airspace limitations.

Visual glide slope indicators provide visual descent guidance information during approach. There are two forms of these aids that have been regularly installed by the FAA at airports. They include precision approach path indicators (PAPI) and visual approach path indicators (VASI). Marana Regional Airport is currently equipped with PAPI-4 for approaches into Runways 12 and 30. Runways 3 and 21 are equipped with a PAPI-2. PAPI-4 should be planned for any future parallel runway.

Two types of automated weather observing systems are currently deployed at airports around the country. Automated Surface Observing System (ASOS) and Automated Weather Observing System (AWOS) both measure and process surface weather observations 24 hours a day, with reporting varying from one minute to hourly. The systems provide near real-time measurements of atmospheric conditions.

ASOS is typically commissioned by the National Weather Service or the Department of Defense. AWOS is often commissioned by the Federal Aviation Administration for airports that meet criteria of either 8,250 annual itinerant operations or 75,500 annual local operations. Marana Regional Airport is currently equipped with an AWOS-III and should maintain this equipment through the planning period.

AIRFIELD LIGHTING, MARKING, AND SIGNAGE

Runway identification lighting provides the pilot with a rapid and positive identification of the runway end. The most basic system involves runway end identifier lights (REILs). Runway 12-30 ends currently have REILs installed. REILs should be planned for Runway 3-21 and any future parallel runway.

The medium intensity runway edge lighting (MIRL) currently available along Runway 12-30 and 3-21 will be adequate for the planning period. Similar lighting should be planned for any future parallel runway. The taxiway system is lighted with medium intensity taxiway lighting (MITL) which will be adequate for the planning period. MITL should be planned for all future taxiways as well.

Lighted airfield signage on the primary runway currently meets FAR Part 139 standards. This will need to be extended to any new airfield pavements as well.

Non-precision runway markings on Runway 12-30 should be upgraded to precision markings with the implementation of a precision approach. Basic runway markings should be maintained on Runway 3-21. A future parallel runway should be planned for non-precision markings. Basic taxiway markings will continue to be adequate and should be applied to all new taxiways as well.

The airport also has a lighted wind cone and segmented circle which provide pilots with information about wind conditions and the airport traffic pattern. In addition, an airport beacon assists in identifying the airport from the air at night. Each of these facilities should be maintained in the future.

AIRPORT TRAFFIC CONTROL TOWER

Marana Regional Airport does not have an operational airport traffic control tower (ATCT); therefore, no formal terminal air traffic control services are available at the airport.

The FAA's Air Traffic Division administers the funding for the operation of Level 1 VFR air traffic control towers through contract agreements with qualified vendors on a regional basis. This "Contract Tower" program has proven to be effective in significantly reducing the cost of providing air traffic control services so that many locations which would have otherwise seen their air traffic control services eliminated can continue to benefit from the services of an ATCT facility.

The decision process for the funding of the operation of contract tower locations is primarily determined by a Benefit/Cost analysis. FAA Report APO 90-7, "*Establishment and Discontinuance Criteria for Air Traffic Control Towers*" outlines the procedures for calculating Benefit/Cost (B/C) ratios.

Costs are those direct costs associated with the operation of the Control Tower, including labor and other expenses. Benefits are measured in terms of lives and property saved by the prevention of midair collisions and other accidents and the savings in flight time by providing controlled airspace. The benefit of the Control Tower must be greater than the cost (benefit/cost ratio of greater than 1.0) in order to qualify for full funding under the FAA's Contract Tower program.

The FAA also manages a separately funded cost-sharing program which allows airports with B/C ratios under 1.0 to continue to participate in air traffic control services. This cost-sharing program uses the B/C ratio to determine the pro-rated share of FAA costs with the balance contributed by the airport sponsor.

An ATCT preliminary benefit/cost analysis was recently completed in 2006 by Quadrex Associates, Inc., to determine the feasibility of a proposed new ATCT at the Marana Regional Airport. Based on this B/C analysis, it appears that if air traffic levels represented in this Master Plan Update are realized, full funding of ATC services at Marana Regional Airport under the FAA's Contract Tower program would be likely once the facility has been constructed.

GENERAL AVIATION FACILITIES

General aviation (GA) facilities are those necessary for handling general aviation aircraft, passengers, and cargo while on the ground. This section is devoted to identifying future GA 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

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 shade hangars or T-hangars, and 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. Smaller single-engine aircraft usually prefer shade or T-hangars, while larger business jets will prefer conventional hangars. Rental costs will also be a factor in the choice.

The airport has 19 T-hangar storage facilities, providing 232 storage units. T-hangar space available at the airport totals approximately 299,667 square feet for aircraft storage. The airport also has 27 shade hangar storage positions, encompassing 17,069 square feet of storage space. Analysis of future T-hangar and shade hangar requirements, as depicted on **Table 3J**, indicates that additional T-hangar and/or shade hangar positions may be needed within the long term planning horizon.

TABLE 3J
Hangar Storage Requirements
Marana Regional Airport

	Existing	Short Term (± 5)	Intermediate Term (± 10)	Long Term (± 20)
Hangar Positions				
Shade/T-Hangars	237	262	293	359
Conventional	15	37	52	80
Total Aircraft to be Hangared	252	299	345	439
Hangar Area Requirements				
Shade/T-Hangars (s.f.)	316,736	301,415	337,160	412,920
Conventional (s.f.)	51,552	169,739	234,173	367,029
Service Hangar Area (s.f.)	28,931	47,115	57,133	77,995
Total Hangar Area (s.f.)	397,219	518,269	628,466	857,944

There are currently six conventional general aviation hangar storage facilities at the airport encompassing 51,552 square feet. Typical users of these facilities include medium and large aircraft. Conventional hangar space will need to be planned to accommodate the business jets forecast to base at Marana Regional Airport.

Requirements for maintenance and fixed base operator (FBO) hangar area were estimated at 10 percent of the total T-hangar and conventional hangar area. It should be noted that FBO hangars are cross-utilized for storage and aircraft maintenance. They are also sometimes used to store transient aircraft overnight.

Table 3J 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 space through the planning period. The analysis also indicates a potential need for additional service hangar space through 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 transient aircraft. The airport provides approximately 59,641 square yards of total apron parking adjacent to the airport terminal and the hangar facilities. The number of local tie-downs and ramp space for the planning period is presented in **Table 3K.**

TABLE 3K
Aircraft Parking Apron Requirements
Marana Regional Airport

	Existing	Short Term (± 5)	Intermediate Term (± 10)	Long Term (± 20)
Non-hangared Based Aircraft	43	51	55	61
Busy Day Itinerant Operations	169	222	287	462
Local Ramp Positions	94	51	55	61
Transient Ramp Positions	16	44	58	92
Total Ramp Positions	110	95	113	153
Apron Area (s.y.)	59,641	41,500	49,600	70,000

FAA Advisory Circular 150/5300-13, *Airport Design*, suggests a methodology by which transient apron requirements can be determined from knowledge of busy-day operations. At Marana Regional Airport, the number of transient spaces required was determined to be approximately 20 percent of busy-day itinerant operations.

A planning criterion of 700 square yards per business jet aircraft and 500 square yards per single and multi-engine aircraft was applied to the number of transient spaces to determine future transient apron requirements. A planning criterion of 360 square yards per based aircraft was applied to the number of local positions.

Local ramp and transient parking spaces will need to be expanded to accommodate the projected long term demand.

GENERAL AVIATION TERMINAL SERVICES

The general aviation facilities are often the first impression of the community that corporate officials or tourists will encounter. General aviation terminal facilities at an airport provide space for passenger waiting, a pilots' lounge and flight planning, concessions, management, storage, and various other needs. This can be accommodated in a single facility or spread throughout several fixed base operators.

The methodology used in estimating general aviation terminal facility needs was based upon the number of airport users expected to utilize general aviation facilities during the design hour, as well as FAA guidelines.

Space requirements for terminal facilities were based on providing 120 square feet per design hour itinerant passenger. **Table 3L** outlines the general space requirements for general aviation terminal services at Marana Regional Airport through the long term planning horizon. There are plans in place to construct a new terminal building with an area of 20,000 square feet. 12,000 square feet of this new terminal building will be used for terminal purposes while the remaining 8,000 square feet are to be used as a restaurant. This new terminal building will be sufficient through the intermediate term; however, additional square footage will need to be added in the long term.

TABLE 3L
GA Terminal Services Requirements
Marana Regional Airport

	Available	Current Need	Short Term (± 5)	Intermediate Term (± 10)	Long Term (± 20)
Itinerant Operations					
Annual		29,090	47,937	61,500	98,250
Design Hour		25	29	35	53
Passengers per Operation		1.8	1.8	1.8	1.8
Design Hour Passengers		45	52	63	95
Terminal Space (s.f.)	9,480	5,341	6,586	8,389	13,871

AIRPORT ACCESS

The airport has a single public access point located on the south side. The entrance road intersects with Avra Valley Road. Using trip generation models from the *Institute of Transportation Engineers* (ITE) *Trip Generation Report*, Marana Regional Airport is estimated to currently generate 2.9 daily vehicle trips per aircraft operation. Based upon this ratio, design day trips can be expected to grow from 1,125 today to 2,300 over the long range planning horizon.

The Town of Marana General Plan has a plan in place to reroute Avra Valley Road farther to the south and to widen the road to four lanes. The projected average daily traffic count for the future Avra Valley Road is 28,885 vehicles per day. Sanders Road to the west of the airport is also forecast to be widened to four lanes. When completed, Sanders Road will have a projected average daily traffic count of 24,320 vehicles. With these upgraded roadways, access to the airport should be adequate through the planning period.

GENERAL AVIATION PARKING

Vehicle parking requirements for general aviation were also examined. Space determinations were based on an evaluation of the existing airport use, as well as industry standards. General aviation spaces were calculated by multiplying design hour itinerant passengers by the industry standard of 1.8. Automobile parking requirements are summarized in **Table 3M**.

The airport currently has 80 parking spaces in its public parking lot. The analysis indicates that the available parking is undersized. This may not be as apparent because most based aircraft users park their vehicles in their T-hangars. The projected parking spaces are based upon no vehicles parked in hangars.

TABLE 3M
Automobile Parking Requirements
Marana Regional Airport

			Future Requirements		
	Available	Base Year	Short Term (± 5)	Intermediate Term (± 10)	Long Term (± 20)
Design Hour Itinerant Passengers		45	52	63	95
Based Aircraft		295	350	400	500
GA Parking Spaces	**80**	**154**	**186**	**226**	**333**

SUPPORT FACILITIES

Various facilities that do not logically fall within classifications of airfield, terminal building, or general aviation requirements have been identified for these remaining facilities:

AIRCRAFT RESCUE AND FIREFIGHTING

The requirements for Aircraft Rescue and Firefighting (ARFF) equipment at an airport are determined by whether it is certified as an FAR Part 139 airport. Marana Regional is not a Part 139 airport; therefore, there is no requirement for ARFF facilities.

FUEL STORAGE

Tucson Aeroservice Center (TAC) owns and operates a fuel facility. The TAC facility is equipped with two 12,000-gallon tanks; one holds 100LL Avgas, the other holds Jet A fuel.

Fuel storage is typically based upon maintaining a one month supply of fuel during an average month; however, more frequent deliveries can reduce the fuel storage capacity requirement. Over the past year, Avgas fuel sales have averaged 1.74 gallons per operation. This ratio was utilized to project future Avgas sales. **Table 3N** presents future Avgas storage requirements for the airport based upon a two-week supply during the peak month.

Jet A fuel consumption at Marana Regional Airport currently averages 73.58 gallons per operation. As business jet operations increase, this ratio can be expected to decline. This ratio was utilized to project future Jet A sales. **Table 3N** presents the Jet A fuel storage requirements.

Both of the available Avgas and Jet A fuel storage will drop below the two-week demand in the short term planning horizon.

TABLE 3N
Fuel Storage Requirements
Marana Regional Airport

	Available	Current Need	Short Term (± 5)	Intermediate Term (± 10)	Long Term (± 20)
Design Day Operations		393	516	666	1,072
Two-week Operations		5,495	7,221	9,321	15,012
Two-week Fuel Storage Requirements*					
Avgas (gal.)	12,000	9,323	12,188	15,570	24,814
Jet A (gal.)	12,000	10,108	15,940	27,434	55,228

* Note: Recommended minimum tank size: 12,000 gallons.

SUMMARY

The intent of this chapter has been to outline the facilities required to meet aviation demands projected for Marana Regional Airport through the long term planning horizon. A summary of the airfield, airline terminal, 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.

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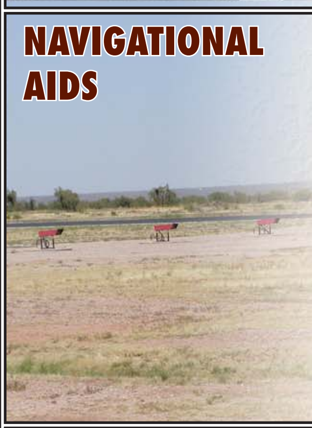
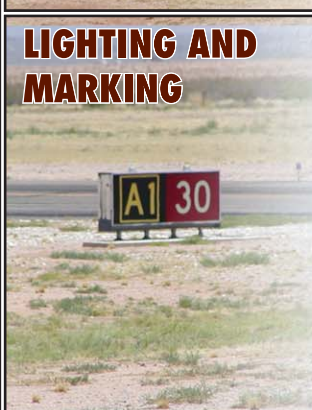
	EXISTING FACILITY	SHORT TERM NEED	LONG TERM NEED
RUNWAYS 	**Runway 12-30** 6,901′ x 100′ 30,000# SWL 60,000# DWL 140,000# DTL ARC C-II **Runway 3-21** 3,893′ x 75′ 20,000# SWL ARC B-II	**Runway 12-30** 7,200′ x 100′ Improve & extend RSA / OFA - Southeast End Acquire Control of RPZs **Runway 3-21** 4,700′ x 75′ Acquire Control of RPZs	**Runway 12-30** Strengthen to 140,000# DWL ARC C-III **Runway 3-21** Same **Potential Parallel Runway** 4,700′ x 75′ 12,500# SWL ARC B-II
TAXIWAYS 	**Runway 12-30** Full Length Parallel 5 Exits - 50′ wide Holding Aprons **Runway 3-21** Full Length Parallel 4 Exits - 35′ wide	**Runway 12-30** Widen Exit Taxilanes to 50′ **Runway 3-21** Holding Aprons	**Runway 12-30** Add: High Speed Exits **Runway 3-21** Same **Potential Parallel Runway** Full Length Parallel 4 Exits - 35′ wide 12,500# SWL Holding Aprons
NAVIGATIONAL AIDS 	AWOS-III **Runway 12-30** PAPI-4 **Runway 3-21** PAPI-2	Contract Airport Traffic Control Tower AWOS-III **Runway 12-30** GPS **Runway 3-21** Same	Same **Runway 12-30** Same **Runway 3-21** GPS **Potential Parallel Runway** PAPI-4 GPS
LIGHTING AND MARKING 	Airport Beacon Segmented Circle MITL Basic Taxiway Marking **Runway 12-30** MIRL, REILS Non-Precision Marking **Runway 3-21** MIRL Basic Marking	Same **Runway 12-30** Same **Runway 3-21** REILS	Same **Runway 12-30** Same **Runway 3-21** Same **Potential Parallel Runway** MIRL, REILS Basic Marking

Exhibit 3E
AIRFIELD REQUIREMENTS

05MP07-3F-10/19/05

AIRCRAFT STORAGE HANGAR REQUIREMENTS

	EXISTING	SHORT TERM NEED	INTERMEDIATE NEED	LONG TERM NEED
Aircraft to be Hangared	252	299	345	439
T-Hangars / Shade Hangars	237	262	293	359
Conventional Hangar Positions	15	37	52	80

HANGAR AREA REQUIREMENTS

	EXISTING	SHORT TERM NEED	INTERMEDIATE NEED	LONG TERM NEED
T-Hangar Area (s.f.)	316,736	301,415	337,160	412,920
Conventional Hangar Storage Area	51,552	169,739	234,173	367,029
Service Hangar Area	28,931	47,115	57,133	77,995
Subtotal Conventional Hangar Area	***397,219***	***518,270***	***628,466***	***857,944***

AIRCRAFT PARKING APRON REQUIREMENTS

	EXISTING	SHORT TERM NEED	INTERMEDIATE NEED	LONG TERM NEED
Transient Ramp Positions	16	44	58	92
Local Ramp Positions	94	51	55	61
Total Ramp Positions	***110***	***95***	***113***	***153***
Total Apron Area (s.y.)	***59,641***	***41,500***	***49,600***	***70,000***

FUEL STORAGE

	EXISTING	SHORT TERM NEED	INTERMEDIATE NEED	LONG TERM NEED
Av Gas (gallons)	12,000	12,188	15,570	24,814
Jet A (gallons)	12,000	15,940	27,434	55,228

TERMINAL SPACE AND VEHICLE PARKING

	EXISTING	SHORT TERM NEED	INTERMEDIATE NEED	LONG TERM NEED
General Aviation Parking (spaces)	80	186	226	333
Terminal Space (s.f.)	9,480	6,586	8,389	13,871

Exhibit 3F
GENERAL AVIATION AND
SUPPORT FACILITY REQUIREMENTS

Chapter Four

DEVELOPMENT ALTERNATIVES

CHAPTER FOUR

Development Alternatives

Prior to defining the development program for Marana Regional 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 that are needed to accommodate projected demand and meet the program requirements as defined in Chapter Three, Airport Facility Requirements.

In this chapter, a series of airport development scenarios are considered for the airport. In each of these scenarios, different physical facility layouts are presented for the purposes of evaluation. The ultimate goal is to develop the underlying rationale that supports the final master plan recommendations. Through this process, an evaluation of the highest and best uses of airport property is made while considering local goals, physical constraints, and federal airport design standards, where appropriate.

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. The master planning process attempts to develop a viable concept for meeting the needs caused by projected demands through the planning period.

The alternatives have been developed to meet the overall program objectives for the airport in a balanced manner. Through coordination with the Planning Advisory Committee (PAC) and the Town of Marana, the alternatives

(or combination thereof) will be refined and modified as necessary to produce the recommended development program. Therefore, the alternatives presented in this chapter can be considered a beginning point in the development of the recommended master plan development program, and input will be necessary to define the resultant program.

REVIEW OF PREVIOUS MASTER PLAN

The previous master plan for Marana Regional Airport was completed in 1999 when the airport was still owned and operated by Pima County. The 1999 Avra Valley Airport Master Plan considered and discussed a variety of potential airfield development schemes to upgrade the primary runway for corporate activity, to provide a parallel runway for capacity, and to provide a longer crosswind runway. Several alternative configurations were considered for the development of an airfield system that would meet these criteria. The recommended and adopted plan for the airfield included the extension of the primary runway to the southeast along with improved safety areas, the development of a parallel runway to the southwest of the primary runway, and an extension of the crosswind runway to the southwest. **Exhibit 4A** depicts the planning scheme as outlined in the 1999 Avra Valley Master Plan and Airport Layout Plan (ALP).

To accommodate the future airfield configuration, Avra Valley Road was planned to be relocated. This has since been included in the Town of Marana's comprehensive and transportation planning. Planning also now includes an alignment for Tangerine Road which would allow access to a future terminal and industrial park on the northeast side of the airfield. A land acquisition program is nearing completion that reserves the area for the future parallel runway and the upgrade of the primary runway.

The 1999 Master Plan called for continued development of the existing terminal area along the Runway 12L-30R flight line to the southeast of the existing T-hangars. Additional development in the existing terminal area was planned to take place to the west along the parallel runway's flightline. Since the completion of that plan, a new development containing eight T-hangars has been constructed north of the crosswind runway near the west end of Runway 3.

This development affects the previously planned location for the parallel runway. The westernmost T-hangars are located inside the Runway Visibility Zone (RVZ) required between the future parallel runway and the crosswind runway. An RVZ is an area intended to provide for line-of sight between aircraft using intersecting runways. The purpose of the RVZ is to reduce the potential for collisions between aircraft using the intersecting runways. The RVZ clearing standards require this zone to be free of objects that could prevent an adequate view of the intersecting runway. The RVZ is an area formed by imaginary lines connecting the crosswind runway's visibility points. These visibility

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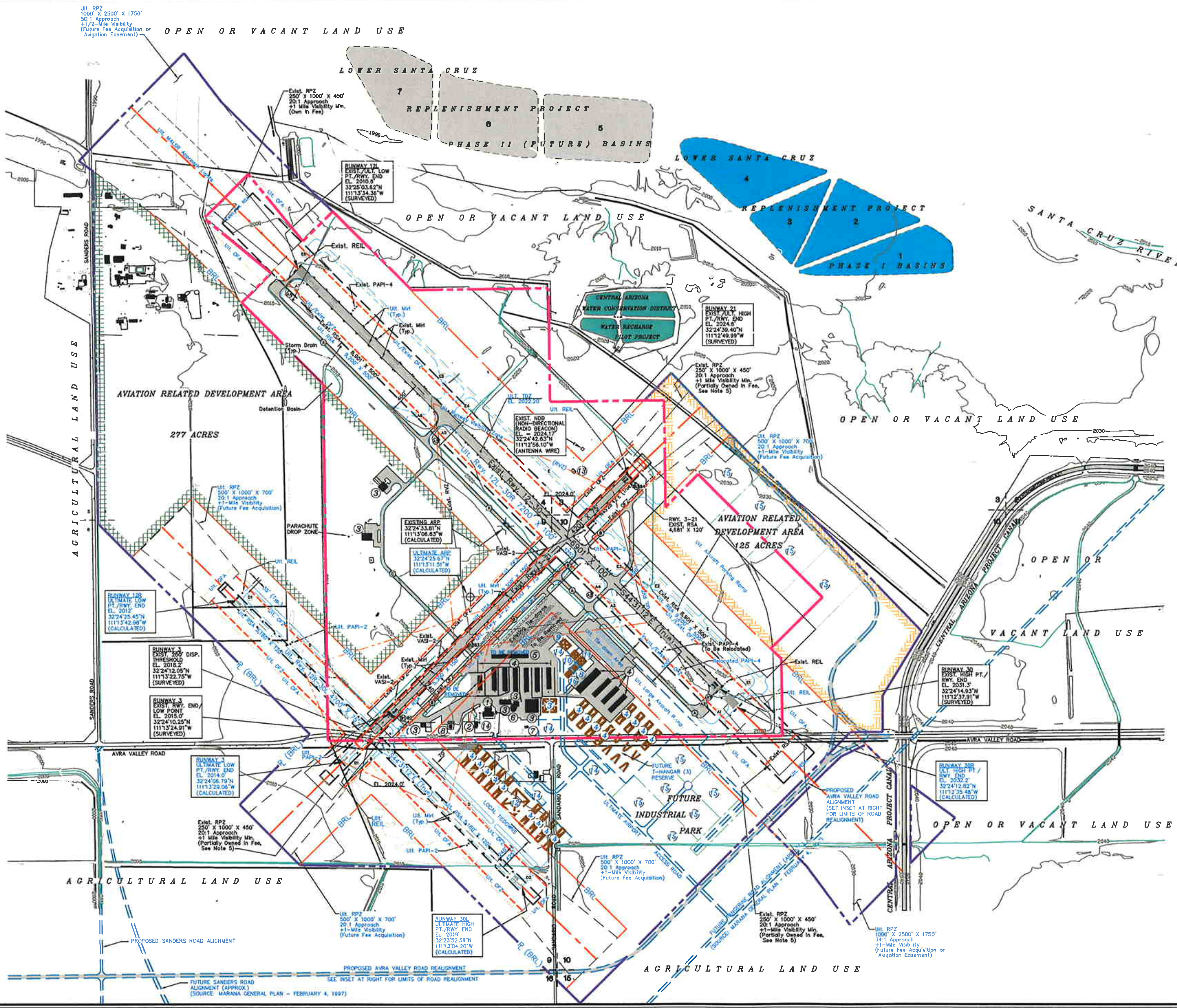

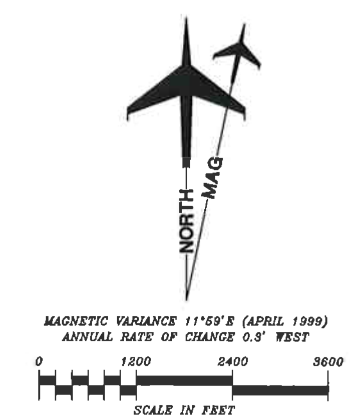

GENERAL NOTES:

1. This drawing is a composite based on aerial photography as flown on August 28, 1997 and May 11, 1998, and the previously FAA approved AIRPORT LAYOUT PLAN dated February 18, 1989 as well as additional drawings and information supplied by various government agencies. All information should be field verified prior to final engineering or construction.
2. Depiction of features and objects, including related elevations within the runway protection zones are depicted on the APPROACH PROFILES AND RUNWAY PROTECTION ZONES PLANS.
3. Details concerning terminal improvements are depicted on the TERMINAL AREA PLAN.
4. Building Restriction Lines (BRL) are established to provide Part 77 clearance for a 35-foot object at the BRL. The BRL may be reduced to the limits of the Runway Object Free Area and Runway Protection Zone.
5. A review of the Pima County Recorder Office Property Records revealed no existing avigation easement records for those portions of the existing RPZs for Runways 3-21 and 30 which extend beyond the existing Avra Valley Airport property boundary.

Marana Regional Airport

Exhibit 4A
1999 AIRPORT LAYOUT PLAN

points are generally the midpoint between each runway end and the intersection of the two runway centerlines. A diamond shaped area is formed by connecting the points. FAA Advisory Circular 150/5300-13, *Airport Design* states, "Terrain needs to be graded and permanent objects need to be designed or sighted so that there is an unobstructed line of sight from any point five feet above an intersecting centerline within the runway visibility zone."

The previous master plan included recommendations to remove encroachments in the RVZ between the primary runway and the parallel runway. Portions of the aircraft tie-down area located north of the T-hangars and south of the Runway 12-30 and Runway 3-21 intersection were planned for removal or relocation.

Another deviation from the previous master plan has been the proposed development of a crosswind runway extension to the northeast. The environmental assessment process is nearing completion for a 500-foot extension of Runway 3-21 to the northeast.

DO-NOTHING ALTERNATIVE

The "do-nothing" alternative essentially considers keeping the airport in its present condition and not providing for any type of improvement to the existing facilities. The primary result of this alternative would be the inability of the airport to satisfy the projected aviation demands of the airport service area.

The Marana area continues to experience dynamic socioeconomic growth. Forecasts approved by the Arizona Department of Economic Security indicate that strong growth will likely continue throughout and beyond the long range planning horizon. This reason, combined with favorable forecasts for the general aviation industry and Marana Regional Airport's role as a reliever airport, indicate a future need for improved facilities. Improvements recommended in the previous chapter include a longer runway, improvements to the taxiway system, improvement of navigational aids, supplementary apron area, the construction of additional conventional and T-hangars, and the construction of a new airport terminal facility. Without these facilities, regular users of the airport will be constrained from taking maximum advantage of the airport's air transportation capabilities.

Marana Regional Airport is one of two general aviation reliever airports in the Tucson metropolitan area. Although the Tucson International Airport location provides for a significant amount of general aviation use, its primary role is to accommodate commercial aviation. General aviation travelers often prefer utilizing reliever type airports due to less congestion and ease of use.

Moreover, if demand continues to grow, it will be critical that Marana Regional Airport accommodate a portion of this growth to ensure that adequate capacity is available for the future at Tucson International Airport. General aviation airports not only provide convenience to general aviation users, but also help to avoid a major concentration of smaller general aviation aircraft and large commercial aircraft at a single airport.

An overall impact of this alternative will likely be the inability to attract certain businesses and industries seeking locations with adequate and convenient aviation facilities. Marana Regional Airport has much to offer in terms of airside and landside facilities. Without regular maintenance and additional improvements, existing and potential users and business for Marana Regional Airport could be lost.

To propose no further development at Marana Regional Airport would adversely affect the long term viability of the airport, resulting in negative economic affects on the Tucson metropolitan airport system and the Town of Marana. Therefore, the "do-nothing" alternative is not considered as prudent or feasible.

TRANSFER AVIATION SERVICES

The alternative of shifting aviation services to another existing airport was found even less desirable due to the lack of available airports having the facilities or the potential that Marana Regional Airport provides the Tucson metropolitan area. In 2004, Marana Regional Airport based 295 aircraft and experienced 101,400 operations.

There are only two other publicly-owned general aviation airports in the region which could potentially serve the demand met by Marana Regional Airport: Tucson International Airport (TIA) and Ryan Airfield. The primary role of TIA is to serve the commercial service needs of the region. It can accommodate some growth in general aviation activity and has been planned accordingly. The long range capacity of TIA, however, can best be protected if the designated reliever airports absorb a share of the increasing general aviation activity.

Ryan Airfield provides the largest portion of general aviation relief in the Tucson region with over 158,000 operations in 2004. The airfield is developing rapidly serving demand on the southwest side of Tucson. In addition to the considerations of capacity previously described, the airfield's location does not provide convenient access to general aviation users in the Marana area and northwest Tucson.

Other public airports are too far away to adequately serve the needs of the northwest Tucson general aviation users. Even if they were convenient enough, they would require a significant upgrade in facilities to meet those currently available at Marana Regional Airport.

To impose the demands now served by Marana Regional Airport on TIA and Ryan Airfield would be an undue burden that could not be absorbed within a reasonable period of time. The locations of Ryan Airfield in the southwest portion of the metropolitan area, TIA in the southeast, and Marana Regional Airport in the northwest provides a highly desirable balance in access to general aviation services. If the services and facilities available at Marana Regional Airport were shifted to another airport, this balance would be upset. If Marana Regional Airport were to be abandoned, essentially one-third of the aviation capabilities and convenience in the region would be lost. This closure would reduce the ability of the region to accommodate future growth.

Additionally, the flexibility so important in aviation planning would all but be eliminated. Ultimately, additional airports would need to be developed to provide necessary aviation capacity. Therefore, transferring services from Marana Regional Airport to another airport would not only damage the aviation system, but would also hinder economic development in the region.

DEVELOPMENT OF A NEW AIRPORT

The alternative of developing an entirely new airport facility in the Tucson metropolitan area to meet projected aviation demands was also considered. Similarly, this alternative was found to be unacceptable primarily due to economic and environmental considerations. Land acquisition, site preparation and the construction of an entirely new airport near an urbanized area can be a very difficult and costly action. In addition, closing Marana Regional Airport would mean the loss of a substantial investment in a transportation facility that can still be utilized and readily expanded. In a situation where public funds are limited, the replacement of a functional and expandable airport facility would represent an unjustifiable loss of a significant public investment.

From the social, political, and environmental standpoints, the commitment of a new large land area must also be considered. There has been significant opposition in the past to attempts to develop new airports in Pima County. Furthermore, the development of a new airport similar to Marana Regional Airport would likely take a minimum of ten years to become a reality. The potential exists for significant environmental impacts associated with disturbing a large land area when developing a new airport site. In addition, the location of the new site would likely be less convenient than Marana Regional Airport.

Overall, transferring service to an existing airport in the region or to an entirely new facility are unreasonable alternatives that should not be pursued further at this time. Marana Regional Airport is fully capable of accommodating its share of the long range aviation demands of the area and should be developed in response to those demands. The airport has the potential to continue to develop as a quality general aviation facility that could greatly enhance the economic development of the metropolitan area.

KEY PLANNING ISSUES

A commitment to remain at the existing site and develop facilities sufficient to meet the long range aviation demands entails the following:

! Provide sufficient airside and landside capacity to meet the long range planning horizon level demand of the area.

! Develop the airport in accordance with the currently established FAA design criteria.

Analyses in the earlier chapters of this master plan indicated that several improvements will be necessary to ensure the airport's capability to serve the needs of the Marana region well into the future. The primary airfield focus will be on providing adequate runway length for general aviation business needs, as well as preserving the long range viability of the facility. On the landside, primary issues focus on improvements to the terminal facilities which would serve the needs of general aviation in a manner that is beneficial to overall community development. **Exhibit 4B** outlines key considerations for this alternative analysis.

AIRSIDE CONSIDERATIONS

Carrying over from the previous master plan are many of the same airfield length issues. The reservation of space for a parallel runway for capacity remains as a means to protect the long term viability of the airport. These two issues were addressed in the previous master plan, but have yet to be implemented. The length requirement for Runway 12L-30R is 7,200 feet, and 4,700 feet for both Runway 3-21 and Runway 12R-30L. In addition, each runway improvement must allow for adequate runway safety area.

To go along with the future viability will be planning for taxiway access to the future developable airport property. High-speed exit taxiways will also be considered for the primary runway to enhance both aircraft safety and traffic flow.

The airport will need to continue to adapt to changes in navigational systems associated with aviation. One major ongoing change is the transformation to the global positioning system (GPS) as the primary navigation system for the FAA. While the transformation will take a longer period than originally scheduled, and may not be exactly as originally envisioned, it is still in the plans. GPS remains a key consideration for improving approach minimums at Marana Regional Airport. From a master planning standpoint, the objective will be to continue to plan for GPS implementation, but to also ensure that other more traditional systems are still in the plan as backups wherever possible.

Other airside considerations include planning for an airport traffic control tower to help facilitate the increasing traffic flow forecasted. Also to be considered is potential acquisition of other properties that may be strategic to the long range viability of the airport.

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AIRSIDE CONSIDERATIONS

- Upgrade of the primary runway to serve C-II, and ultimately, C-III aircraft
- Extend Runway 3-21 to 4,700 feet
- Construction of parallel runway
- Provide additional approaches utilizing Global Positioning System (GPS) technology
- Taxiway circulation and high speed exits
- Addition of a Airport Traffic Control Tower
- Protection of runway approaches

LANDSIDE CONSIDERATIONS

- Construct new terminal facility
- Locations for fixed base operator development
- Locations for various types of hangar development
- Locations for corporate development
- Apron expansion
- Vehicle parking locations
- Road circulation

Exhibit 4B
INITIAL DEVELOPMENT CONSIDERATIONS

LANDSIDE CONSIDERATIONS

It was determined that a terminal building is needed to facilitate general aviation needs. A terminal facility serves several functions at an airport. These functions include providing passenger waiting areas, a pilot's lounge and flight planning, restrooms, concessions, administrative and management offices, storage, and various other needs. At present, there is not a dedicated terminal facility at Marana Regional Airport; however, as noted in Chapter One, a new terminal facility is in the conceptual planning and design stage.

The orderly development of the landside area is a critical element of an airport's capabilities, but it is typically the most difficult to control. Many general aviation airports have been developed without proper foresight with regards to the functional elements to be served, often taking the least expensive short term solution. A development approach that picks the path of least resistance can often turn out to be an impediment to the strategic long term growth and viability of the airport. Allowing operators and tenants to develop wherever they please without regard to a functional plan can result in a haphazard array of buildings and small ramp areas, which can eventually preclude the most efficient use of valuable space along the flight line.

General aviation hangar space is in short supply at Marana Regional Airport, so the master plan must consider places to locate conventional, corporate, and T-hangars. Fixed base operator (FBO) development with growing general aviation traffic should also be considered. Auto parking in the general aviation area will need to be planned in concert with hangar development.

As Marana's economy develops more in the coming years, some businesses may desire to locate near the airport for more direct access to air transportation. To accommodate these types of businesses, locations for corporate development have been analyzed and will be shown in each alternative.

Parking areas will become an issue as activities at the airport rise. Parking space will become even more limited if the long term horizon is realized. Areas for auto parking development need to be addressed with each alternative.

The following alternatives discuss options for development of the airport.

AIRPORT DEVELOPMENT ALTERNATIVES

ALTERNATIVE 1

As presented on **Exhibit 4C, Alternative 1** most closely resembles the previous master plan. This alternative would extend primary Runway 12-30 and its parallel Taxiway A 299 feet to the southeast to achieve the desired 7,200 foot length. In addition to the runway extension, a full 1,000-foot runway safety area would be extended beyond the end of the pavement. A key to this development remains the relocation of Avra Valley Road.

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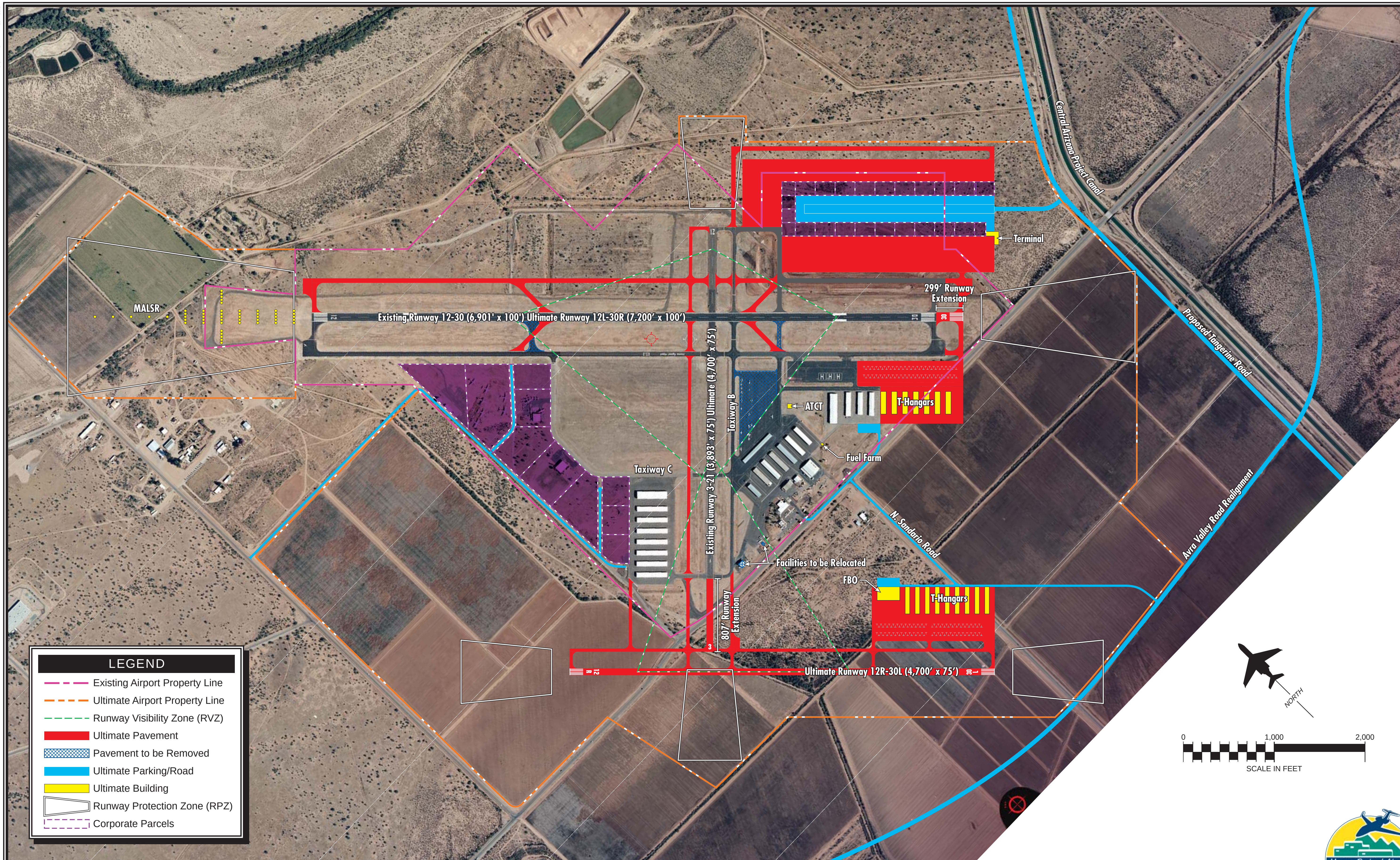

Exhibit 4C
AIRPORT DEVELOPMENT ALTERNATIVE 1

With the safety area improvements, Runway 12-30 meets the safety design standards of the critical airport reference code (ARC C-III). A full-length parallel taxiway is planned for the northeast side of the runway to provide access to the terminal facilities to be developed northeast of the Runway 30R threshold. Four high-speed exit taxiways serving Runway 12L-30R are shown on this alternative exhibit.

Alternative 1 would achieve the desired crosswind runway length by extending Runway 3-21 and its parallel Taxiway B 807 feet to the southwest. The runway would be maintained at ARC B-II specifications.

The parallel runway under **Alternative 1** would be located approximately 3,950 feet southwest of the centerline of the existing Runway 12-30. Parallel Runway 12R-30L would be designed to ARC B-II specifications with a length of 4,700 feet and a width of 75 feet. Runway 12R-30L would be served by a full-length parallel taxiway which would intersect with the ultimate Runway 3 end. Both the runway and taxiway would be designed to a 30,000 pound dual wheel loading (DWL) pavement strength rating.

The parallel runway location is further from the centerline of the existing runway than previously planned to ensure that the RVZ can be maintained without moving the T-hangars located north of Runway 3-21. In addition, the runway must be shifted slightly further to the southeast than previously planned for the same reasons.

This alternative shows additional T-hangars and apron areas would be developed southeast of the transport category apron. The area will have ground transportation access from the west.

The area northeast of the Runway 30L threshold would be reserved for FBO and T-hangar development along with a general aviation apron. This would be the primary location for T-hangar development, and would be accessible via a road extending from the relocated Avra Valley Road alignment.

The terminal building and corporate aircraft center would be developed in the quadrant east of the primary runway and south of the crosswind runway. The terminal building is planned at the southeastern edge of the apron to provide access and visibility from Tangerine Road for the restaurant which would be located in the terminal building. Several conventional hangar facilities could be built along the U-shaped terminal area in the designated corporate parcels. A large apron area would be available for larger business jets and turboprops. This terminal area would be accessible via a new access road constructed from the ultimate Tangerine Road alignment.

The north side of the airport between the parallel runways would be reserved for corporate parcels. These parcels, ranging in size from three to over nine acres could be leased to develop aviation-related businesses requiring large hangars and/or ramp space. These parcels would access the runway system via Taxiway C. A new access road extending from the North Sanders Road would serve these corporate parcels.

Advantages: Alternative A provides distinct separations between corporate and general aviation activity functions on the airport. Corporate aircraft activity would be concentrated on the east side of the airport. This would provide direct access to the primary runway and some separation from the other general aviation uses. This can be attractive for safety and security purposes.

Aviation-related business uses have the potential to develop on the north side parcels. This can focus on specialty uses such as those currently located in this area.

Small general aviation uses would be focused between the parallel runways and primarily in the south general aviation development area. Small general aviation aircraft will continue to dominate the mix on the airport. It is also the type of aircraft for which the crosswind runway and parallel runway are specifically designed. The center core area provides small general aviation with the best access to all three runways.

Disadvantages: While separation of function is desirable, this alternative also requires the development of infrastructure in three separate quadrants. In addition, property acquisitions are higher than with the other two alternatives to be discussed below.

ALTERNATIVE 2

Alternative 2, as depicted on **Exhibit 4D**, proposes the same Runway 12-30 extension as Alternative 1; however, the other runway improvements create a distinctly different airfield concept.

The ultimate parallel runway would be located 700 feet northeast of the existing Runway 12-30 centerline. This would result in a designation of Runway 12L-30R for the parallel runway. As in Alternative 1, the parallel runway would be designed to ARC B-II standards with a length of 4,700 feet and a width of 75 feet. The parallel taxiways would be developed between the two runways as well as to the east of the proposed runway. The taxiway between the runway would extend the full length of the primary runway, while the outboard taxiway would extend the length of the parallel runway. This would serve landside apron and hangar development proposed to the east of the runway system.

Crosswind Runway 3-21 would be extended 807 feet to the northeast to achieve the ultimate length requirement of 4,700 feet. A full-length parallel taxiway would be developed along the north side of this runway for access from the existing T-hangars and the ultimate terminal area that would be located in the western quadrant.

The terminal area is designed in the same manner as in Alternative 1 with corporate parcels and hangar devel-

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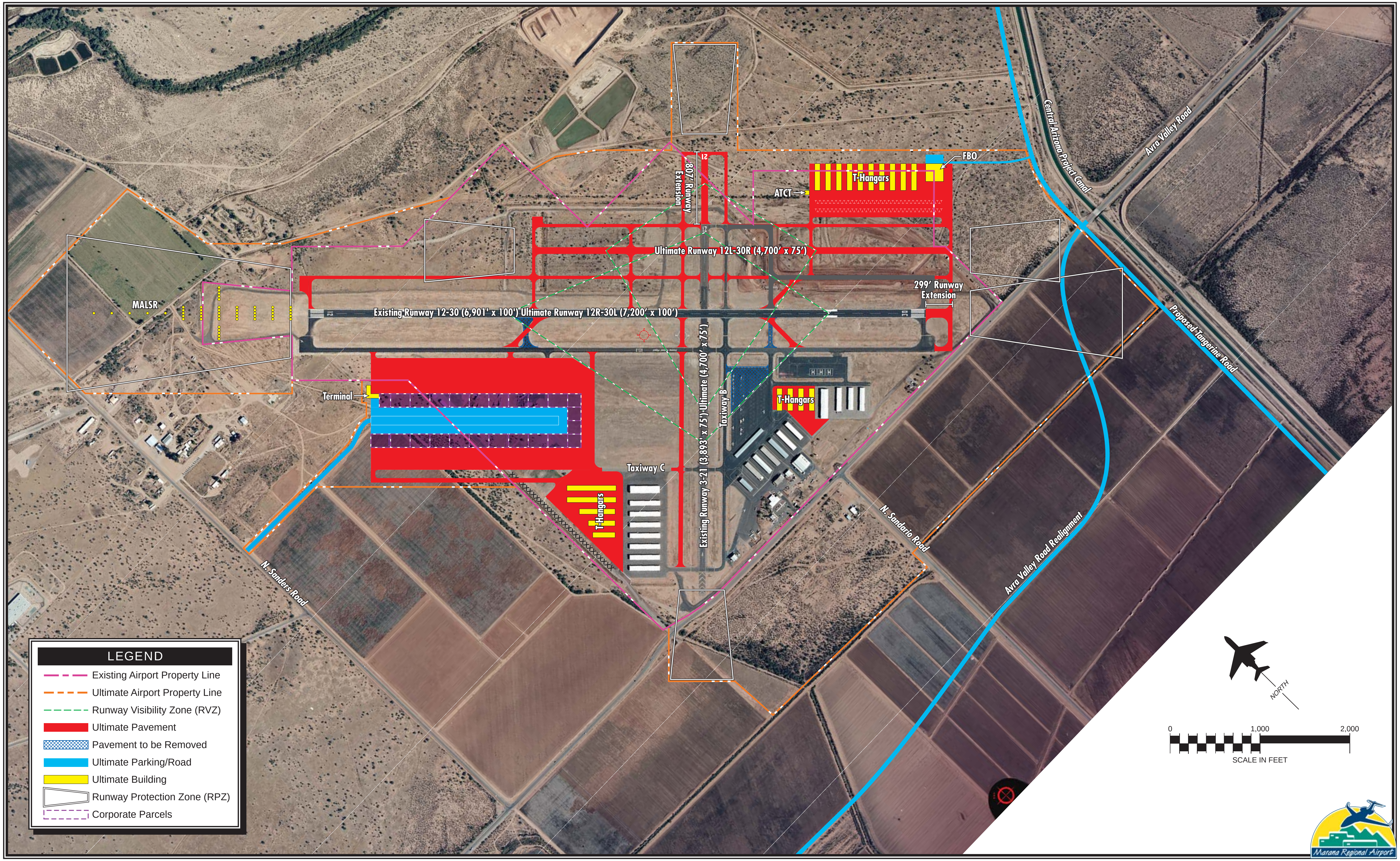

Exhibit 4D
AIRPORT DEVELOPMENT ALTERNATIVE 2

opment areas, but would be located at the west end of the airport. This is necessary in **Alternative 2** so that the corporate aircraft do not have to cross the parallel runway to use the primary runway. The terminal building would be located at the northwest corner of the terminal area and would be accessible via a new access road constructed off North Sanders Road.

This alternative plans additional fill-in T-hangar development adjacent to the existing general aviation apron, north of the west T-hangars. T-hangars are also planned in the east quadrant, adjacent to the parallel runway. These T-hangars would be adjacent to apron and FBO development that would cater to small general aviation uses that could take advantage of proximity to the parallel runway. This area would be accessible via a new access road constructed off the ultimate Tangerine Road alignment.

Advantages: The parallel runway configuration of this alternative provides for a more compact airfield, thus reducing the land requirements. The parallel runway on the northeast side also eliminates the potential runway visibility zone problem with the west T-hangars. This alternative also takes advantage of the future plans for North Sanders Road as a major arterial with access north into the town center as well as to the interstate.

Disadvantages: This alternative would segregate small general aviation uses into three different areas of the airport. The corporate uses would share the west quadrant with small general aviation users in the T-hangars. If corporate access from Avra Valley Road is more desirable, this alternative is at a disadvantage because users in the east must cross the parallel runway to get to the primary runway.

ALTERNATIVE 3

As presented in **Exhibit 4E, Alternative 3** proposes extending Runway 12-30 to the northwest, in the opposite direction from the previous two alternatives. Avra Valley Road would still need to be relocated to provide for the 1,000-foot extended runway safety area.

Another major difference in this alternative is the relocation of the crosswind runway to the northwest. This runway would have the same designation as the existing crosswind runway (Runway 3-21) and be designed to ARC B-II standards with a length of 4,700 feet and a width of 75 feet. The ultimate crosswind runway would be served by a full-length parallel taxiway located southeast of the runway centerline. Relocating the crosswind runway to the north allows for a large, contiguous terminal area in core between the two runways. It also allows for the parallel runway to be developed near its previously planned alignment without impacting the runway visibility zone. In addition, the existing ramps previously recommended for removal due to the RVZ could remain.

The parallel Runway 12R-30L would be constructed 3,400 feet southwest of

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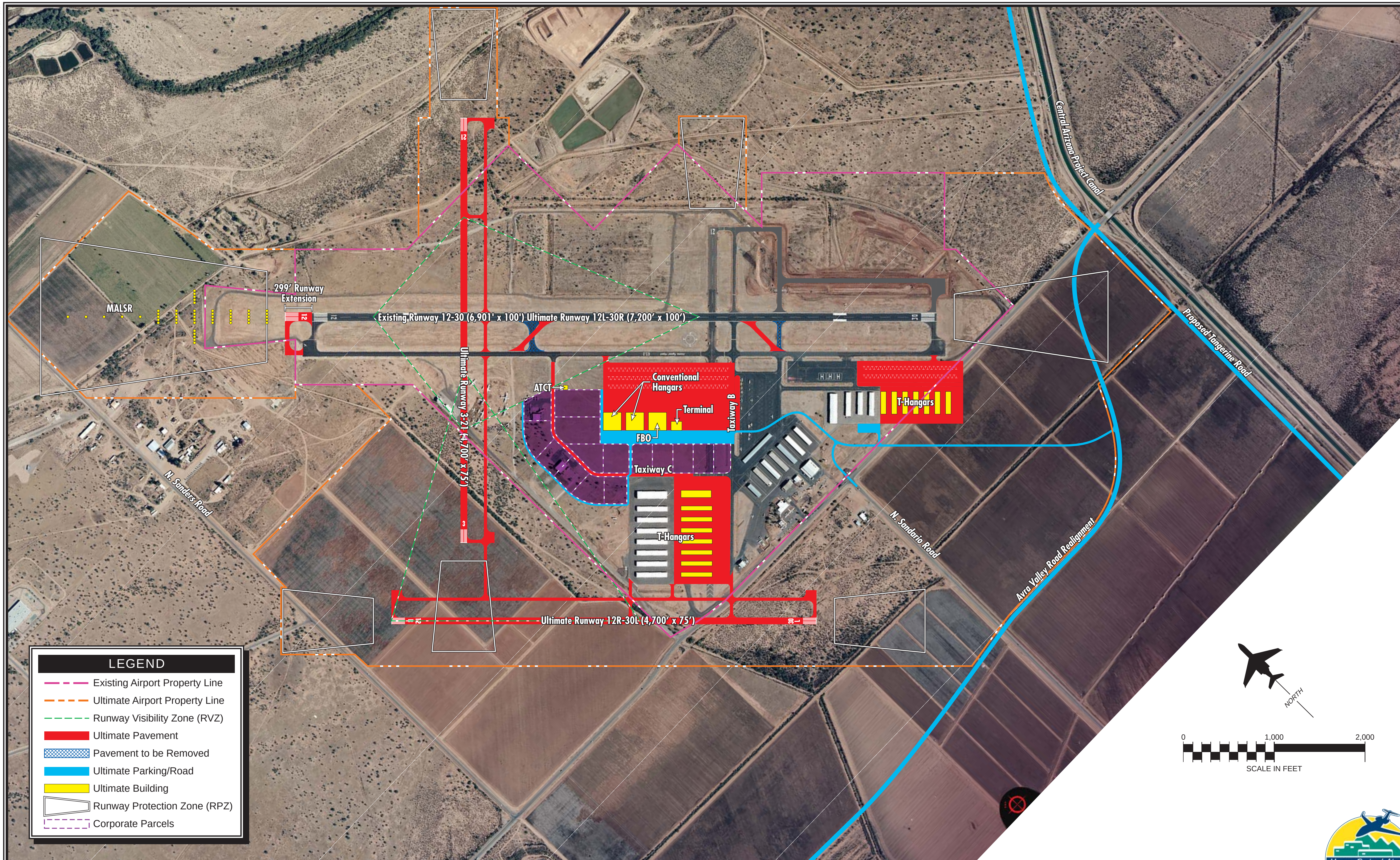

Exhibit 4E
AIRPORT DEVELOPMENT ALTERNATIVE 3

Runway 12-30. The parallel runway would be served by a full-length parallel taxiway along its east side which would provide access to the terminal area.

The terminal area would be located in the center core of the airport, north of the existing general aviation apron. FBO and conventional hangar facilities would also be located adjacent to a large, central apron near midfield of the primary runway. Corporate parcels would immediately surround the north and west sides of the main terminal area. T-hangars would be located to the west and south. The centralized terminal/general aviation area would be accessible from the southeast from both the relocated Avra Valley Road and North Sandario Road.

Advantages: This alternative provides centralized terminal facilities all within the area between the two runways. This provides some efficiencies for taxiways, utilities, and other landside infrastructure. Even though the crosswind runway is relocated, there is less taxiway development with this alternative.

Disadvantages: With the relocation of the crosswind runway, this alternative is distinctly different from previous planning and would affect many plans at or near design. The terminal building would be located in the center core and would not be visible from any of the surrounding arterial roadways. Constructing two new runways as opposed to one proposed in the previous alternatives may be inherently more expensive and more time consuming in the construction process. The crosswind runway extends further to the east than in other alternatives and may have impacts on the drainage and recharge basins east of the airport.

SUMMARY

The process utilized in assessing the airfield and landside development alternatives involved consideration of short and long term needs as well as future growth potential. Current airport design standards were considered in every scenario. Safety, both in the air and on the ground, was given high priority in the analyses.

The recommended development concept for Marana Regional Airport must represent a means by which the airport can grow in a balanced manner to accommodate the planning horizons. In addition, the plan must provide the flexibility to meet activity growth beyond the long range planning horizon.

Through further meetings and discussions with the Planning Advisory Committee, as well as the general aviation users and the public, a recommended concept will evolve. The plan will represent a means by which the airport can continue to effectively serve general aviation needs within the overall operation and development of the airport. This will then be developed into a plan for maintaining and improving Marana Regional Airport.

Chapter Five

AIRPORT PLANS

Airport Plans

The planning process for the Marana Regional Airport Master Plan has included 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 draft phase reports (representing the first four chapters of the Master Plan) to the Planning Advisory Committee (PAC) and the Town of Marana. A plan for the use of Marana Regional 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 Marana Regional Airport.

AIRFIELD PLAN

The airfield plan for Marana Regional Airport focuses on meeting Federal Aviation Administration (FAA) design and safety standards, lengthening primary Runway 12L-30R to the southeast, lengthening crosswind runway 3-21 to the northeast and southwest, constructing a parallel runway with a full-length parallel taxiway, constructing full-length parallel taxiways to the northeast of Runway 12L-30R and to the northwest of Runway 3-21, and constructing additional exit taxiways for Runways 12L-30R and 3-21. **Exhibit 5A** graphically depicts the proposed airfield improvements. The following text summarizes the elements of the airfield plan.

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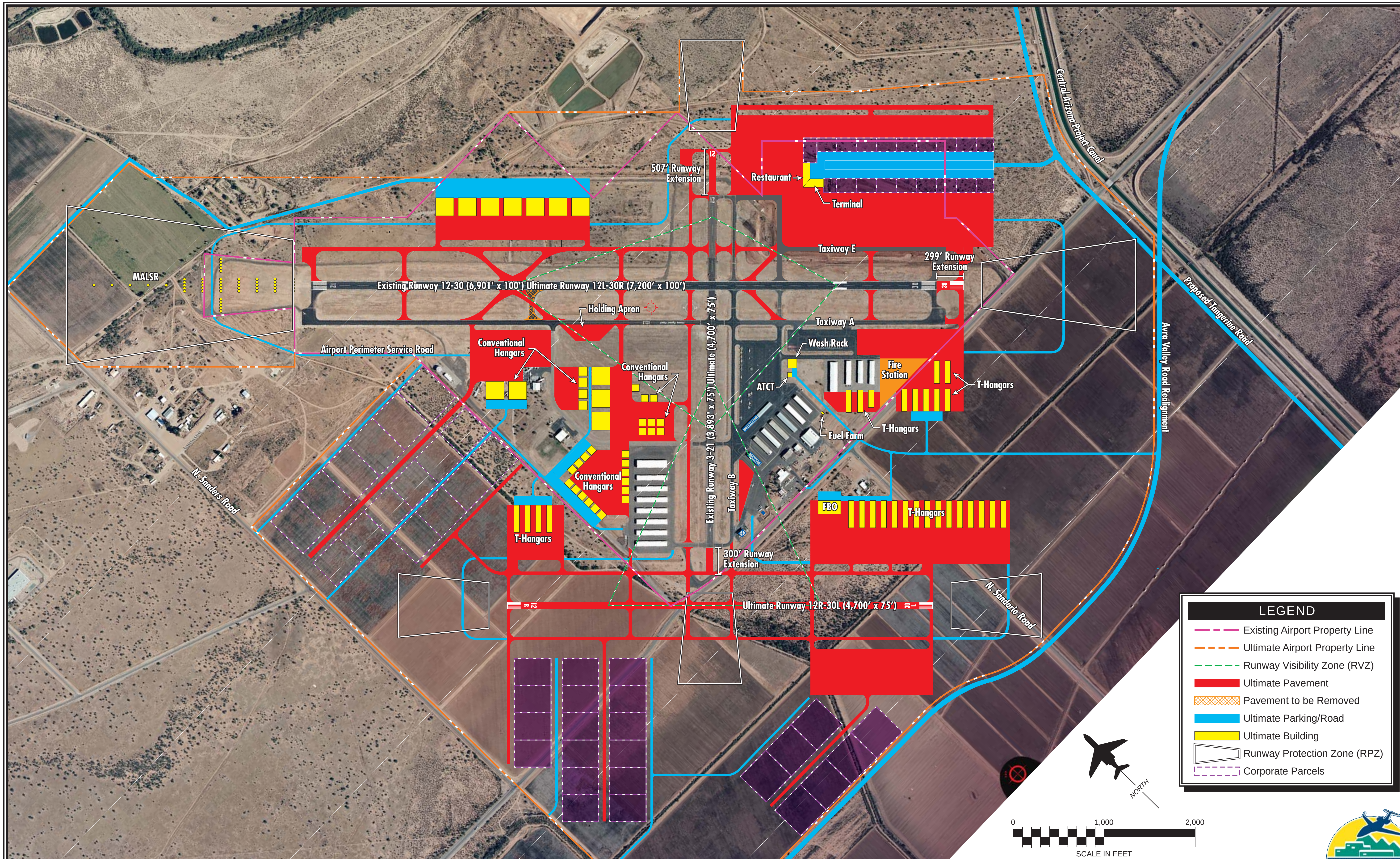

Exhibit 5A
MASTER PLAN CONCEPT

AIRFIELD DESIGN STANDARDS

The FAA has established a variety of design criterion to define the physical dimensions of runways and taxiways, and the surrounding imaginary surfaces that protect the safe operation of aircraft at the airport. FAA design standards also define the separation criteria for the placement of landside facilities. As discussed previously in Chapter Three, FAA design criteria are a function of the critical design aircraft's (the most demanding aircraft or "family" of aircraft which will conduct 500 or more operations [take-offs and landings] per year at the airport) wingspan and approach speed, and in some cases, the runway approach visibility minimums. The Federal Aviation Administration (FAA) has established the Airport Reference Code (ARC) to relate these factors to airfield design standards.

Marana Regional Airport is currently used by a wide variety of aircraft, ranging from general aviation business jet aircraft to general aviation recreational aircraft. These aircraft range from ARC A-I to ARC D-I and D-II on occasion. A wide range of transient business aircraft operate at the airport. These business aircraft generally fall within ARC C-II and ARC C-III. The airport also has the potential to serve larger propeller aircraft, such as the Lockheed C-130 or C-54 used in aerial firefighting as well as skydiving. These aircraft fall within ARC B-III.

Assigning ARC C-III to the ultimate design of airfield facilities at Marana Regional Airport provides for the full range of corporate aircraft, including the Bombardier Global Express, Gulfstream V, and the Boeing Business Jet.

As the primary runway, Runway 12L-30R and its associated taxiways should be planned to ARC C-III. To meet crosswind requirements, ARC B-II design standards will be applied to the design and construction of Runway 3-21. The purpose of the future parallel Runway 12R-30L will be to provide capacity relief to the primary runway and to separate business jet aircraft from the smaller general aviation single-engine piston aircraft. Therefore, Runway 12R-30L is planned to ARC B-II design standards. **Table 5A** summarizes the ARC C-III and B-II airfield safety and facility dimensions to be applied to Marana Regional Airport planning and design.

AIRFIELD DEVELOPMENT

The airfield plan for Marana Regional Airport provides for the airport to fully comply with ARC C-III design standards on Runway 12L-30R, and ARC B-II design standards on Runways 3-21 and 12R-30L. Primary Runway 12L-30R would be extended 299 feet to the southeast. At 7,200 feet, Runway 12L-30R would be able to better serve the business and corporate users of the airport.

Crosswind Runway 3-21 is planned to be extended a total of 807 feet in two phases of construction. The first phase would extend the Runway 21 end 507 feet to the northeast. A second phase would extend the Runway 3 end 300 feet to the southwest.

Fee simple acquisition of a 244-acre parcel north of Avra Valley Road and a 548-acre parcel south of Avra Valley Road are planned to accommodate the Runway 12L-30R extension, and the construction of parallel runway 12R-30L. The 507-foot Runway 3-21 extension to the northeast will require the acquisition of 19 acres northeast of the runway. Two parcels totaling 110-acres northeast of Runway 12L-30R are planned for acquisition to provide for the expansion of the terminal area, the construction of the airport terminal access road, and for other future landside developments. An additional 129-acre parcel would be acquired to allow for the ultimate runway safety area (RSA), object free area (OFA), runway protection zone (RPZ), and the medium intensity approach lighting system with runway alignment indicator lighting (MALSR) northwest of the Runway 12L end.

TABLE 5A
Planned Airfield Safety and Facility Dimensions (in feet)

	Runway 12L-30R		**Runway 3-21 & 12R-30L**
Airport Reference Code (ARC) **Approach Visibility Minimums**	**C-III** **½-Mile**		**B-II** **One-mile**
Runway			
Width	100		75
Length	7,200		4,700
Runway Safety Area (RSA)			
Width	500		150
Length Beyond Runway End	1,000		300
Object Free Area (OFA)			
Width	800		500
Length Beyond Runway End	1,000		300
Obstacle Free Zone (OFZ)			
Width	400		400
Length Beyond Runway End	200		200
Runway Centerline To:			
Hold Line	250		200
Parallel Taxiway Centerline	400		240
Edge of Aircraft Parking	500		250
Runway Protection Zone (RPZ)	**12L**	**30R**	
Inner Width	1,000	500	500
Outer Width	1,750	1,010	700
Length	2,500	1,700	1,000
Approach Obstacle Clearance	50:1	34:1	20:1
Taxiways			
Width	50		35
Safety Area Width	118		79
Object Free Area Width	186		131
Taxiway Centerline To:			
Parallel Taxiway/Taxilane	152		105
Fixed or Moveable Object	93		65.5
Taxilanes			
Taxilane Centerline To:			
Parallel Taxilane Centerline	140		97
Fixed or Moveable Object	81		57.5
Taxilane Object Free Area	162		115

Source: FAA Advisory Circular 150/5300-13, *Airport Design*, Change 7, FAR Part 77, *Objects Affecting Navigable Airspace*, FAA Advisory Circular 150/5340-1F, *Marking Of Paved Areas On Airports*

The plan includes the development of a full-length parallel taxiway northeast of primary Runway 12L-30R. A full-length parallel taxiway northwest of crosswind Runway 3-21 is also planned. This taxiway would provide access to the crosswind runway for the west side of the airport. Taxiway B will also be extended from the ultimate Runway 21 end to parallel Runway 12R-30L.

Twelve additional exit taxiways for primary Runway 12L-30R are included in the plan to reduce runway occupancy time. Two exit taxiways are planned to be located between Taxiways A1 and A2. This taxiway is located approximately 1,000 feet from the ultimate Runway 30R threshold. Two exit taxiways are planned to be located between taxiways A3 and A4, approximately 1,000 feet from the Runway 12L threshold. Two exit taxiways are planned between Runway 3-21 and Taxiway A3 to allow aircraft to vacate Runway 12L-30R before they reach Runway 3-21 from the northeast. High-speed exit taxiways are planned 5,000 feet from each end of the primary Runway 12L-30R. An additional two high-speed exit taxiways are planned to be located approximately 2,300 feet from the Runway 12L end to allow incoming smaller aircraft to Runway 12L to vacate the runway quicker. A holding apron is planned for Taxiway A west of Runway 3-21. This will allow taxiing aircraft to pull to the side and allow aircraft taxiing in the opposite direction to pass, reducing congestion issues.

Existing taxiways are equipped with medium intensity taxiway lights (MITL). Each new taxiway is planned to be equipped with MITL. In addition to MITL, Runway 3-21 and parallel Runway 12R-30L will receive runway end identifier lights (REILs) to provide pilots the ability to identify the runway ends and distinguish the runway end lighting from other lighting on the airport. Runway 12R-30L will also have medium intensity runway lights (MIRL) installed. Precision approach path indicators (PAPI) 4s are planned for Runway 12R-30L.

Primary Runway 12L-30R and its associated taxiways are planned for a pavement strength of up to 140,000 pounds dual wheel loading (DWL). The current crosswind Runway 3-21 pavement strength is adequate to serve the needs of the aircraft using the runway now and through the planning period. Parallel Runway 12R-30L is planned to 12,500 pounds single wheel loading (SWL) to accommodate the smaller single engine and multi-engine aircraft it is intended to serve.

A Category I (CAT I) instrument approach is planned for Runway 12L. An instrument landing system (ILS) can provide CAT I (one-half mile visibility and 200-foot cloud ceiling minimum) capabilities. New installations of this type are being limited because the FAA is implementing the wide area augmentation system (WAAS) to enhance the standard GPS signal for both vertical and lateral navigational approach capabilities. Because the timing of full implementation of the CAT I GPS capability is still not certain, this master plan allows for the installation of either type of CAT I approach.

Planning for CAT I precision approaches to Runway 12L requires a larger RPZ. As shown on **Exhibit 5A**, the RPZ would extend beyond the existing airport property boundary. The acquisition of a 129-acre parcel of land is planned at the Runway 12L end, to protect this RPZ from incompatible development.

The airfield plan includes the installation of a medium intensity approach lighting system with runway alignment indicator lights (MALSR) at the Runway 12L end in support of the CAT I approach.

Runways 30R, 3-21, and 12R-30L are planned to allow the capability for GPS non-precision approach procedures. The GPS approaches provide descent and course guidance information with one mile visibility minimums and cloud ceilings of 500 feet.

The segmented circle and windsock are currently located where the northwest parallel taxiway for Runway 3-21 is planned to be located. Therefore, the segmented circle and windsock are planned to be relocated to the west of its present location.

LANDSIDE PLAN

The landside plan for Marana Regional Airport has been devised to safely, securely, and efficiently accommodate potential aviation demand. The landside plan provides for the construction of a new terminal building, an airport traffic control tower, development of new commercial/industrial aviation parcels, aircraft storage facilities, construction of an aircraft wash rack, and a fire fighting facility. Landside improvements are shown in detail on **Exhibit 5A**.

The new terminal building is planned to be constructed to the northeast of Taxiway E. This new terminal building will have an approximate area of 12,000 square feet. A new restaurant is also planned to be constructed to the northeast of the terminal building. The purple parcels in the new terminal area are reserved for hangar and aviation-related development. Automobile parking and roadway access is depicted by the blue areas on **Exhibit 5A** in the center of the terminal area.

The landside plan depicts the development of a fire station facility to the south of the transport category apron and adjacent to the existing T-hangars. In this location, the fire station will have access to the airfield as well as to the surrounding community via Avra Valley Road. A T-hangar development is planned adjacent to the fire station. The southernmost section of the T-hangar development, however, would be possible only after Avra Valley Road is realigned.

The airport traffic control tower (ATCT) is planned to be constructed to the east of the general aviation apron. From this location, air traffic controllers will have a clear line-of-sight of the airfield.

A series of conventional hangars will be available for development on the west side of Runway 12L-30R near the intersection of Runway 12L-30R and 3-21 and to the northeast of Runway

12L-30R. These conventional hangar parcels could also be utilized as a location for fixed base operator (FBO) development in the future or for general aviation aircraft storage. A corporate parcel complex is planned to the west of the airfield. These corporate parcels will have runway access via a newly constructed taxiway stemming off of Taxiway A.

T-hangar development areas are located northeast of Runway 12R-30L. Additional FBO facilities are planned for development at the southeast corner of Runway 12R-30L along with a large apron for T-hangar development and aircraft parking.

The runway visibility zone (RVZ) between Runways 3-21 and 12R-30L is obstructed by seven of the existing T-hangars located west of Runway 3-21, as well as a conventional hangar and the fuel storage facility east of the runway. As a result, the parallel runway will not be able to develop until an ATCT is operational at the airport. Until or unless the tower is in 24-hour, continuous operation, the parallel runway would have to be closed during the same hours the tower would be closed. At night, Runway 12R-30L will need to be closed to meet FAA regulations regarding the RVZ and to allow the T-hangar facilities to remain where they are currently located. The fuel farm is planned to be relocated east of the Tucson Aeroservice Center maintenance facility.

An aircraft wash rack facility is planned to be constructed adjacent to the ATCT. The aircraft wash rack would provide an area for aircraft cleaning, and the proper collection of the aircraft cleaning solvents and contaminants removed from the aircraft hull during cleaning.

A large aircraft parking apron and several corporate/aviation-related parcels are located southwest of Runway 12R-30L. Aircraft utilizing these areas will access the runway system via taxiways stemming from the southwest parallel taxiway for Runway 12R-30L. Each of these areas will be accessible via access roads constructed from Avra Valley Road and North Sanders Road.

CAPITAL IMPROVEMENT PROGRAM

The implementation of the Marana Regional 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 is timing and airport activity. Both of these factors should be used as references in plan implementation.

Experience has indicated that major 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 a realistic schedule and costs for implementing the plan. This section examines the overall cost of development and presents a development schedule. The recommended improvements are grouped and divided into three planning horizons of short term, intermediate term, and long range. **Table 5B** summarizes the key activity milestones for each planning horizon.

TABLE 5B
Planning Horizon Summary
Marana Regional Airport

	Current	Short Term	Intermediate Term	Long Range
Based Aircraft	295	350	400	500
Annual Operations				
Military	2,000	2,000	2,000	2,000
Itinerant	27,090	45,937	59,500	96,250
Local	72,310	85,313	110,500	178,750
Total Operations	101,400	133,250	172,000	277,000

The short term planning horizon covers items of highest priority, as well as items that should be developed as the airport approaches the short term activity milestones. Priority items include improvements related to safety and improvements to facilities that will be inadequate with any growth in demand and property acquisitions. Because of their priority, those items will need to be incorporated into the Town's budgeting process, as well as FAA and ADOT programming. To assist in this process, short term projects are scheduled year-by-year over a five-year period.

When short term horizon activity levels are reached, it will be time to program for the intermediate term based upon the next activity milestone. Also, as pavements age, maintenance of these pavements will need to be addressed. Similarly, when the intermediate term milestones are reached, it will be time to program for the long range.

Due to the conceptual nature of a master plan, implementation of capital projects should occur only after further refinement of their design and costs through architectural and engineering analyses. A 20 percent contingency factor was added to the construction costs. Engineering, architecture, construction administration, and administrative costs were also estimated at 20 percent. Capital costs in this chapter should be viewed only as estimates subject to further refinement during design.

Nevertheless, these estimates are considered sufficiently accurate for the planning level analyses in this chapter. Cost estimates for each development project listed in **Table 5C** are presented in current (2006) dollars.

TABLE 5C
Capital Improvement Program
Marana Regional Airport

No.	Project	Total Costs	Federally Eligible	ADOT Eligible	Local Share
2007					
1	Phase III – Taxiway E Apron	$1,750,000	$1,662,500	$43,750	$43,750
2	Rehabilitate Taxiways	200,000	190,000	5,000	5,000
3	Rehabilitate Runways	300,000	285,000	7,500	7,500
4	Acquire Runway Sweeper	250,000	237,500	6,250	6,250
5	Large Aircraft Apron Reconstruction	1,800,000	--	1,620,000	180,000
6	Land Acquisition (Purchase 244 Acres) for Parallel Runway	1,952,000	1,854,400	48,800	48,800
7	Construct Airport Terminal	3,300,000	--	2,970,000	330,000
8	Construct Airport Terminal Access Road	2,570,000	2,441,500	64,250	64,250
9	Construct Terminal Auto Parking	650,000	--	585,000	65,000
10	Construct Security Fence	300,000	285,000	7,500	7,500
11	Fire Protection	1,500,000	--	1,350,000	150,000
12	Construct T-Hangar Taxilanes – Phase I	840,000	--	756,000	84,000
Subtotal 2007		**$15,412,000**	**$6,955,900**	**$7,464,050**	**$992,050**
2008					
1	Rehabilitate Taxiways	$700,000	$665,000	$17,500	$17,500
2	Land Acquisition (Purchase 19 Acres) for Rwy. 3-21 Extension	152,000	144,400	3,800	3,800
3	Construct Parallel Taxiway for Rwy. 12L-30R, Phase I	900,000	855,000	22,500	22,500
4	Rehabilitate Taxiway C	800,000	760,000	20,000	20,000
5	Runway 3-21 Extension (507 feet)	900,000	855,000	22,500	22,500
6	Construct Taxiway B to Ultimate Runway 21 End	300,000	285,000	7,500	7,500
7	Signage Install – Phase II	950,000	902,500	23,750	23,750
Subtotal 2008		**$4,702,000**	**$4,466,900**	**$117,550**	**$117,550**
2009					
1	Construct Parallel Taxiway Northwest of Rwy 3-21	$2,800,000	$2,660,000	$70,000	$70,000
2	Land Acquisition/MALSR (Purchase 129 acres)	3,225,000	3,063,750	80,625	80,625
3	Rehabilitate Apron Areas	2,500,000	--	2,250,000	250,000
4	Install Security Fence	750,000	712,500	18,750	18,750
5	Install MITL Taxiway C	175,000	166,250	4,375	4,375
6	Construct Aircraft Wash Rack	50,000	--	45,000	5,000
Subtotal 2009		**$9,500,000**	**$6,602,500**	**$2,468,750**	**$428,750**
2010					
1	Rehabilitate Runway 3-21	$400,000	$380,000	$10,000	$10,000
2	Land Acquisition – Terminal Area (Purchase 110 Acres)	1,531,250	1,454,688	38,281	38,281
3	Construct Fuel Farm	500,000	--	450,000	50,000
4	Install Security Fence	500,000	--	450,000	50,000
5	Construct Two Exit Taxiways for Runway 12L-30R	560,000	532,000	14,000	14,000
6	Extend Taxiway E to Runway 3-21	640,000	608,000	16,000	16,000
7	Construct Aircraft Holding Apron for Runway 12L-30R	800,000	760,000	20,000	20,000
8	Construct Two High-Speed Exit Taxiways for Runway 12L-30R	700,000	665,000	17,500	17,500
Subtotal 2010		**$5,631,250**	**$4,399,688**	**$1,015,781**	**$215,781**

TABLE 5C (Continued) Capital Improvement Program Marana Regional Airport					
No.	**Project**	**Total Costs**	**FAA Eligible**	**ADOT Match**	**Town**
2011					
1	Land Acquisition – Phase III (Purchase 548 Acres)	$7,640,000	$7,258,000	$191,000	$191,000
2	Fire Protection	2,500,000	--	2,250,000	250,000
3	Update Airport Master Plan	250,000	237,500	6,250	6,250
4	Update Part 150 Noise Study	300,000	285,000	7,500	7,500
5	Construct Airport Traffic Control Tower	1,200,000	1,140,000	30,000	30,000
6	Construct Airport Access Road, Phase I	685,000	650,750	17,125	17,125
7	Construct Conventional Hangar Apron	695,000	--	625,500	69,500
Subtotal 2011		**$13,270,000**	**$9,571,250**	**$3,127,375**	**$571,375**
SHORT TERM HORIZON TOTAL		**$48,515,250**	**$31,996,238**	**$14,193,506**	**$2,325,506**
INTERMEDIATE HORIZON					
1	Avra Valley Road Realignment	$7,000,000	$6,650,000	$175,000	$175,000
2	Extend Taxiway E to Runway 12L End	1,450,000	1,377,500	36,250	36,250
3	Construct Apron Southeast of Terminal-Phase I	1,250,000	--	1,125,000	125,000
4	Construct Auto Parking for Terminal Area Parcels-Phase I	275,000	--	--	275,000
5	Construct T-hangar Taxilanes – Phase II	1,200,000	1,140,000	30,000	30,000
6	Construct Four Exit Taxiways for Rwy. 12L-30R	1,250,000	1,187,500	31,250	31,250
7	Construct Airport Access Road – Phase II	1,800,000	1,710,000	45,000	45,000
8	Runway Construction – (Construct Rwy. 12R-30L)	3,500,000	--	3,150,000	350,000
9	Construct Parallel Twy. to Rwy. 12R-30L	2,800,000	2,660,000	70,000	70,000
10	Runway 3-21 Extension (300 feet)	925,000	878,750	23,125	23,125
11	Relocate West Side Access Road	925,000	878,750	23,125	23,125
12	Install MIRL Runway 12R-30L	480,000	456,000	12,000	12,000
13	Install PAPIs and REILs Runway 12R-30L	400,000	380,000	10,000	10,000
14	Install Signage for Runway 12R-30L	450,000	427,500	11,250	11,250
15	Install MITL (Runway 12R-30L Parallel Taxiway)	550,000	522,500	13,750	13,750
16	Construct Conventional Hangar Apron	695,000	--	625,500	69,500
17	Pavement Preservation	500,000	475,000	12,500	12,500
INTERMEDIATE HORIZON TOTAL		**$25,450,000**	**$18,743,500**	**$5,393,750**	**$1,312,750**
LONG RANGE HORIZON					
1	Construct High-Speed Exit Taxiways for Runway 12L-30R	$1,400,000	$1,330,000	$35,000	$35,000
2	Construct Taxiway (Corporate Parcels)	1,500,000	1,425,000	37,500	37,500
3	Construct Corporate Parcels Access Road	900,000	855,000	22,500	22,500
4	Construct Apron Southeast of Terminal - Phase II	1,900,000	1,805,000	47,500	47,500
5	Construct Auto Parking for Term. Area Parcels – Phase II	400,000	--	--	400,000
6	Construct T-hangar Taxilanes – Phase III	900,000	855,000	22,500	22,500
7	Construct East T-hangar Access Road and Auto Parking	250,000	237,500	6,250	6,250
8	Construct T-hangar Taxilanes – Phase IV	1,500,000	1,425,000	37,500	37,500
9	Construct West T-hangar Access Road and Auto Parking	250,000	237,500	6,250	6,250
10	Construct Conventional Hangar Apron	500,000	475,000	12,500	12,500
11	Annual Pavement Maintenance/Preservation	500,000	475,000	12,500	12,500
LONG RANGE HORIZON TOTAL		**$10,000,000**	**$9,120,000**	**$240,000**	**$640,000**
TOTAL PROGRAM COSTS		**$83,965,250**	**$59,859,738**	**$19,827,256**	**$4,278,256**

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 to assist in capital improvement. **Short term improvements presented in Table 5C and depicted on Exhibit 5B are estimated at $48.5 million**.

The first year focuses on acquisition of surrounding properties primarily for

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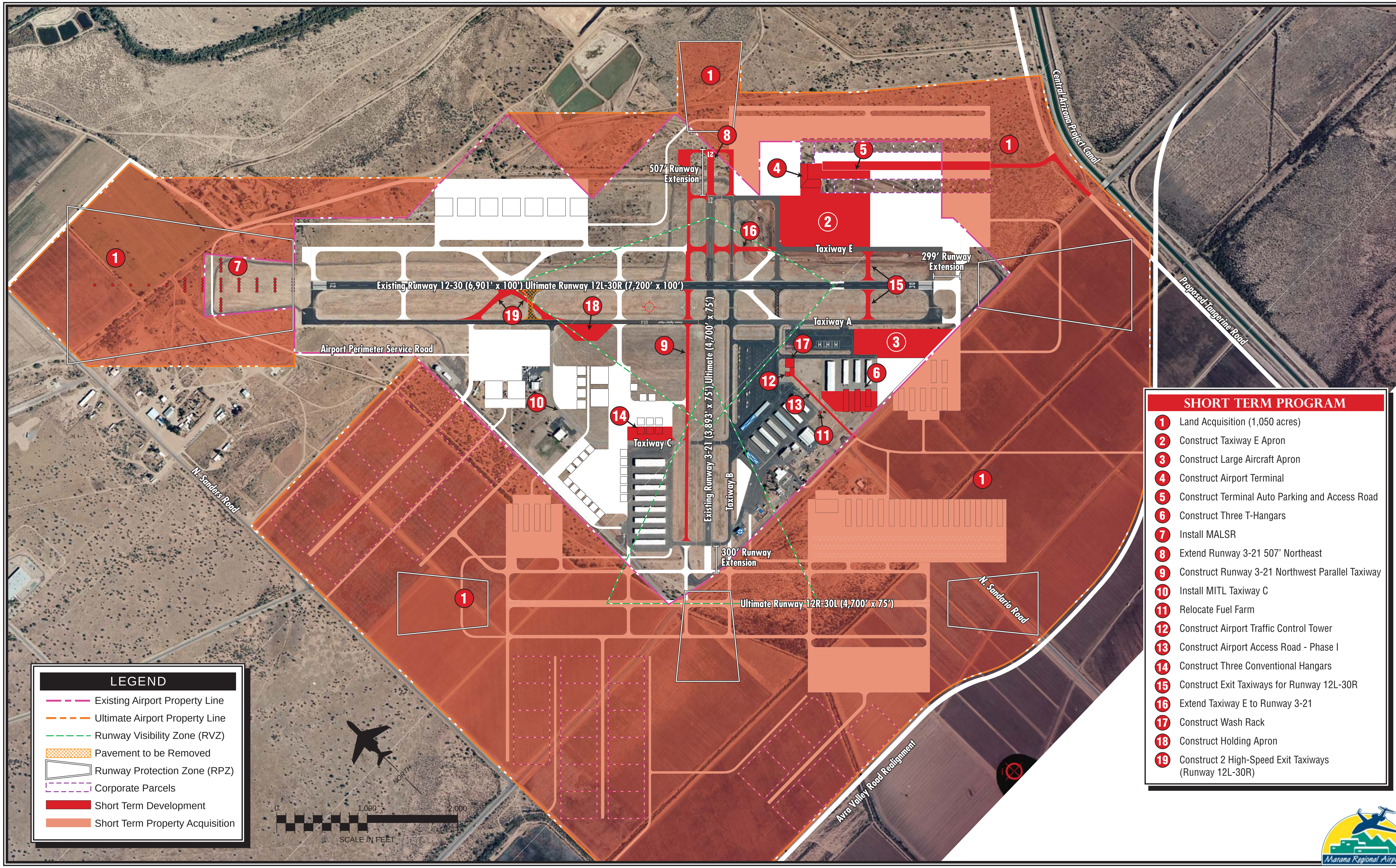

Exhibit 5B
SHORT TERM
DEVELOPMENT STAGING

the preservation of the airport's long-range viability. This includes the 792 acres on the south and west sides of the airport that will allow for the construction of a parallel runway and support future airport development.

On the north side, a 19-acre parcel should be acquired to allow for the Runway 3-21 extension. A 129-acre section of land should be acquired to allow for the addition of a MALSR and larger runway protection zone for instrument approaches into Runway 12L. In addition, a 110-acre section should be acquired to allow for the expansion of the terminal area in the northeast corner of the airport and for further landside developments in the future.

Once the property area is acquired, follow-up projects include the rehabilitation of taxiways and runways as well as the expansion of the large aircraft apron, the construction of the terminal facility, an airport traffic control tower, and new hangar facilities.

Another short term project is the 507-foot extension of Runway 3-21 to the northeast and the construction of a full-length parallel taxiway for Runway 3-21. The fuel farm will also need to be relocated in the short term to allow for the future parallel runway's runway visibility zone (RVZ).

INTERMEDIATE PLANNING HORIZON

Projects in the intermediate planning period are based on the relocation of Avra Valley Road and the construction of the parallel runway. With the construction of the parallel runway and associated parallel taxiway, new airport access routes will need to be constructed from Avra Valley Road to the general aviation area of the airport, as well as an access road from North Sanders Road to the west quadrant of the airport.

Runway 12L-30R will be extended by 299 feet to the southeast in the intermediate term, which will allow it to accommodate most business jet aircraft. Runway 12L-30R's parallel taxiway E will also be extended to the Runway 12L threshold. Two exit taxiways will also be constructed for Runway 12L-30R.

The airport terminal apron and automobile parking area will be expanded to the east of the terminal and restaurant to accommodate further corporate parcel development. T-hangar development is located to the east of the fire station.

The cost estimates for intermediate term projects are estimated at $25.5 million. Intermediate projects are depicted on **Exhibit 5C**.

LONG RANGE PLANNING HORIZON

The long range planning horizon includes projects that will likely be needed by the long range activity milestone, but are not necessarily a priority in the near future. Demand for additional T-hangar facilities will be met by constructing an additional

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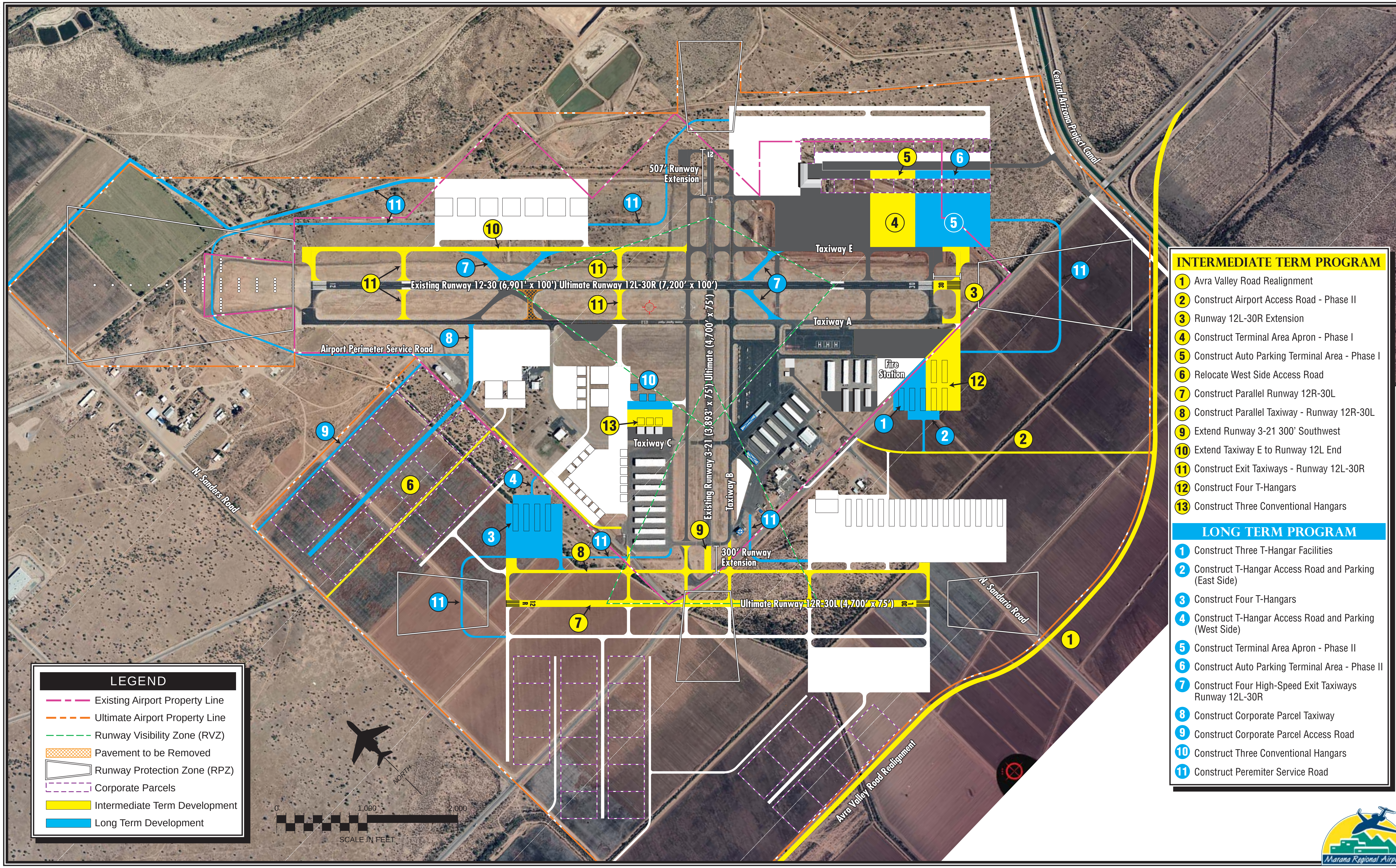

Exhibit 5C
INTERMEDIATE AND LONG TERM
DEVELOPMENT STAGING

five T-hangar buildings south of the fire station. The corporate parcels to the southeast of the terminal facility will meet the conventional hangar demand. The terminal apron and automobile parking area will need to be expanded to allow for this development.

High-speed exit taxiways are planned for Runway 12L-30R in the long range to help alleviate runway occupancy times and congestion. A taxiway will be constructed to allow access to the runway system for the corporate parcels on the west side of the airport. An additional access road will also need to be constructed for landside access to these corporate parcels.

The cost estimates for the long range projects total $10.0 million. Long range projects are depicted on **Exhibit 5C**.

CAPITAL IMPROVEMENTS FUNDING

Financing capital improvements at the airport will not rely exclusively upon the financial resources of the Town of Marana. Capital improvement funding is available through various grants-in-aid programs at both the federal and state level. 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 Program* (AIP) of 1982. The AIP has been reauthorized several times, with the most recent legislation enacted in late 2003 and entitled the *Vision 100 – Century of Aviation Reauthorization Act*.

The remaining FAA fiscal years covered by the four-year program are 2006 and 2007. This bill presented similar funding levels to the previous reauthorization – *AIR-21*. Funding was authorized at $3.6 billion in 2006 and $3.7 billion in 2007.

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*, Marana Regional Airport is eligible for 95 percent funding assistance from AIP grants, as opposed to the previous *AIR-21* level of 90 percent.

FAA FACILITIES AND EQUIPMENT PROGRAM

The Airway Facilities Division of the FAA administers the national Facilities and Equipment (F&E) Program. This annual program provides funding for the installation and maintenance of various navigational aids and equipment for the national airspace system and airports. Under the F&E program, funding is provided for FAA airport traffic control towers, enroute navigational aids, and on-airport navigational aids such as approach lighting systems. Assuming inclusion in the NPIAS, as activity levels and other development warrant, the airport may be considered by the FAA Airways Facilities Division for the installation and maintenance of navigational aids through the F&E program.

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.

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 funds are provided for airport-related construction projects that are not eligible for funding under another program.

LOCAL FUNDING

The balance of project costs, after consideration has been given to grants, must be funded through local 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 local share would be ten percent of the project.

According to **Table 5C**, local funding will be needed in each planning horizon. This includes $2.3 million in the short term, $1.3 million in the intermediate term, and $640,000 in the long range.

There are several alternatives for local finance options for future development at the airport, including airport revenues, direct funding from the Town, issuing bonds, and leasehold financing. These strategies could be used to fund the local matching share or complete the project if grant funding cannot be arranged.

The capital improvement program has assumed that some landside facility development (conventional hangars, T-hangars, and public auto parking) would be completed privately, while other developments (namely T-hangars, and public auto parking) would be completed by the Town.

There are several municipal bonding options available to the Town of Marana, including general obligation bonds, limited obligation bonds, and revenue bonds. General obligation bonds are a common form of municipal bond which is issued by voter approval and is secured by the full faith and credit of the Town. Town tax revenues are pledged to retire the debt. As instruments of credit, and because the community secures the bonds, general obligation bonds reduce the available debt level of the community. Due to the community pledge to secure and pay general obligation bonds, they are the most secure type of municipal bond and are generally issued at lower interest rates and carry lower costs of issuance. The primary disadvantage of general obligation bonds is that they require voter approval and are subject to statutory debt limits. This requires that they be used for projects that have broad support among the voters, and that they are reserved for projects that have the highest public priorities.

In contrast to general obligation bonds, limited obligation bonds (sometimes referred to as Self-Liquidating Bonds) are secured by revenues from a local source. While neither general fund revenues nor the taxing power of the local community is pledged to pay the debt service, these sources may be required to retire the debt if pledged revenues are insufficient to make interest and principal payments on the bonds. These bonds still carry the full faith and credit pledge of the local community and, therefore, are considered, for the purpose of financial analysis, as part of the debt burden of the local community. The overall debt burden of the local community is a factor in determining interest rates on municipal bonds.

There are several types of revenue bonds, but in general, they are a form of municipal bond which is payable solely from the revenue derived from the operation of a facility that was constructed or acquired with the proceeds of the bonds. For example, a Lease Revenue Bond is secured with the income from a lease assigned to the repayment of the bonds. Revenue bonds have become a common form of financing airport improvements. Revenue bonds present the opportunity to provide those improvements without direct burden to the taxpayer. Revenue bonds normally carry a higher interest rate because they lack the guarantees of general and limited obligation bonds.

Leasehold financing refers to a developer or tenant financing improvements under a long term ground lease. The obvious advantage of such an arrangement is that it relieves the community of all responsibility for raising the capital funds for improvements. However, the private development of facilities on a ground lease, particularly on property owned by a municipal agency, produces a unique set of problems. In particular, it is more difficult to obtain private financing as only the improvements and the right to continue the lease can be claimed in the event of a default. Ground leases normally provide for the reversion of improvements to the lessor at the end of the lease term, which reduces their potential value to a lender taking possession. Also, companies that want to own their property as a matter of financial policy may not locate where land is only available for lease.

To ensure that the airport maximizes revenue potential in the future, the Town of Marana should also periodically review aviation services rates and charges (i.e., fuel flowage fees, hangar and tiedown rental) at other regional airports to ensure that rates and charges at the airport are competitive and similar to aviation services at other airports. Additionally, all new leases at the airport should have inflation clauses allowing for periodic rate increases in-line with inflationary factors.

While it is desirable for the airport to directly pay for itself, the indirect and intangible benefits of the airport to the community's economy and growth must be considered in implementing future capital improvements.

PLAN IMPLEMENTATION

The successful implementation of the Marana Regional Airport Master Plan will require sound judgment on the part of the Town of Marana with regard to the implementation of projects to meet future activity demands, while maintaining the existing infrastructure and improving this infrastructure in support of economic development.

While the projects included in the capital improvement program have been broken into short, intermediate, and long term planning periods, the Town will need to consider the scheduling of projects in a flexible manner and add new projects from time-to-time to satisfy safety or design standards or newly created demands.

In summary, the planning process requires that the Town continually monitor the need for new or rehabilitated facilities, since applications (for eligible projects) must be submitted to the FAA and State each year. The Town should continually monitor and communicate with the FAA and State the projects which are of highest priority.

ENVIRONMENTAL EVALUATION

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 Evaluation is to review the proposed improvement program for Marana Regional Airport to determine whether the proposed actions could, individually or collectively, have the potential to significantly affect the quality of the environment. Information contained in this Evaluation was obtained from an Environmental Assessment completed in March 2006 for the shift of Runway 3-21, 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). 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 Order1050.1E and Order 5050.4A, Airport Environmental Handbook.*

PROPOSED DEVELOPMENT

As a result of analysis undertaken for the Airport Master Plan, a number of airport improvements have been recommended for implementation over the long-range planning horizon. Following is a summary of planned major projects.

Airside Development

The airfield plan for Marana Regional Airport focuses on meeting FAA design and safety standards by extending the primary Runway 12L-30R to the southwest 299 feet, extending crosswind runway 3-21 507 feet to the northeast and 300 feet to the southwest, constructing a parallel runway with a full-length parallel taxiway, constructing full-length parallel taxiways to the northeast of Runway 12L-30R and to the northwest of Runway 12L-30R, and constructing additional exit taxiways for runway 12L-30R and 3-21. **Exhibit 5A** graphically depicts the proposed airfield improvements.

Landside Development

The landside plan for Marana Regional Airport has been devised to safely, securely, and efficiently accommodate potential aviation demand. The landside plan provides for the construction of a new terminal building, an airport traffic control tower, development of new commercial/industrial aviation parcels, aircraft storage facilities, and a fire fighting facility. Landside improvements are shown in detail on **Exhibit 5A**.

ENVIRONMENTAL ANALYSIS

The following sections provide a description of the environmental resources which could be impacted by the proposed airport development.

TABLE 5D
Environmental Evaluation

Environmental Resource	Potential Resource Impacts
Air Quality. The US 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 (O3), Carbon Monoxide (CO), Sulfur Dioxide (SO2), Nitrogen Dioxide (NO_2), Particulate matter (PM10 and PM 2.5), and Lead (Pb). 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. Various levels of review apply within both NEPA and permit requirements.	• Marana Regional Airport is located in Pima County, Arizona which is listed by the EPA as being in nonattainment for PM-10. • As a result of this exceedance, the Pima Department of Environmental Quality (PDEQ) has submitted a Natural Event Action Plan (NEAP). A NEAP addresses violations of the PM-10 standard that occur as a result of natural occurrences such as high winds. • In accordance with the EPA, a western county that has monitored exceedances of the federal standard can create and implement a NEAP in order to meet NAAQS. • Additional air quality analysis is needed to determine potential impacts to air quality that may result from implementation of the various development projects at the airport. • A number of projects planned at the airport could 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.
Coastal Resources. Federal activities involving or affecting coastal resources are governed by the Coastal Barriers Resource Act (CBRA), the Coastal Zone Management Act (CZMA), and E.O. 13089, Coral Reef Protection.	• No impacts. The airport is not located within a Coastal Management Zone or Coastal Barrier Area.
Compatible Land Use. The compatibility of existing and planned land uses in vicinity of an airport is usually associated with the extent of the airport's noise impacts. Typically, significant impacts will occur over noise sensitive areas within the 65 DNL noise contour.	• Noise contours were prepared for the 14 CFR Part 150 Noise Compatibility Study prepared in 2006. • As contained within the study, year 2010 extends slightly off airport property to the southeast and northwest. It was determined that no dwelling units are contained within the 2010 65 DNL noise contour • Within the long-range capacity 65 DNL noise contour, it is estimated that three existing dwelling units would be impacted. • Detailed information regarding land use compatibility and noise impacts can be found in the 14 CFR Part 150 Noise Compatibility Study.

TABLE 5D (Continued)
Environmental Evaluation

Environmental Resource	Potential Resource Impacts
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 a requirement of construction-related permits such as an NPDES permit. Use of these measures typically alleviates potential resource impacts. • There are no concentrated residential or noise-sensitive developments located in close proximity of the airport; therefore, no construction related noise impacts are anticipated.
Department of Transportation Act, Section 4(f). 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 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.	• It is not anticipated that the proposed development would 'substantially impair' any Section 4(f) resources. The improvements will not require the physical use of any Section 4(f) lands. • There are no known Section 4(f) resources within the airport environs.
Farmlands. Under the *Farmland Protection Policy Act* (FPPA), federal agencies are directed to identify and take into account the adverse effects of federal programs on the preservation of farmland, to consider appropriate alternative actions which could lessen adverse effects, and to assure that such federal programs are, to the extent practicable, compatible with state or local government programs and policies to protect farmland. The FPPA guidelines apply to farmland classified as prime or unique, or of state or local importance as determined by the appropriate government agency, with concurrence by the Secretary of Agriculture.	• Approximately 620 acres of land currently utilized for agriculture uses will be acquired under the proposed action. However, according to the Natural Resource Conservation Service soil survey; no soil types in the project area are classified as prime or unique farmland. • The airport is surrounded by land dedicated to public use, and no prime or unique farmland soils are present; therefore, the FPPA does not apply.

TABLE 5D (Continued)
Environmental Evaluation

Environmental Resource	Potential Resource Impacts
Fish, Wildlife, and Plants. The Fish and Wildlife Service (FWS) and the National Marine Fisheries Service (NMFS) determines that a significant impact will result when the proposed action would likely jeopardize the continued existence of a species in question, or would result in the destruction or adverse modification of Federally-designated critical habitat in the area. Lesser impacts, as outlined by agencies and organizations having jurisdiction, may result in a significant impact.	• The airport is located in an area categorized as Sonoran Desert scrub. • According to the U.S. Fish and Wildlife Service Ecological Services website, Pima County contains habitat for numerous threatened and endangered species. • Coordination with the Arizona Fish and Game and the U.S. Fish and Wildlife Service during the March, 2006 EA identified concerns regarding raptor species, particularly burrowing owls. In addition, the ferruginous pygmy-owl and the thornber fishhook cactus have been identified within two-miles of the airport. • Prior to any construction at the airport, consultation with the U.S. Fish and Wildlife Service is required and a biological assessment may be requested.
Floodplains. Significant impacts to floodplains occur when a proposed action results in notable adverse impacts on natural and beneficial 100-year floodplain values.	• According to the Federal Emergency Management Agency (FEMA) Federal Insurance Rate Maps (FIRM) Letter of Map Revision (LOMR) dated September 16, 2004, the airport is located in Zone AE. This zone represents a special flood hazard area inundated by a 100-year flood where base flood elevations have been determined. • As all proposed projects are located within a 100-year floodplain, the airport should coordinate with the Town of Marana Floodplain Administrator to obtain a floodplain use permit.
Hazardous Materials, Pollution Prevention, and Solid Waste. The airport must comply with applicable pollution control statutes and requirements. Impacts may occur when changes to the quantity or type of solid waste generated, or type of disposal, differ greatly from existing conditions.	• According to the EA completed in March 2006, the airport is not located within one-mile of the boundaries to any site listed, or under consideration for listing, on the National Priorities List. • 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 storm-water 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.

TABLE 5D (Continued) Environmental Evaluation	
Environmental Resource	**Potential Resource Impacts**
Historical, Architectural, Archaeological, and Cultural Resources. Impacts may occur when the proposed project causes an adverse effect on a property which has been identified (or is unearthed during construction) as having historical, architectural, archaeological, or cultural significance.	• Numerous cultural resource sites have been identified within the vicinity of the airport. • Further coordination with the State Historic Preservation Office (SHPO) is required regarding potential impacts to cultural or archaeological resources. It is anticipated that a cultural resource survey will be requested as the proposed acquisition areas have not been surveyed for cultural resources.
Light Emissions and Visual Impacts. Impacts occur when lighting associated with an action will create an annoyance among people in the vicinity or interfere with their normal activities. Aesthetic impacts relate to the extent that the development contrasts with the existing environment and whether the jurisdictional agency considers this contrast objectionable.	• The proposed improvements will introduce new light emission sources at the airport. However, the land surrounding the airport is currently vacant or used for agricultural uses; therefore, It is not anticipated that the introduced lighting will significantly impact the surrounding areas as there are no concentrated residential developments within the vicinity.
Natural Resources and Energy Supply. In instances of major proposed actions, power companies or other suppliers of energy will need to be contacted to determine if the proposed project demands can be met by existing or planned facilities.	• 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. The Yearly Day-Night Average Sound Level (DNL) is used in this study to assess aircraft noise. DNL is the metric currently accepted by the Federal Aviation Administration (FAA), Environmental Protection Agency (EPA), and Department of Housing and Urban Development (HUD) as an appropriate measure of cumulative noise exposure. These three agencies have each identified the 65 DNL noise contour as the threshold of incompatibility.	• The 2010 65 DNL noise contour falls outside the airport boundary on several instances, all of which are less than 500 feet. No noise sensitive land uses are contained within the 65 DNL. • The long range capacity 65 DNL noise contour extends 500 feet off airport property to the northwest and southeast. To the southwest, the contour is 900 feet beyond the proposed airport property at its greatest point. On the northeast side, the noise contour stays on airport property. Three noise sensitive land uses are contained within the long range 65 DNL noise contour. • Detailed information regarding land use compatibility and noise impacts, including DNL noise contours, can be found in the 14 CFR Part 150 Noise Compatibility Study

TABLE 5D (Continued)
Environmental Evaluation

Environmental Resource	Potential Resource Impacts
Secondary (Induced) Impacts. These impacts address those secondary impacts to surrounding communities resulting from the proposed development, including shifts in patterns of population growth, public service demands, and changes in business and economic activity to the extent influenced by airport development.	• 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.
Socioeconomic Impacts, Environmental Justice, and Children's Environmental Health and Safety Risks. Impacts occur when disproportionately high and adverse human health or environmental effects occur to minority and low-income populations; disproportionate health and safety risks occur to children; and extensive relocation of residents, businesses, and disruptive traffic patterns are experienced.	• The proposed project includes the acquisition of approximately 1,050 acres of land surrounding the airport. This land is mainly used for agriculture. One home will be impacted by the acquisition. • All property acquisition must comply with the *Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970*.
Water Quality. Water quality concerns associated with airport expansion most often relate to domestic sewage disposal, increased surface runoff and soil erosion, and the storage and handling of fuel, petroleum, solvents, etc.	• The airport will need to continue to comply with a NPDES 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 NPDES General Permit, including the preparation of a *Notice of Intent* and a *Stormwater Pollution Prevention Plan*, prior to the initiation of product construction activities.
Wetlands. Wetlands are defined by 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 seasonally saturated soil conditions for growth and reproduction.	• According to the EA completed in March 2006, there are no wetlands located on airport property. • A search on the U.S. Fish and Wildlife Service National Wetlands Interactive Mapper did not have information available regarding the presence of wetlands on property adjacent to the airport proposed for acquisition. • Further coordination with the U.S. Army Corps of Engineers and local agencies will be required prior to construction of the proposed projects and further study may be required.
Wild and Scenic Rivers. Wild and scenic rivers (WSR) are designated by the Wild and Scenic River Act. A National Rivers Inventory (NRI) is maintained to identify those river segments which are protected under this act.	• No impacts. The airport is not located near any designated wild and scenic rivers.

Appendix A

GLOSSARY OF TERMS & ABBREVIATIONS

Glossary of Terms

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 non-regulatory 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) transport 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: An alphabetic classification of aircraft based upon 1.3 times the stall speed in a landing configuration at their maximum certified landing weight.

AIRCRAFT OPERATION: The landing, takeoff, or touch-and-go procedure by an aircraft on a runway at an airport.

AIRCRAFT OPERATIONS AREA: 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 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 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.

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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 LAYOUT DRAWING (ALD): The drawing of the airport showing the layout of existing and proposed airport facilities.

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 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 enroute 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 enroute phase of flight.

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, dewpoint, 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).

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.

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.

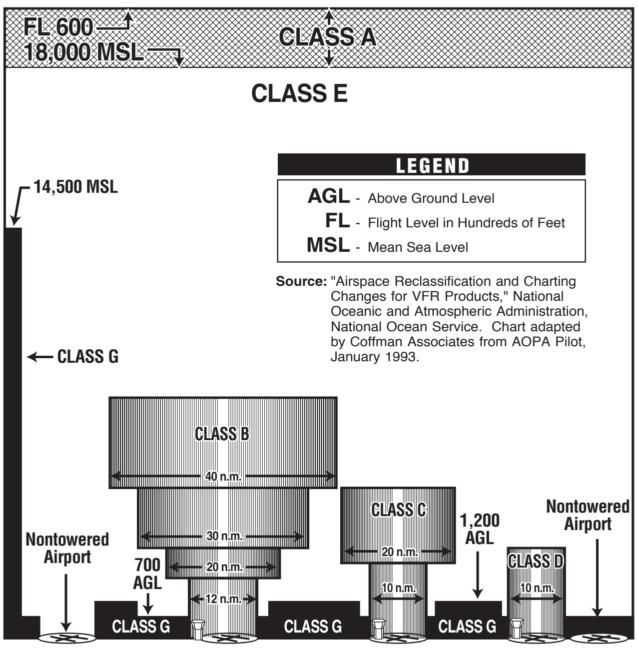
- *CLASS B:* Generally, the airspace from the surface to 10,000 feet MSL surrounding the nation's busiest airports. The configuration of Class B airspace is unique to each airport, but typically consists of two or more layers of air space and is designed to contain all published instrument approach procedures 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 airport that have an operational control tower. Class D airspace is individually tailored and configured to encompass published instrument approach proce dures. 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."

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; and

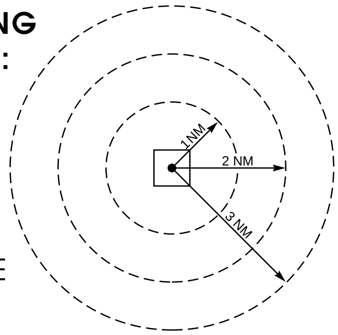
- *LANDING DISTANCE AVAILABLE (LDA):* The runway length declared available and suitable for landing.

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 A-weighted 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."

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 non-scheduled 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 ar 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.

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.

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."

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

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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.

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.

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.

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.

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.

KNOTS: A unit of speed length used in navigation that is equivalent to the number of nautical miles traveled in one hour.

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 enroute navigation.

LOW INTENSITY RUNWAY LIGHTS: The lowest classification in terms of intensity or brightness for lights designated for use in delineating the sides of a runway.

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.

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.)

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.

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.

OPERATION: A take-off or a landing.

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.

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 Sevice Volume. PVC conditions exist when the cloud ceiling is less than 500 feet and visibility is less than one mile.

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 enroute 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 enroute 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.

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

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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 TERMINAL ARRIVAL (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.

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.

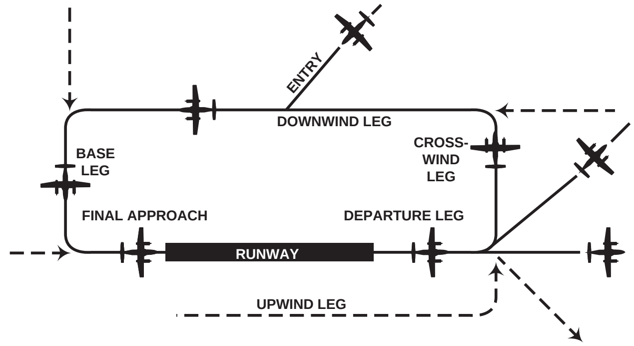
TOUCHDOWN: The point at which a landing aircraft makes contact with the runway surface.

TOUCHDOWN 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.

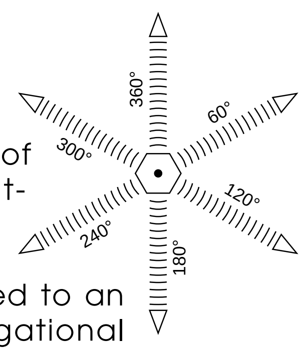


UNCONTROLLED AIRPORT: An airport without an air traffic control tower at which the control of Visual Flight Rules traffic is not exercised.

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."



VECTOR: A heading issued to an aircraft to provide navigational guidance by radar.

VERY HIGH FREQUENCY/ OMNIDIRECTIONAL RANGE STATION (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.

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VERY HIGH FREQUENCY OMNI-DIRECTIONAL RANGE STATION/ 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."

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.

Abbreviations

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)

APV: instrument approach procedure with vertical guidance

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ARC: airport reference code

ARFF: aircraft rescue and firefighting

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 (100LL)

AWOS: automated weather observation station

BRL: building restriction line

CFR: Code of Federal Regulations

CIP: capital improvement program

DME: distance measuring equipment

DNL: day-night noise level

DWL: runway weight bearing capacity for aircraft with dual-wheel type landing gear

DTWL: runway weight bearing capacity fo 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 middle marker

LOC: ILS localizer

LOM: compass locator at ILS outer marker

LORAN: long range navigation

MALS: medium intensity approach lighting system

MALSR: medium intensity approach lighting system with runway alignment 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 rulemaking

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 sequenced flashers

SSALR: 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 type landing gear

STWL: 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

AIRPORT LAYOUT DRAWINGS

U.S. Department
of Transportation
Federal Aviation Administration

Western-Pacific Region
Los Angeles Airports District Office

P.O. Box 92007
Los Angeles, CA 90009

July 19, 2007

Mr. Charles E. Mangum
Airport Director
Marana Regional Airport
11700 W. Avra Valley Road #91
Marana, Arizona 85653

Marana Regional Airport
Airport Master Plan Update Study
Airport Layout Plan - Final Approval

Dear Mr. Mangum:

The enclosed Airport Layout Plan (ALP) for Marana Regional Airport has been reviewed for revisions requested in our letter of March 14, 2007. The terms specified within the referenced letter have been met, therefore, the subject document is hereby conditionally approved.

In accordance with Federal Aviation Administration (FAA) Order 5050.1B, *Airport Environmental Handbook* and FAA Order 1050.1E, Change 1 *Environmental Impacts: Policies and Procedures*, prior to receiving an unconditional approval or funding of projects proposed in the ALP, an FAA environmental review and determination is required. The environmental determination can result in a categorical exclusion if the action meets the list of FAA approved categorical exclusions and there are no extraordinary circumstances, as defined in paragraph 304 of FAA Order 1050.1E, Change 1. Prior to a categorical exclusion determination, the FAA will need appropriate information from the airport sponsor to describe the project and documentation that shows there are no extraordinary circumstances that result from a proposed project. If environmental impacts are anticipated, than depending on the level of impacts, an Environmental Assessment (EA) or an Environmental Impact Statement (EIS) may be required to document the environmental affects of the proposed action.

This approval, as indicated by my signature, is given subject to the conditions cited above on the proposed list of projects identified below, but not limited to, will require an FAA environmental determination and approval in order to enable construction or federal funding for the following:

- Land Acquisition in excess of 3 acres not studied in the previous EA completed in 2007 based on revised "future" airport property boundary.
- Proposed extension to main Runway 12L-30R, from 6,901' to 7,200'.
- Proposed new Runway 12R-30L and associated taxiways.
- Realignment/Relocation of Avra Valley Road.
- Relocation of the airport perimeter road.
- MALSR Approach lighting system for Ultimate Rwy 12L/30R

This approval does not commit this agency to participate in the cost for any development not currently programmed, nor does it negate notification and review requirements imposed by Part 77 and Part 157 of the Federal Aviation Regulations as it pertains to all proposed structures shown on this plan. Further, the Federal Aviation Administration cannot prevent erection of any structure in the vicinity of airports. Airport environs can only be adequately protected through such means as local zoning ordinances.

All future proposed structures shown on the ALP, if not built within six (6) months of the ALP's approval date, shall be filed as separate notice on FAA Form 7460-1 at their time of intended construction. This will enable a current airspace evaluation to be completed with regard to contemporary airspace requirements.

We have returned four (4) copies of the approved plan. Please insure that one (1) approved drawing set along with a copy of this approval letter is forwarded to the State of Arizona Department of Transportation (ADOT), Aeronautics Division for their files. The remaining three (3) copies were retained for our files. If we can be of any further assistance please do not hesitate to call.

Sincerely,

Brian Q. Armstrong
Manager, Los Angeles Airports District Office

Enclosures

AIRPORT LAYOUT PLANS
FOR
MARANA REGIONAL AIRPORT

Prepared for the

Town of Marana, Arizona

INDEX OF DRAWINGS

1. DATA SHEET
2. AIRPORT LAYOUT DRAWING
3. PART 77 AIRSPACE DRAWING
4. APPROACH ZONE PROFILES RUNWAY 12(L)-30(R)/RUNWAY PROFILE
5. APPROACH ZONE PROFILES RUNWAYS 3-21 AND 12R-30L/RUNWAY PROFILES
6. INNER PORTION OF RUNWAY 12(L) APPROACH SURFACE DRAWING
7. INNER PORTION OF RUNWAY 30(R) APPROACH SURFACE DRAWING
8. INNER PORTION OF RUNWAYS 3-21 APPROACH SURFACE DRAWING
9. INNER PORTION OF RUNWAYS 12R-30L APPROACH SURFACE DRAWING
10. TERMINAL AREA DRAWING
11. AIRPORT LAND USE DRAWING
12. EXHIBIT A

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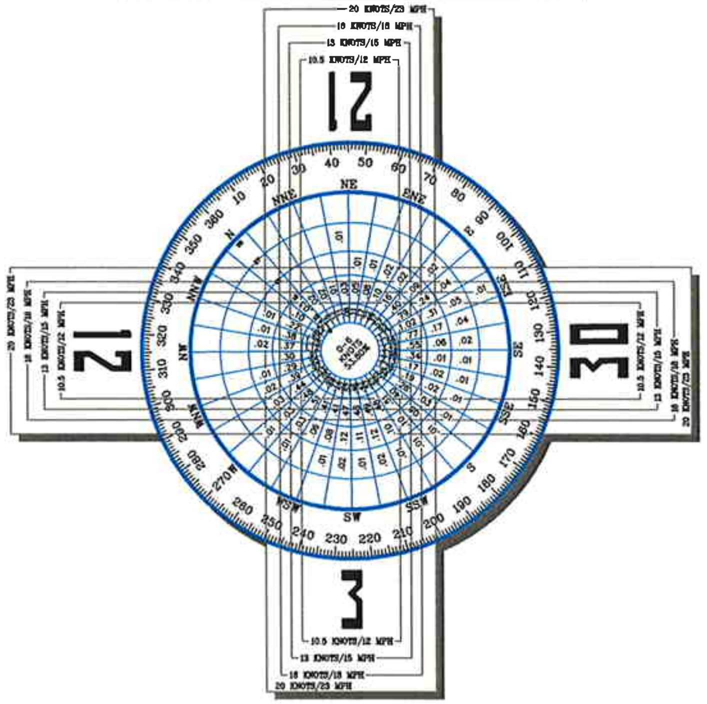
ALL WEATHER WIND COVERAGE

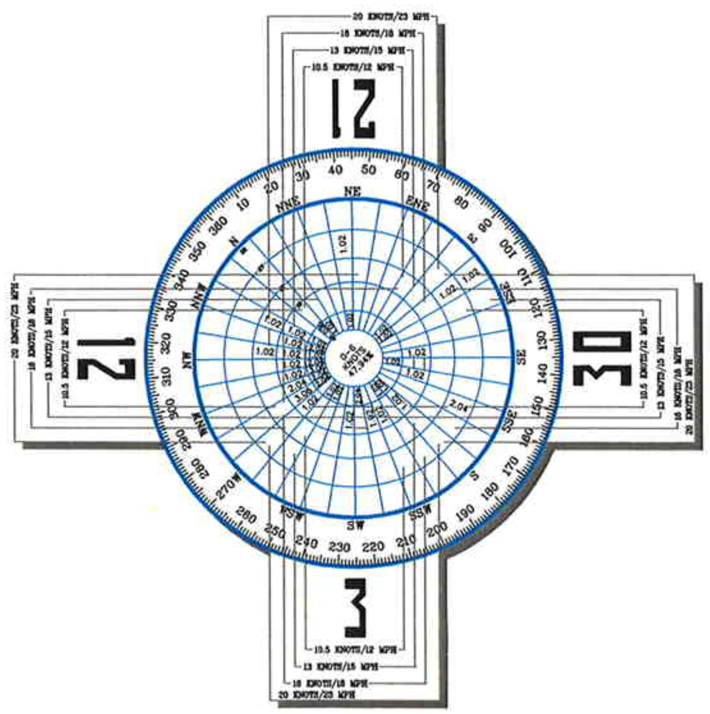
Runways	10.5 Knots 12 MPH	13 Knots 15 MPH	16 Knots 18 MPH	20 Knots 23 MPH
Runway 3-21	92.48%	95.90%	98.94%	99.77%
Runway 12-30	94.60%	97.16%	99.12%	99.79%
Combined	99.13%	99.79%	99.96%	100.00%



SOURCE:
NOAA National Climatic Center
Asheville, North Carolina
Tucson International Airport (TUS)
Tucson, Arizona

OBSERVATIONS:
78,617 All Weather Observations
98 IFR CAT-I Observations
1995-2004

Magnetic Variance
11° 04' East (May 2006)
Annual Rate of Change
00° 06' West (May 2006)



IFR WIND COVERAGE

Runways	10.5 Knots 12 MPH	13 Knots 15 MPH	16 Knots 18 MPH	20 Knots 23 MPH
Runway 3-21	80.69%	86.63%	91.75%	94.23%
Runway 12-30	92.62%	95.51%	97.88%	98.88%
Combined	96.73%	98.14%	99.00%	99.90%

AIRPORT DATA

MARANA REGIONAL AIRPORT (AVQ)

CITY: MARANA, ARIZONA | COUNTY: PIMA, ARIZONA | RANGE: 11 E | TOWNSHIP: 12 S

		EXISTING	ULTIMATE
AIRPORT SERVICE LEVEL		RELIEVER	RELIEVER
AIRPORT REFERENCE CODE		C-II	C-III
DESIGN AIRCRAFT		CANADAIR CL-600	BOEING 737-700 BBJ
AIRPORT ELEVATION		2031.3 MSL	2031.3 MSL
MEAN MAXIMUM TEMPERATURE OF HOTTEST MONTH		102.7° F (JULY)	102.7° F (JULY)
AIRPORT REFERENCE POINT (ARP) COORDINATES (NAD 83)	LATITUDE	32° 24' 34.400" N	32° 24' 26.189" N
	LONGITUDE	111° 13' 06.200" W	111° 13' 11.255" W
AIRPORT AND TERMINAL NAVIGATIONAL AIDS		SEGMENTED CIRCLE PAPI-4 (12/30) PAPI-2 (3/21) NDB (12) GPS (30)	SEGMENTED CIRCLE PAPI-4 (12L/12R/30L/30R) PAPI-2 (3/21) NDB (12L) MALSR (12L)
GPS APPROACH		3/12/21	3/12L/12R/21/30L/30R

RUNWAY DATA

RUNWAY DATA	RUNWAY 3-21				RUNWAY 12(L)-30(R)				RUNWAY 12R-30L			
	EXISTING		ULTIMATE		EXISTING		ULTIMATE		EXISTING		ULTIMATE	
	3	21	3	21	12	30	12L	30R	12R	30L	12R	30L
AIRCRAFT APPROACH CATEGORY-DESIGN GROUP	B-I		B-II		C-II		C-III		N/A		B-II	
APPROACH VISIBILITY MINIMUMS (LOWEST)	1 MILE	1 MILE	1 MILE	1 MILE	1 MILE	1 MILE	3/4 MILE	1 MILE			1 MILE	1 MILE
CRITICAL AIRCRAFT	KING AIR 100		CITATION 560XL		CANADAIR CL-600		BOEING 737-700 BBJ				CITATION 560XL	
CRITICAL AIRCRAFT WINGSPAN	45.9'		55.8'		61.8'		94.8'				55.8'	
CRITICAL AIRCRAFT UNDERCARRIAGE WIDTH	13.0'		14.9'		10.3'		17.2'				14.9'	
CRITICAL AIRCRAFT APPROACH SPEED (KNOTS)	111		117		125		140				117	
CRITICAL AIRCRAFT MAXIMUM CERTIFIED TAKEOFF WEIGHT (LBS.)	11,800		16,300		47,450		133,500				16,300	
F.A.R. PART 77 CATEGORY	C	C	C	C	C	C	PIR	C			C	C
PERCENTAGE OF WIND COVERAGE (ALL WEATHER IN MPH)	92.48%-12/95.90%-15/98.94%-18/99.77%-23		92.48%-12/95.90%-15/98.94%-18/99.77%-23		94.60%-12/97.16%-15/99.12%-18/99.79%-23		94.60%-12/97.16%-15/99.12%-18/99.79%-23				94.60%-12/97.16%-15/99.12%-18/99.79%-23	
MAXIMUM CERTIFIED TAKEOFF WEIGHT (in LBS) OF DESIGN AIRCRAFT	18,740		20,000		140,000		140,000				20,000	
LINE OF SIGHT REQUIREMENT MET	YES		YES		YES		YES				YES	
MAXIMUM ELEVATION (ABOVE MSL)	2025.9		2025.9		2031.3		2031.3				2017.0	
LOWEST ELEVATION (ABOVE MSL)	2019.0		2018.8		2010.6		2010.6				2014.0	
RUNWAY DIMENSIONS	3,893' x 75'		4,500' x 75'		6,901' x 100'		7,200' x 100'				4,700' x 75'	
RUNWAY BEARING (TRUE BEARING - DECIMAL DEGREES)	45.4798	225.4846	45.4786	225.4845	135.4736	315.4821	135.4736	315.4823			135.4774	315.4831
RUNWAY APPROACH SURFACES (F.A.R. PART 77)	34:1	34:1	34:1	34:1	34:1	34:1	50:1	34:1			34:1	34:1
RUNWAY END ELEVATION	2019.0	2024.6	2019.0	2024.6	2010.6	2031.3	2010.6	2032.1			2014.0	2017.0
RUNWAY THRESHOLD DISPLACEMENT	494'	0'	0'	0'	0'	0'	0'	0'			0'	0'
RUNWAY THRESHOLD SITING REQUIREMENTS (APPENDIX 2, CATEGORY)	3	3	3	3	7	7	8	7			3	3
RUNWAY STOPWAY	0'	0'	0'	0'	0'	0'	0'	0'			0'	0'
RUNWAY SAFETY AREA (RSA)	4,288' x 120'		5,100' x 150'		8,300' x 500'		9,200' x 500'				5,300' x 150'	
RUNWAY SAFETY AREA (RSA) BEYOND RUNWAY STOP END	240'	155'	300'	300'	943'	456'	1,000'	1,000'			300'	300'
RUNWAY OBSTACLE FREE ZONE (OFZ)	4,293' x 250'		4,900' x 250'		7,301' x 400'		7,600' x 400'				5,100' x 250'	
RUNWAY OBSTACLE FREE ZONE (OFZ) BEYOND RUNWAY STOP END	200'	200'	200'	200'	200'	200'	200'	200'			200'	200'
RUNWAY OBJECT FREE AREA (OFA)	4,275' x 400'		5,100' x 500'		7,425' x 800'		9,200' x 800'				5,300' x 500'	
RUNWAY OBJECT FREE AREA (OFA) BEYOND RUNWAY STOP END	142'	240'	300'	300'	183'	341'	1,000'	1,000'			300'	300'
RUNWAY PAVEMENT SURFACE MATERIAL	ASPHALT		ASPHALT		ASPHALT		ASPHALT				ASPHALT	
RUNWAY PAVEMENT STRENGTH (IN THOUSAND LBS.)[1]	20(S)		20(S)		30(S)/60(D)/140(DT)		30(S)/60(D)/140(DT)				20(S)	
RUNWAY EFFECTIVE GRADIENT	0.14%		0.11%		0.30%		0.30%				0.06%	
RUNWAY MAXIMUM GRADIENT	0.45%		0.45%		0.42%		0.42%				0.06%	
RUNWAY TOUCHDOWN ZONE ELEVATION (ABOVE MSL)	2025.9	2025.9	2024.9	2025.9	2021.8	2031.3	2021.8	2032.1			2015.9	2017.0
RUNWAY MARKING	BASIC	BASIC	BASIC	BASIC	Nonprecision	Nonprecision	Precision	Nonprecision			BASIC	BASIC
RUNWAY LIGHTING	MIRL		MIRL		MIRL		MIRL				MIRL	
RUNWAY APPROACH LIGHTING	NONE	NONE	NONE	NONE	NONE	NONE	MALSR	NONE			NONE	NONE
RUNWAY TO TAXIWAY SEPARATION (FROM CENTERLINE TO CENTERLINE)	240'		250'		408'		408'				250'	
RUNWAY HOLD LINE POSITION (FROM RUNWAY CENTERLINE)	125'		200'		250'		250'				200'	
TAXIWAY TO TAXILANE SEPARATION (FROM CENTERLINE TO CENTERLINE)	69'		105'		105'		152'				105'	
TAXIWAY CENTERLINE TO FIX OR MOVEABLE OBJECT	44.5'		65.5'		65.5'		93'				65.5'	
TAXIWAY LIGHTING	MITL		MITL		MITL		MITL				MITL	
TAXIWAY MARKING	CENTERLINE		CENTERLINE		CENTERLINE		CENTERLINE				CENTERLINE	
TAXIWAY SURFACE MATERIAL	ASPHALT		ASPHALT		ASPHALT		ASPHALT				ASPHALT	
TAXIWAY WINGTIP CLEARANCE	20'		26'		26'		34'				26'	
TAXIWAY WIDTH	35'		35'		50'		50'				35'	
TAXIWAY SAFETY AREA WIDTH	49'		79'		79'		118'				79'	
TAXIWAY OBJECT FREE AREA WIDTH	89'		131'		131'		186'				131'	
RUNWAY VISUAL NAVIGATIONAL AIDS	PAPI-2L	PAPI-2L	PAPI-2L REIL	PAPI-2L REIL	PAPI-4L REIL	PAPI-4L REIL	PAPI-4L REIL	PAPI-4L REIL			PAPI-2L REIL	PAPI-2L REIL
RUNWAY ELECTRONIC NAVIGATIONAL AIDS	GPS	GPS	GPS	GPS	NDB	GPS	GPS NDB	GPS			GPS	GPS

[1]Pavement strengths are expressed in Single(S), Dual(D), Dual Tandem(DT) and Double Dual Tandem(DDT) wheel loading capacities.

VICINITY MAP

LOCATION MAP

DEVIATIONS FROM FAA AIRPORT DESIGN STANDARDS

DEVIATION DESCRIPTION	EFFECTED DESIGN STANDARD	STANDARD	EXISTING	PROPOSED DISPOSITION
PROPERTY LINE/FENCE/SERVICE ROAD/W AVRA VALLEY ROAD EXTENDS THROUGH RUNWAY 3 OFA	RUNWAY OBJECT FREE AREA (OFA)	240' BEYOND RUNWAY END	142' BEYOND RUNWAY END	EXTEND RUNWAY-RELOCATE PROPERTY LINE/FENCE/SERVICE ROAD/W AVRA VALLEY ROAD
SERVICE ROAD EXTENDS THROUGH RUNWAY 12 RSA	RUNWAY SAFETY AREA (RSA)	1,000' BEYOND RUNWAY END	943' BEYOND RUNWAY END	RELOCATE SERVICE ROAD
PROPERTY LINE/FENCE/SERVICE ROAD EXTENDS THROUGH RUNWAY 21 OFA	RUNWAY OBJECT FREE AREA (OFA)	1,000' BEYOND RUNWAY END	183' BEYOND RUNWAY END	RELOCATE PROPERTY LINE/FENCE/SERVICE ROAD
SERVICE ROAD EXTENDS THROUGH RUNWAY 21 RSA	RUNWAY SAFETY AREA (RSA)	240' BEYOND RUNWAY END	155' BEYOND RUNWAY END	EXTEND RUNWAY-RELOCATE SERVICE ROAD
PROPERTY LINE/FENCE/SERVICE ROAD/W AVRA VALLEY ROAD EXTENDS THROUGH RUNWAY 30 RSA	RUNWAY SAFETY AREA (RSA)	1,000' BEYOND RUNWAY END	456' BEYOND RUNWAY END	EXTEND RUNWAY-RELOCATE PROPERTY LINE/FENCE/SERVICE ROAD/W AVRA VALLEY ROAD
PROPERTY LINE/FENCE/SERVICE ROAD/W AVRA VALLEY ROAD EXTENDS THROUGH RUNWAY 30 OFA	RUNWAY OBJECT FREE AREA (OFA)	1,000' BEYOND RUNWAY END	341' BEYOND RUNWAY END	EXTEND RUNWAY-RELOCATE PROPERTY LINE/FENCE/SERVICE ROAD/W AVRA VALLEY ROAD
"MARANA REGIONAL AIRPORT 123.0" PAINTED ON TAXIWAY A	TAXIWAY MARKINGS	NO NONSTANDARD MARKINGS	MARANA REGIONAL AIRPORT 123.0	TO BE REMOVED

RUNWAY END COORDINATES (NAD 83)

RUNWAY		EXISTING	ULTIMATE
Runway 3	Latitude	32° 24' 12.380" N	32° 24' 10.298" N
	Longitude	111° 13' 22.375" W	111° 13' 24.869" W
Runway 3 Displaced Threshold	Latitude	32° 24' 15.810" N	N/A
	Longitude	111° 13' 18.263" W	N/A
Runway 21	Latitude	32° 24' 39.386" N	32° 24' 42.905" N
	Longitude	111° 12' 50.000" W	111° 12' 45.780" W
Runway 12(L)	Latitude	32° 25' 03.612" N	32° 25' 03.612" N
	Longitude	111° 13' 34.356" W	111° 13' 34.356" W
Runway 30(R)	Latitude	32° 24' 14.932" N	32° 24' 12.817" N
	Longitude	111° 12' 37.919" W	111° 12' 35.467" W
Runway 12R	Latitude	N/A	32° 24' 23.931" N
	Longitude	N/A	111° 13' 46.123" W
Runway 30L	Latitude	N/A	32° 23' 50.772" N
	Longitude	N/A	111° 13' 07.687" W

No.	REVISIONS	DATE	BY	APP'D.
3	MASTER PLAN	5/10/07	CA	-
2	UPDATE AIRPORT MASTER PLAN	8/9/99	CA	-
1	UPDATE BASED ON SIGNIFICANT AIRPORT CHANGES SINCE 8/21/91 APPROVAL	2/18/98	FAA	-

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MARANA REGIONAL AIRPORT (AVQ)

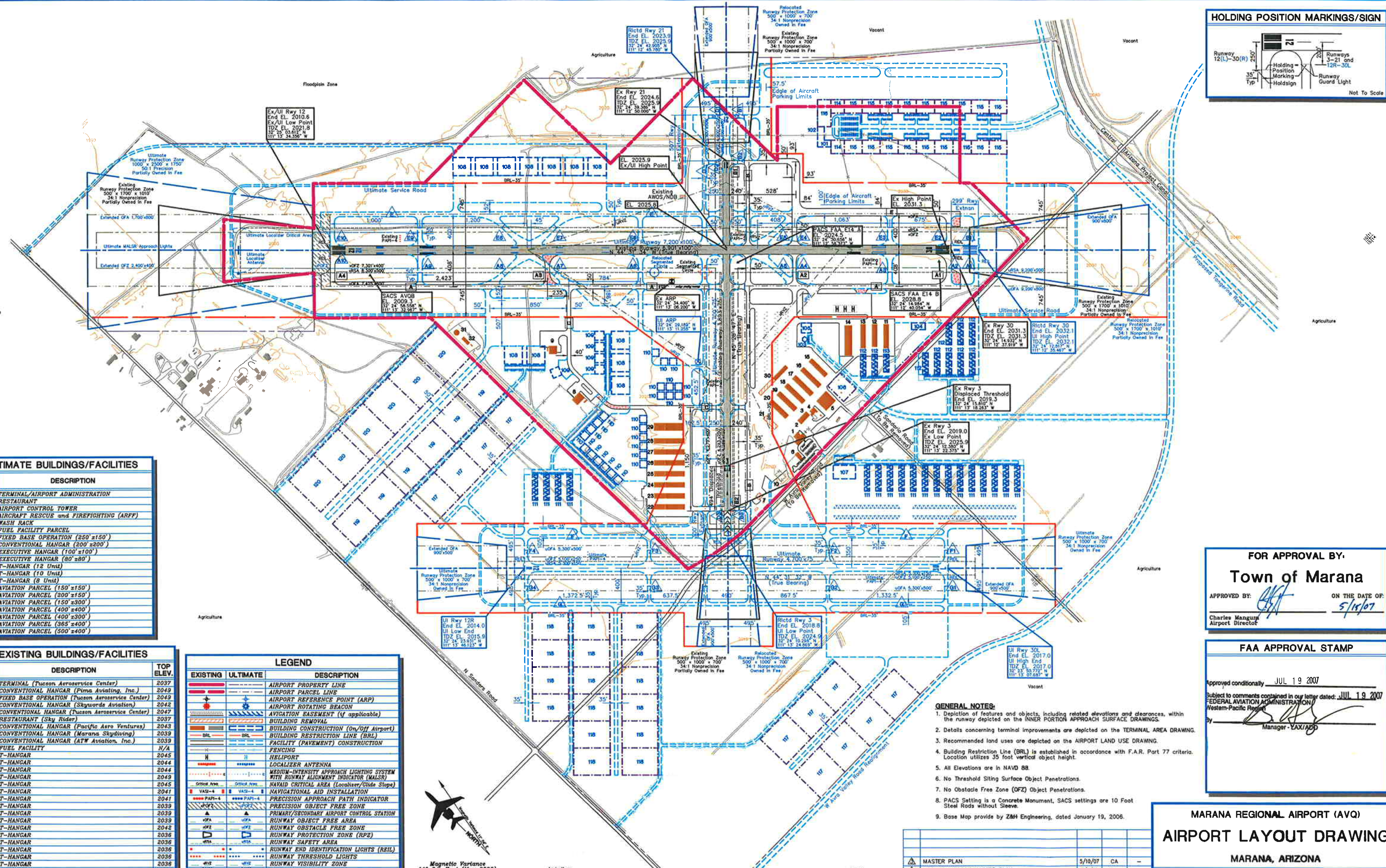
DATA SHEET

MARANA, ARIZONA

PLANNED BY: Eric S. Pfeifer
DETAILED BY: Richard A. Lolly
APPROVED BY: Steven S. Benson

May 11, 2007 — SHEET 1 OF 12

Coffman Associates Airport Consultants



ULTIMATE BUILDINGS/FACILITIES

BLDG. NO.	DESCRIPTION
101	TERMINAL/AIRPORT ADMINISTRATION
102	RESTAURANT
103	AIRPORT CONTROL TOWER
104	AIRCRAFT RESCUE and FIREFIGHTING (ARFF)
105	WASH RACK
106	FUEL FACILITY PARCEL
107	FIXED BASE OPERATION (250'x150')
108	CONVENTIONAL HANGAR (200'x200')
109	EXECUTIVE HANGAR (100'x100')
110	EXECUTIVE HANGAR (80'x80')
111	T-HANGAR (12 Unit)
112	T-HANGAR (10 Unit)
113	T-HANGAR (8 Unit)
114	AVIATION PARCEL (150'x150')
115	AVIATION PARCEL (300'x150')
116	AVIATION PARCEL (150'x300')
117	AVIATION PARCEL (400'x400')
118	AVIATION PARCEL (400'x300')
119	AVIATION PARCEL (365'x400')
120	AVIATION PARCEL (500'x400')

EXISTING BUILDINGS/FACILITIES

BLDG. NO.	DESCRIPTION	TOP ELEV.
1	TERMINAL (Tucson Aeroservice Center)	2037
2	CONVENTIONAL HANGAR (Pima Aviating, Inc.)	2049
3	FIXED BASE OPERATION (Tucson Aeroservice Center)	2049
4	CONVENTIONAL HANGAR (Skywords Aviation)	2042
5	CONVENTIONAL HANGAR (Tucson Aeroservice Center)	2047
6	RESTAURANT (Sky Rider)	2037
7	CONVENTIONAL HANGAR (Pacific Aero Ventures)	2043
8	CONVENTIONAL HANGAR (Marana Skydiving)	2039
9	CONVENTIONAL HANGAR (ATW Aviation, Inc.)	2039
10	FUEL FACILITY	N/A
11	T-HANGAR	2045
12	T-HANGAR	2044
13	T-HANGAR	2044
14	T-HANGAR	2049
15	T-HANGAR	2045
16	T-HANGAR	2041
17	T-HANGAR	2041
18	T-HANGAR	2039
19	T-HANGAR	2039
20	T-HANGAR	2039
21	T-HANGAR	2042
22	T-HANGAR	2036
23	T-HANGAR	2036
24	T-HANGAR	2036
25	T-HANGAR	2036
26	T-HANGAR	2036
27	T-HANGAR	2036
28	T-HANGAR	2036
29	T-HANGAR	2043
30	SHADE HANGAR	2040
31	FIRE SUPPRESSION STORAGE TANK	
32	FIRE SUPPRESSION BUILDING	

LEGEND

EXISTING	ULTIMATE	DESCRIPTION
		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
		HELIPORT
		LOCALIZER ANTENNA
		MEDIUM-INTENSITY APPROACH LIGHTING SYSTEM WITH RUNWAY ALIGNMENT INDICATOR (MALSR)
Critical Area	Critical Area	NAVAID CRITICAL AREA (Localizer/Glide Slope)
VASI-4	VASI-4	NAVIGATIONAL AID INSTALLATION
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
xRVZ	uRVZ	RUNWAY VISIBILITY ZONE
		SECTION CORNER
		SEGMENTED CIRCLE/WIND INDICATOR
		TAXIWAY DESIGNATION
		TAXIWAY HOLD LINE
		TOPOGRAPHY
		WIND INDICATOR (Lighted)

GENERAL NOTES:

1. Depiction of features and objects, including related elevations and clearances, within the runway depicted on the INNER PORTION APPROACH SURFACE DRAWINGS.
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. Building Restriction Line (BRL) is established in accordance with F.A.R. Part 77 criteria. Location utilizes 35 foot vertical object height.
5. All Elevations are in NAVD 88.
6. No Threshold Siting Surface Object Penetrations.
7. No Obstacle Free Zone (OFZ) Object Penetrations.
8. PACS Setting is a Concrete Monument, SACS settings are 10 Foot Steel Rods without Sleeve.
9. Base Map provide by Z&H Engineering, dated January 19, 2006.

FOR APPROVAL BY:

Town of Marana

APPROVED BY: [signature] ON THE DATE OF: 5/15/07

Charles Mangum
Airport Director

FAA APPROVAL STAMP

Approved conditionally JUL 19 2007

Subject to comments contained in our letter dated: JUL 19 2007

FEDERAL AVIATION ADMINISTRATION
Western-Pacific Region

By [signature]
Manager - LAX/ADO

No.	REVISIONS	DATE	BY	APP'D.
△	MASTER PLAN	5/10/07	CA	–
△	UPDATE AIRPORT MASTER PLAN	8/9/99	CA	–
△	UPDATE BASED ON SIGNIFICANT AIRPORT CHANGES SINCE 8/21/91 APPROVAL	2/18/98	FAA	–

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MARANA REGIONAL AIRPORT (AVQ)

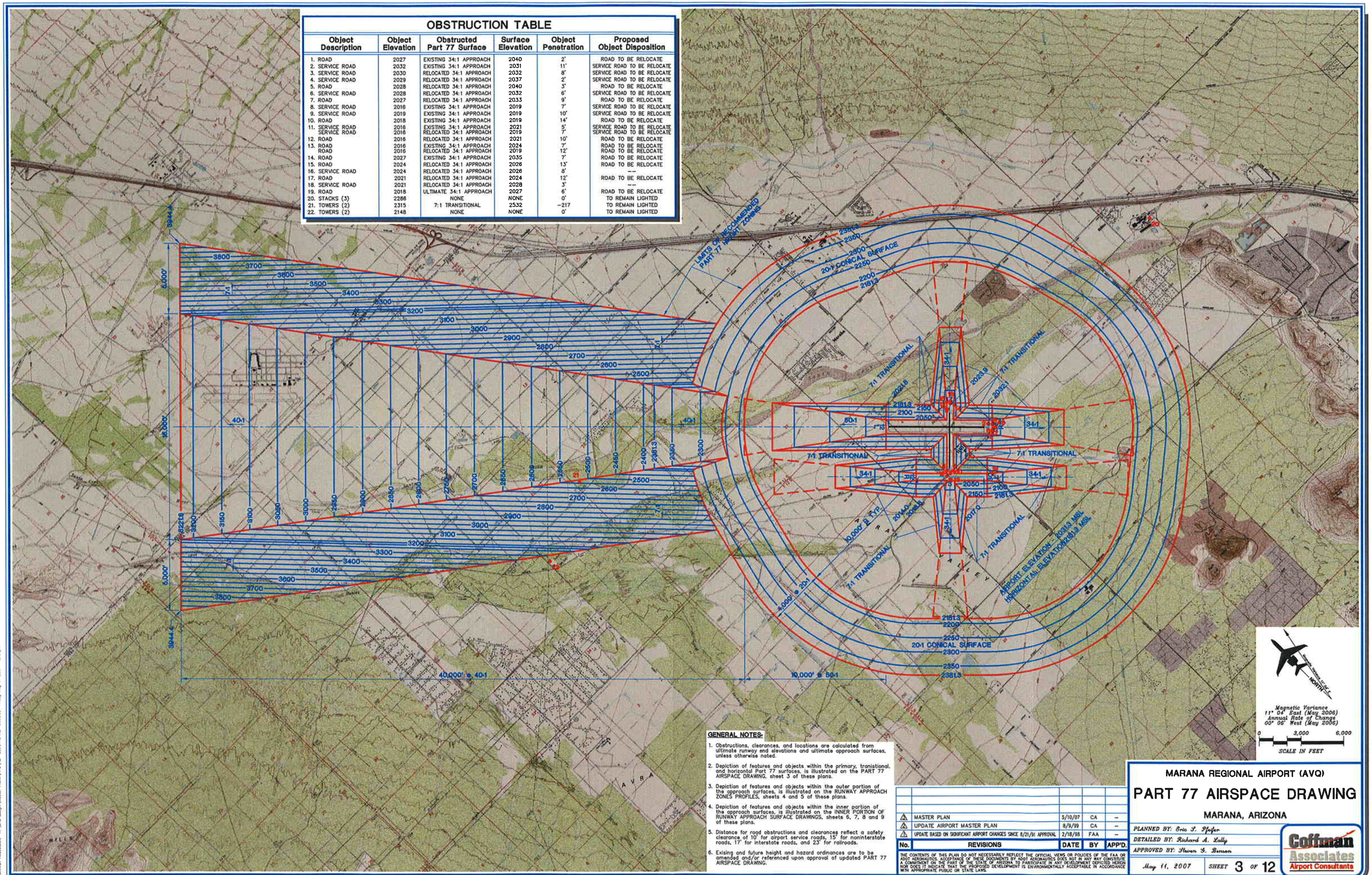
AIRPORT LAYOUT DRAWING

MARANA, ARIZONA

PLANNED BY: Eric S. Pfeifer
DETAILED BY: Richard A. Lolly
APPROVED BY: Steven G. Benson

May 11, 2007 | SHEET 2 OF 12

Coffman Associates
Airport Consultants



OBSTRUCTION TABLE

Object Description	Object Elevation	Obstructed Part 77 Surface	Surface Elevation	Object Penetration	Proposed Object Disposition
1. ROAD	2027	EXISTING 34:1 APPROACH	2040	2'	ROAD TO BE RELOCATE
2. SERVICE ROAD	2032	EXISTING 34:1 APPROACH	2031	11'	SERVICE ROAD TO BE RELOCATE
3. SERVICE ROAD	2030	RELOCATED 34:1 APPROACH	2032	8'	SERVICE ROAD TO BE RELOCATE
4. SERVICE ROAD	2029	RELOCATED 34:1 APPROACH	2037	2'	SERVICE ROAD TO BE RELOCATE
5. ROAD	2028	RELOCATED 34:1 APPROACH	2040	3'	ROAD TO BE RELOCATE
6. SERVICE ROAD	2028	RELOCATED 34:1 APPROACH	2032	6'	SERVICE ROAD TO BE RELOCATE
7. ROAD	2027	RELOCATED 34:1 APPROACH	2033	9'	ROAD TO BE RELOCATE
8. SERVICE ROAD	2016	EXISTING 34:1 APPROACH	2019	7'	SERVICE ROAD TO BE RELOCATE
9. SERVICE ROAD	2019	EXISTING 34:1 APPROACH	2019	10'	SERVICE ROAD TO BE RELOCATE
10. ROAD	2018	EXISTING 34:1 APPROACH	2019	14'	ROAD TO BE RELOCATE
11. SERVICE ROAD	2016	EXISTING 34:1 APPROACH	2021	5'	SERVICE ROAD TO BE RELOCATE
SERVICE ROAD	2016	RELOCATED 34:1 APPROACH	2019	7'	SERVICE ROAD TO BE RELOCATE
12. ROAD	2016	RELOCATED 34:1 APPROACH	2021	10'	ROAD TO BE RELOCATE
13. ROAD	2016	EXISTING 34:1 APPROACH	2024	7'	ROAD TO BE RELOCATE
ROAD	2016	RELOCATED 34:1 APPROACH	2019	12'	ROAD TO BE RELOCATE
14. ROAD	2027	EXISTING 34:1 APPROACH	2035	7'	ROAD TO BE RELOCATE
15. ROAD	2024	RELOCATED 34:1 APPROACH	2026	13'	ROAD TO BE RELOCATE
16. SERVICE ROAD	2024	RELOCATED 34:1 APPROACH	2026	8'	--
17. ROAD	2021	RELOCATED 34:1 APPROACH	2024	12'	ROAD TO BE RELOCATE
18. SERVICE ROAD	2021	RELOCATED 34:1 APPROACH	2028	3'	--
19. ROAD	2018	ULTIMATE 34:1 APPROACH	2027	6'	ROAD TO BE RELOCATE
20. STACKS (3)	2286	NONE	NONE	0'	TO REMAIN LIGHTED
21. TOWERS (2)	2315	7:1 TRANSITIONAL	2532	-217	TO REMAIN LIGHTED
22. TOWERS (2)	2148	NONE	NONE	0'	TO REMAIN LIGHTED

GENERAL NOTES:

1. Obstructions, clearances, and locations are calculated from ultimate runway end elevations and ultimate approach surfaces, unless otherwise noted.
2. Depiction of features and objects within the primary, tranistional, and horizontal Part 77 surfaces, is illustrated on the PART 77 AIRSPACE DRAWING, sheet 3 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 6, 7, 8 and 9 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.
3	MASTER PLAN	5/10/07	CA	–
2	UPDATE AIRPORT MASTER PLAN	8/9/99	CA	–
1	UPDATE BASED ON SIGNIFICANT AIRPORT CHANGES SINCE 8/21/91 APPROVAL	2/18/98	FAA	–

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MARANA REGIONAL AIRPORT (AVQ)

PART 77 AIRSPACE DRAWING

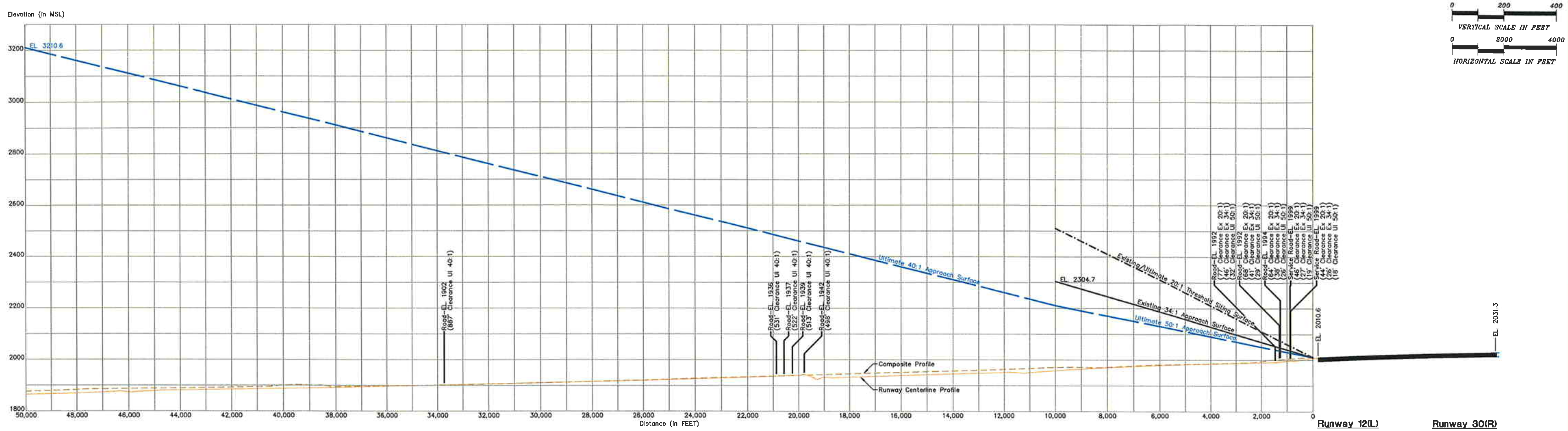
MARANA, ARIZONA

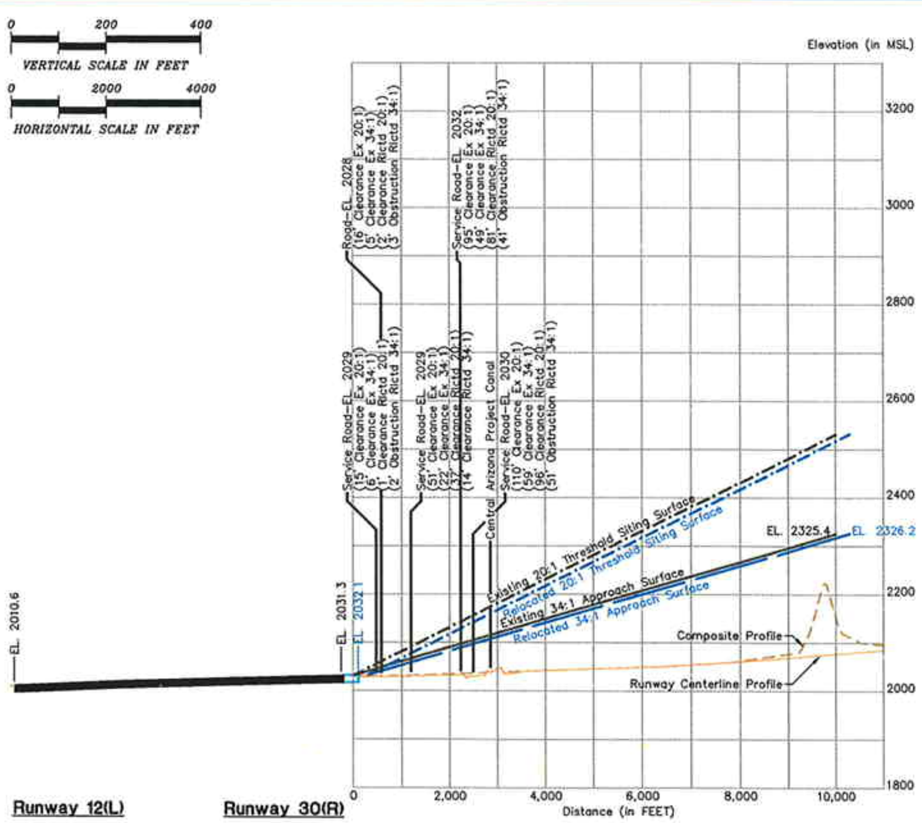
PLANNED BY: Eric S. Pfeifer
DETAILED BY: Richard A. Lally
APPROVED BY: Steven G. Benson

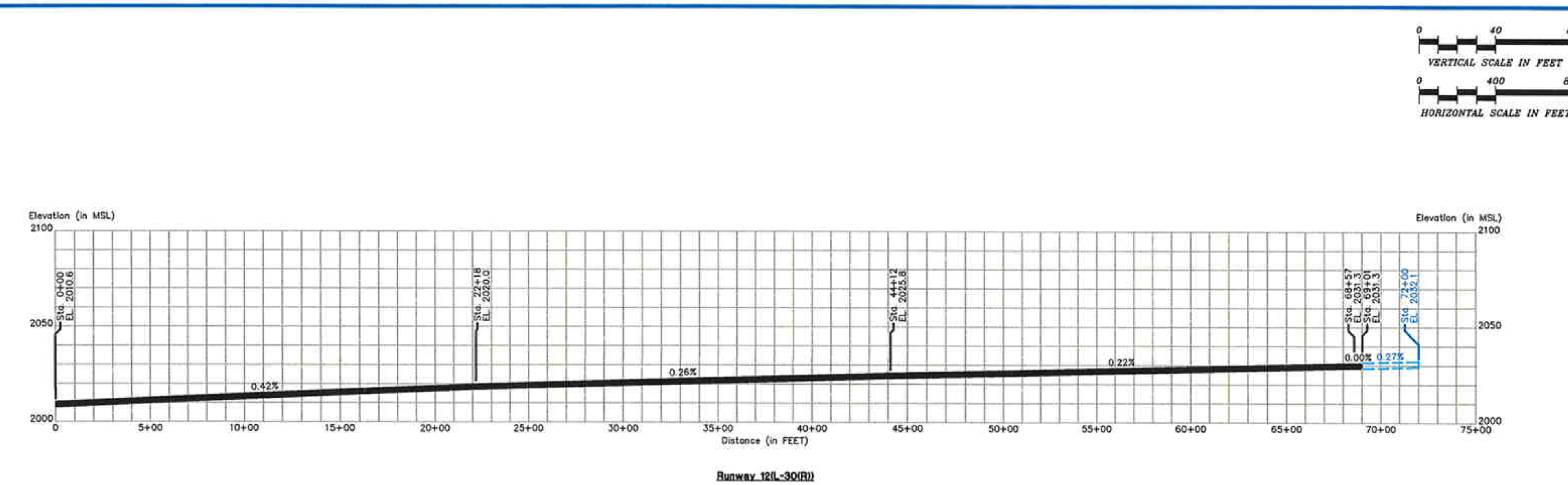
May 11, 2007

SHEET 3 OF 12

Coffman Associates Airport Consultants







GENERAL NOTES:

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2. Depiction of features and objects within the primary, tranistional, and horizontal Part 77 surfaces, is illustrated on the PART 77 AIRSPACE DRAWING, sheet 3 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 6, 7, 8 and 9 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.
△	MASTER PLAN	5/10/07	CA	–
△	UPDATE AIRPORT MASTER PLAN	8/9/99	CA	–
△	UPDATE BASED ON SIGNIFICANT AIRPORT CHANGES SINCE 8/21/91 APPROVAL	2/18/98	FAA	–

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MARANA REGIONAL AIRPORT (AVQ)

APPROACH ZONE PROFILES
RUNWAY 12(L)-30(R)/RUNWAY PROFILE

MARANA, ARIZONA

PLANNED BY: Eric S. Pfeifer
DETAILED BY: Richard A. Lally
APPROVED BY: Steven G. Benson

May 11, 2007 | SHEET 4 OF 12

Coffman Associates Airport Consultants

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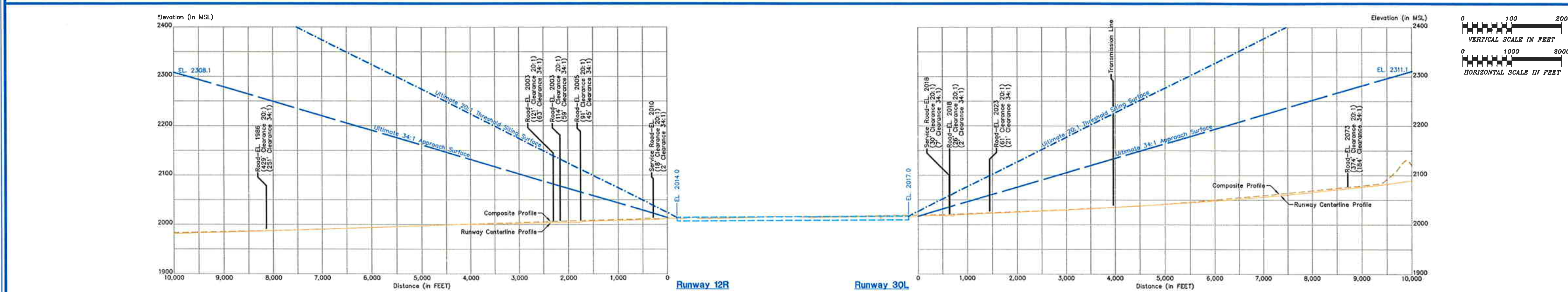

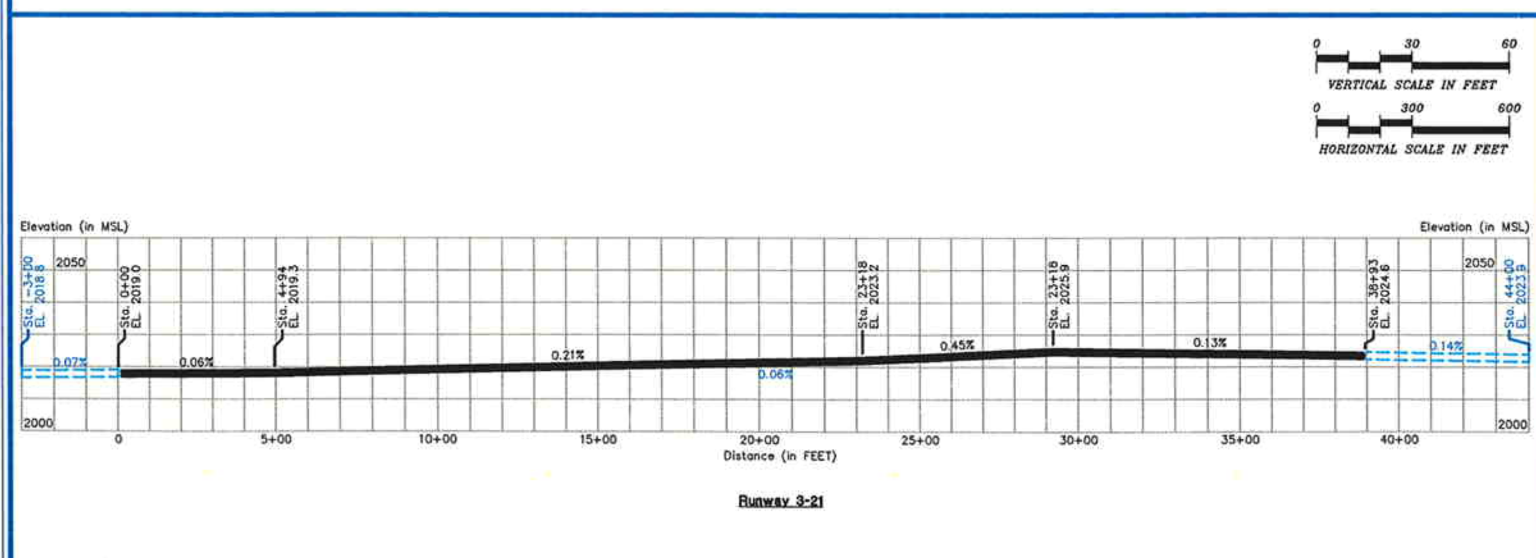

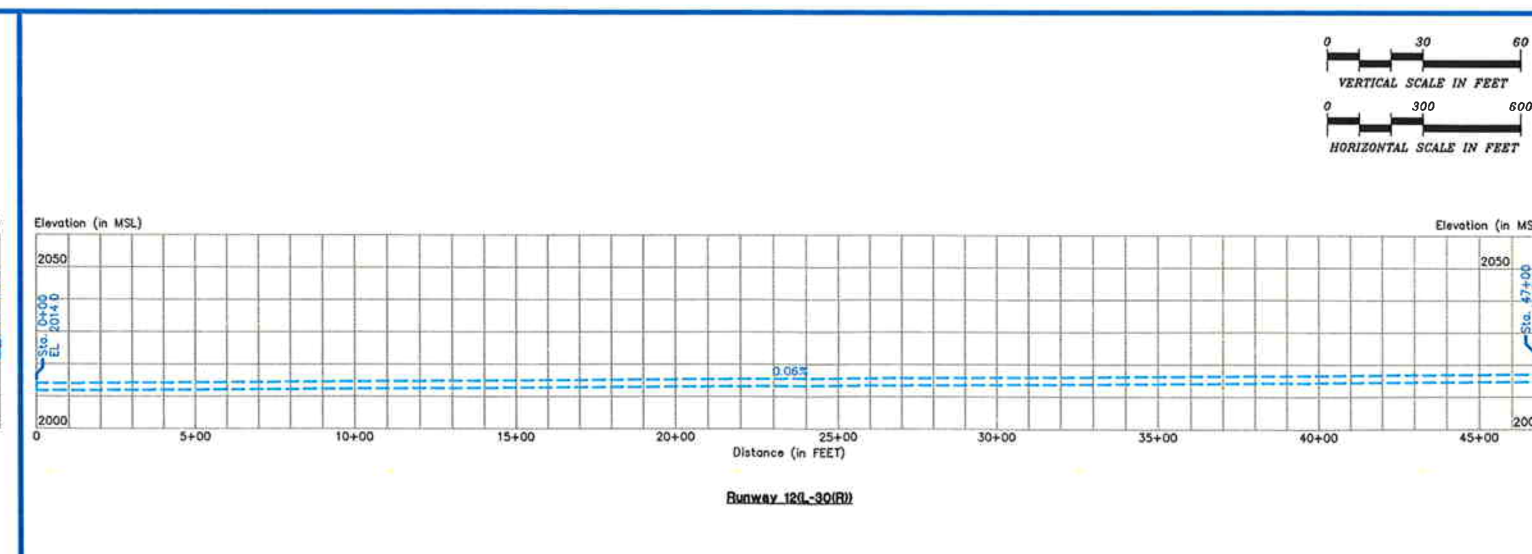

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6. Exising and future height and hazard ordinances are to be amended and/or referenced upon approval of updated PART 77 AIRSPACE DRAWING.

No.	REVISIONS	DATE	BY	APP'D.
△	MASTER PLAN	5/10/07	CA	–
△	UPDATE AIRPORT MASTER PLAN	8/9/99	CA	–
△	UPDATE BASED ON SIGNIFICANT AIRPORT CHANGES SINCE 8/21/91 APPROVAL	2/18/98	FAA	–

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MARANA REGIONAL AIRPORT (AVQ)

APPROACH ZONE PROFILES RUNWAYS 3-21 AND 12R-30L/RUNWAY PROFILES

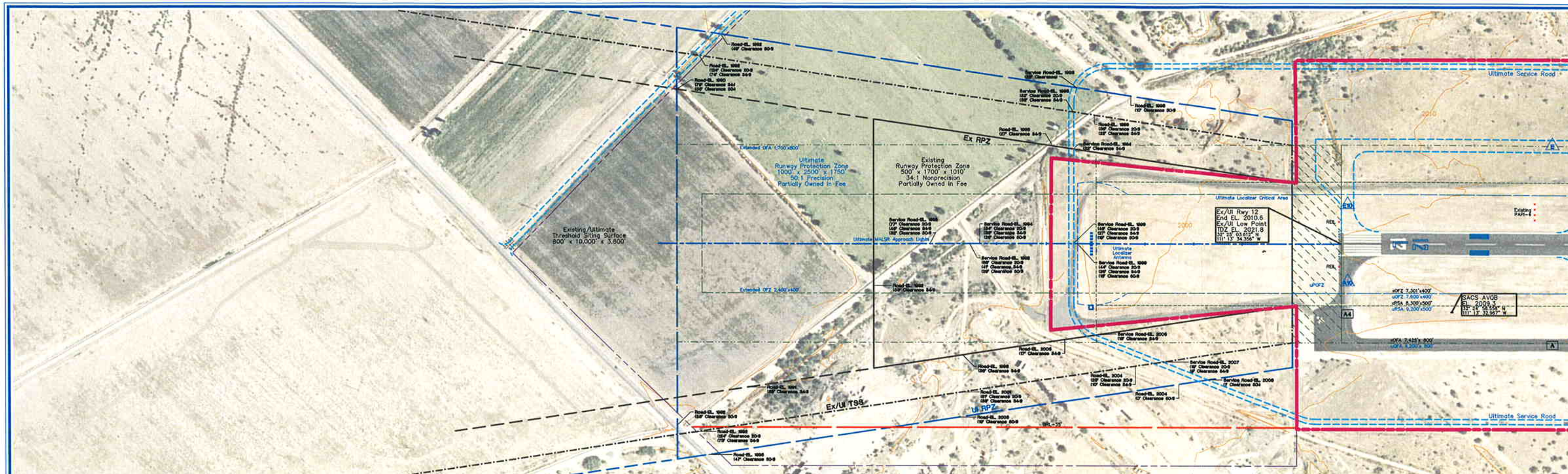
MARANA, ARIZONA

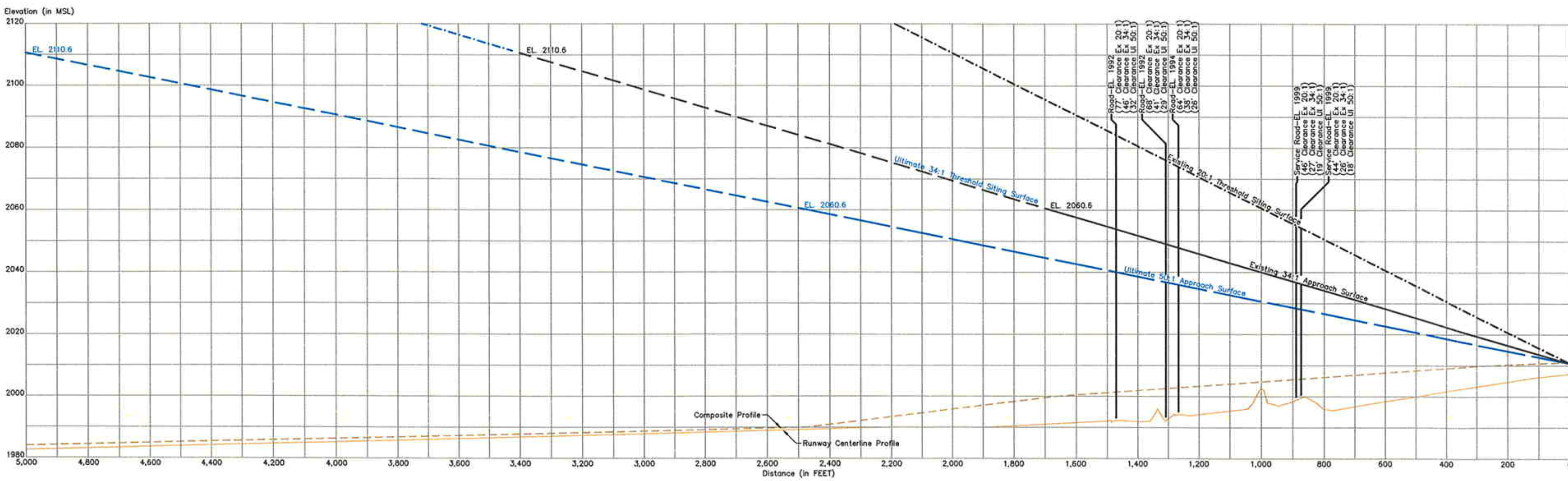
PLANNED BY: Eric S. Pfeifer
DETAILED BY: Richard A. Lally
APPROVED BY: Steven G. Benson

May 11, 2007

SHEET 5 OF 12

Coffman Associates
Airport Consultants





Runway 12(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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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	Object Elevation	Obstructed Part 77 Surface	Surface Elevation	Object Penetration	Proposed Object Disposition
NONE					

No.	REVISIONS	DATE	BY	APP'D.
△	MASTER PLAN	5/10/07	CA	–
△	UPDATE AIRPORT MASTER PLAN	8/9/99	CA	–
△	UPDATE BASED ON SIGNIFICANT AIRPORT CHANGES SINCE 8/21/91 APPROVAL	2/18/98	FAA	–

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MARANA REGIONAL AIRPORT (AVQ)

INNER PORTION OF RUNWAY 12(L) APPROACH SURFACE DRAWING

MARANA, ARIZONA

PLANNED BY: Eric S. Pfeifer
DETAILED BY: Richard A. Lally
APPROVED BY: Steven G. Benson

May 11, 2007 — SHEET 6 OF 12

Coffman Associates Airport Consultants

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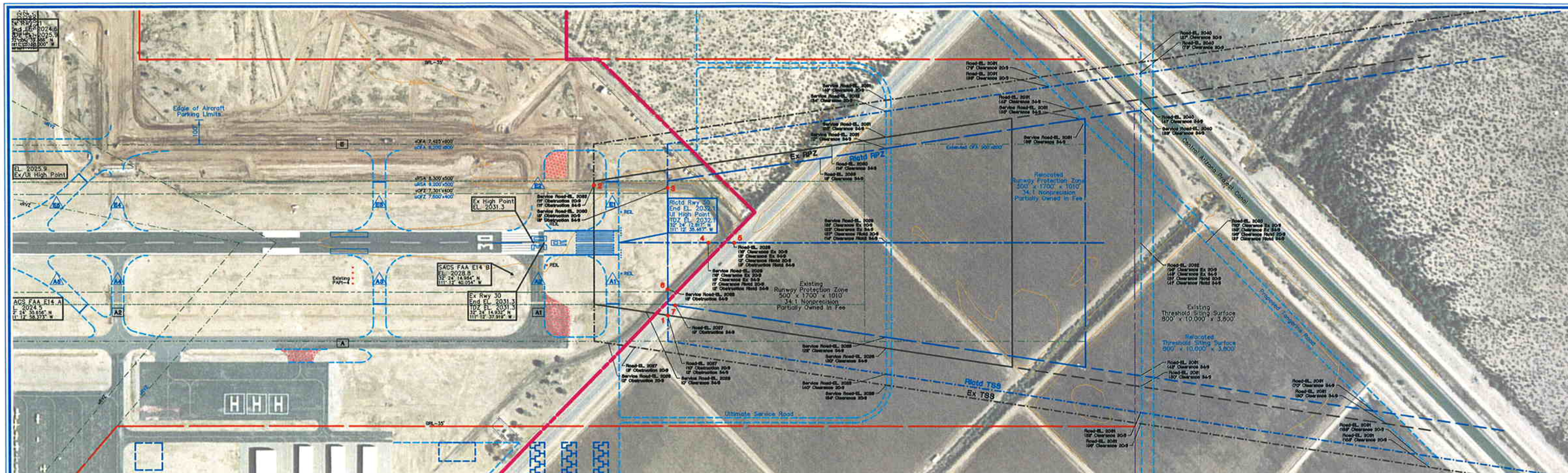

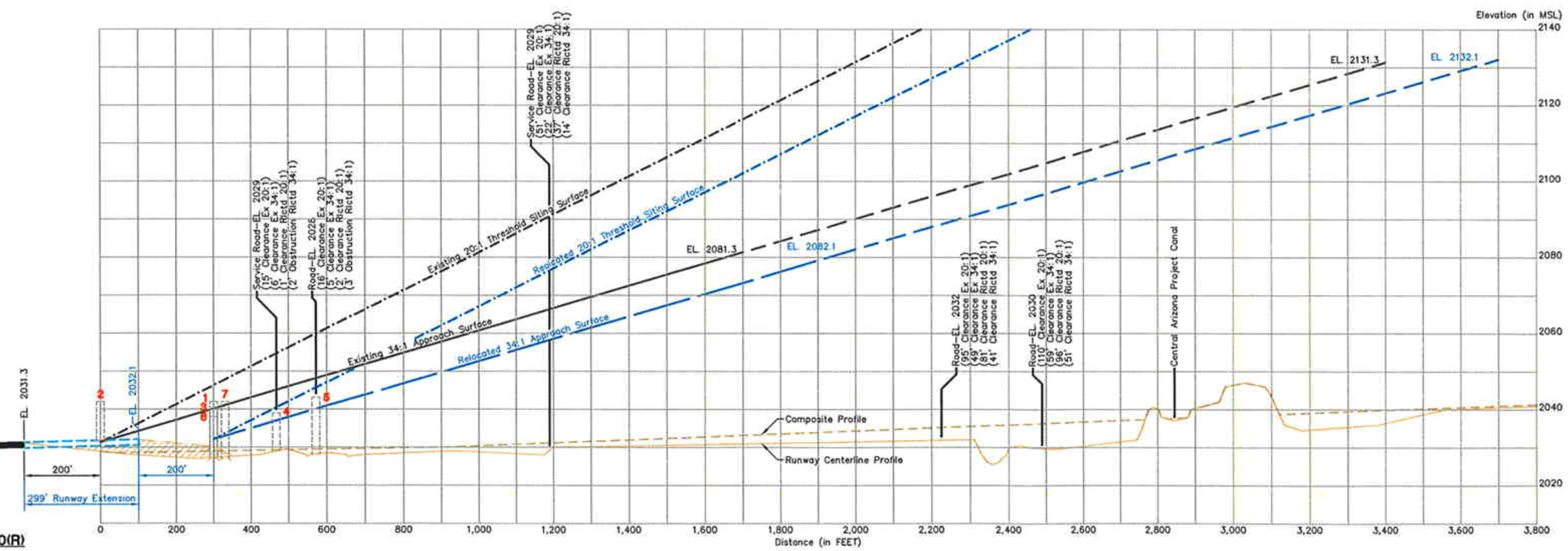

Runway 30(R)

GENERAL NOTES:

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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.
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	Object Elevation	Obstructed Part 77 Surface	Surface Elevation	Object Penetration	Proposed Object Disposition
1. ROAD	2027	EXISTING 34:1 APPROACH	2040	2'	ROAD TO BE RELOCATE
2. SERVICE ROAD	2032	EXISTING 34:1 APPROACH	2031	11'	SERVICE ROAD TO BE RELOCATE
3. SERVICE ROAD	2030	RELOCATED 34:1 APPROACH	2032	8'	SERVICE ROAD TO BE RELOCATE
4. SERVICE ROAD	2029	RELOCATED 34:1 APPROACH	2037	2'	SERVICE ROAD TO BE RELOCATE
5. ROAD	2028	RELOCATED 34:1 APPROACH	2040	3'	ROAD TO BE RELOCATE
6. SERVICE ROAD	2028	RELOCATED 34:1 APPROACH	2032	6'	SERVICE ROAD TO BE RELOCATE
7. ROAD	2027	RELOCATED 34:1 APPROACH	2033	9'	ROAD TO BE RELOCATE

No.	REVISIONS	DATE	BY	APP'D.
△	MASTER PLAN	5/10/07	CA	–
△	UPDATE AIRPORT MASTER PLAN	8/9/99	CA	–
△	UPDATE BASED ON SIGNIFICANT AIRPORT CHANGES SINCE 8/21/91 APPROVAL	2/18/98	FAA	–

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MARANA REGIONAL AIRPORT (AVQ)

INNER PORTION OF RUNWAY 30(R) APPROACH SURFACE DRAWING

MARANA, ARIZONA

PLANNED BY: Eric S. Pfeifer
DETAILED BY: Richard A. Lally
APPROVED BY: Steven G. Benson

May 11, 2007

Coffman Associates Airport Consultants

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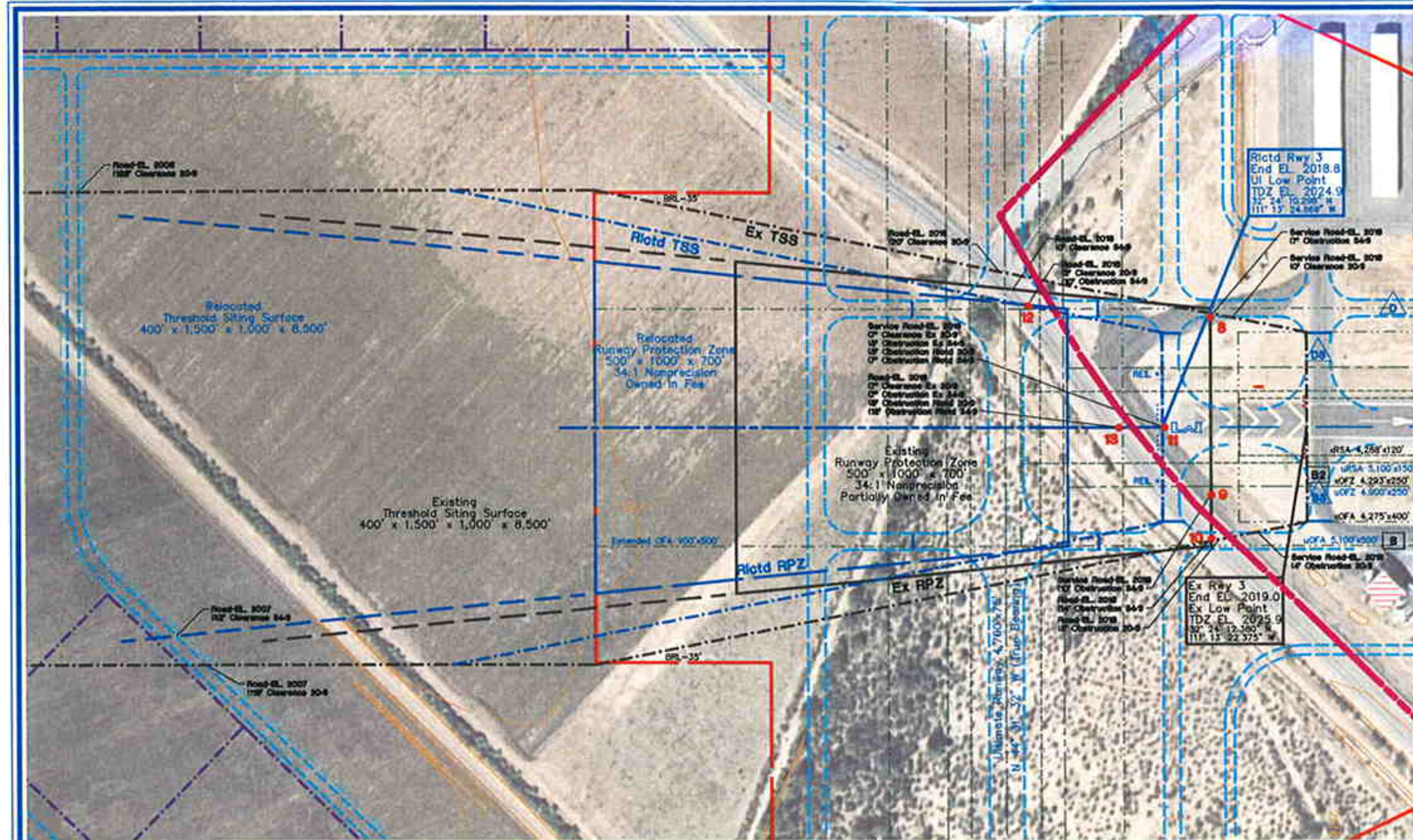

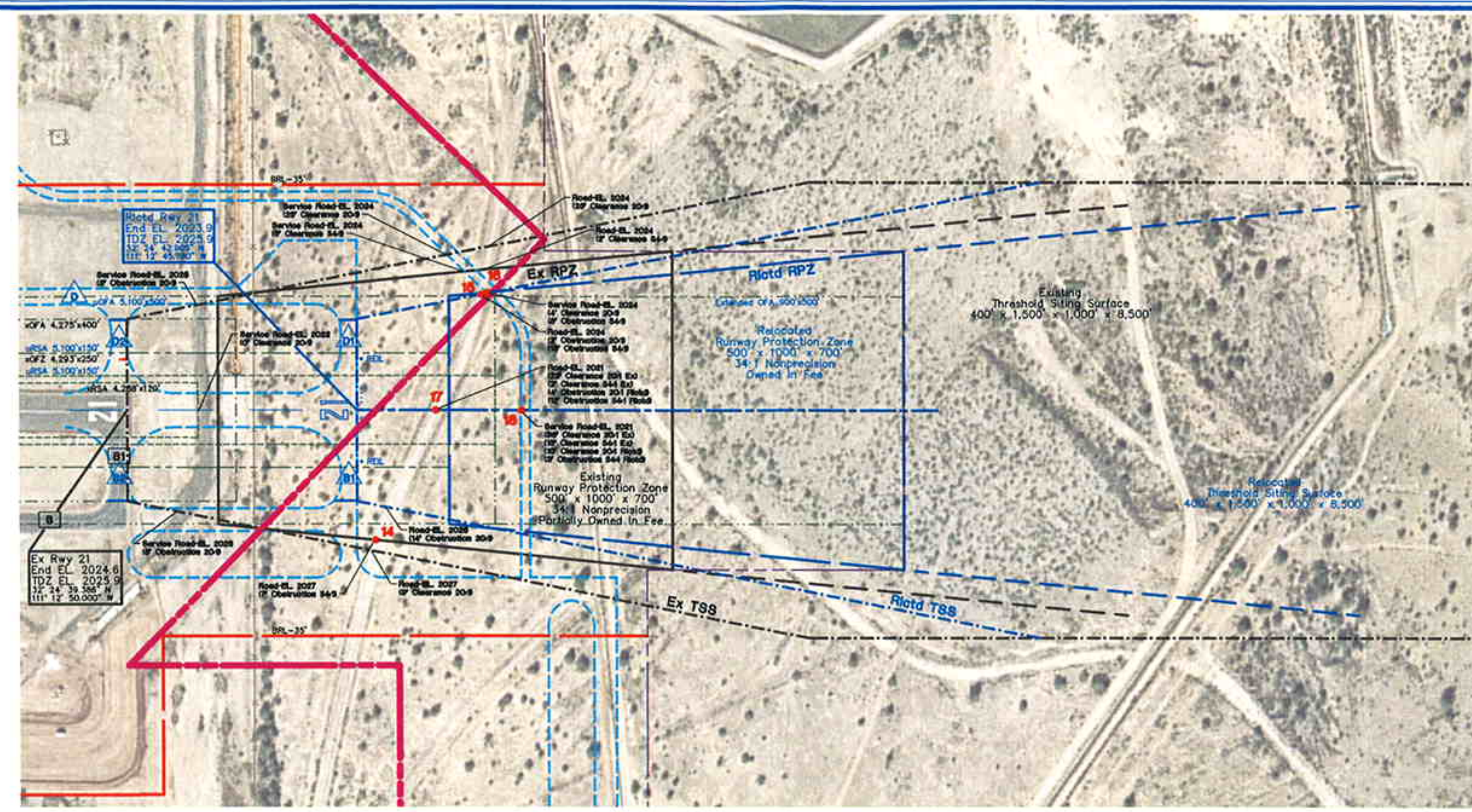

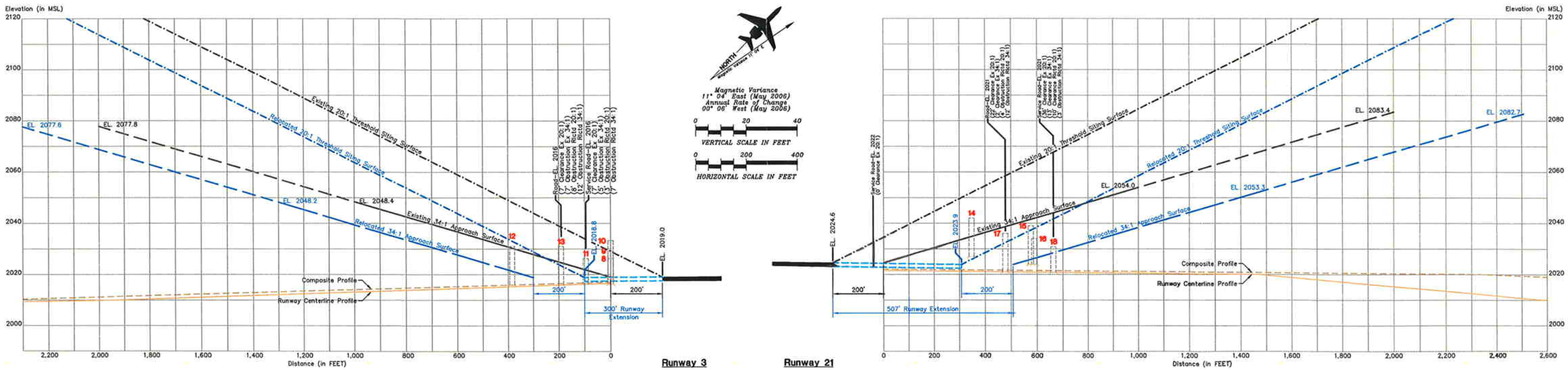

OBSTRUCTION TABLE

Object Description	Object Elevation	Obstructed Part 77 Surface	Surface Elevation	Object Penetration	Proposed Object Disposition
8. SERVICE ROAD	2016	EXISTING 34:1 APPROACH	2019	7'	SERVICE ROAD TO BE RELOCATE
9. SERVICE ROAD	2019	EXISTING 34:1 APPROACH	2019	10'	SERVICE ROAD TO BE RELOCATE
10. ROAD	2018	EXISTING 34:1 APPROACH	2019	14'	ROAD TO BE RELOCATE
11. SERVICE ROAD	2016	EXISTING 34:1 APPROACH	2021	5'	SERVICE ROAD TO BE RELOCATE
SERVICE ROAD	2016	RELOCATED 34:1 APPROACH	2019	7'	SERVICE ROAD TO BE RELOCATE
12. ROAD	2016	RELOCATED 34:1 APPROACH	2021	10'	ROAD TO BE RELOCATE
13. ROAD	2016	EXISTING 34:1 APPROACH	2024	7'	ROAD TO BE RELOCATE
ROAD	2016	RELOCATED 34:1 APPROACH	2019	12'	ROAD TO BE RELOCATE
14. ROAD	2027	EXISTING 34:1 APPROACH	2035	7'	ROAD TO BE RELOCATE
15. ROAD	2024	RELOCATED 34:1 APPROACH	2026	13'	ROAD TO BE RELOCATE
16. SERVICE ROAD	2024	RELOCATED 34:1 APPROACH	2026	8'	--
17. ROAD	2021	RELOCATED 34:1 APPROACH	2024	12'	ROAD TO BE RELOCATE
18. SERVICE ROAD	2021	RELOCATED 34:1 APPROACH	2028	3'	--

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No.	REVISIONS	DATE	BY	APP'D.
3	MASTER PLAN	5/10/07	CA	–
2	UPDATE AIRPORT MASTER PLAN	8/9/99	CA	–
1	UPDATE BASED ON SIGNIFICANT AIRPORT CHANGES SINCE 8/21/91 APPROVAL	2/18/98	FAA	–

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MARANA REGIONAL AIRPORT (AVQ)

INNER PORTION OF RUNWAYS 3-21 APPROACH SURFACES DRAWING

MARANA, ARIZONA

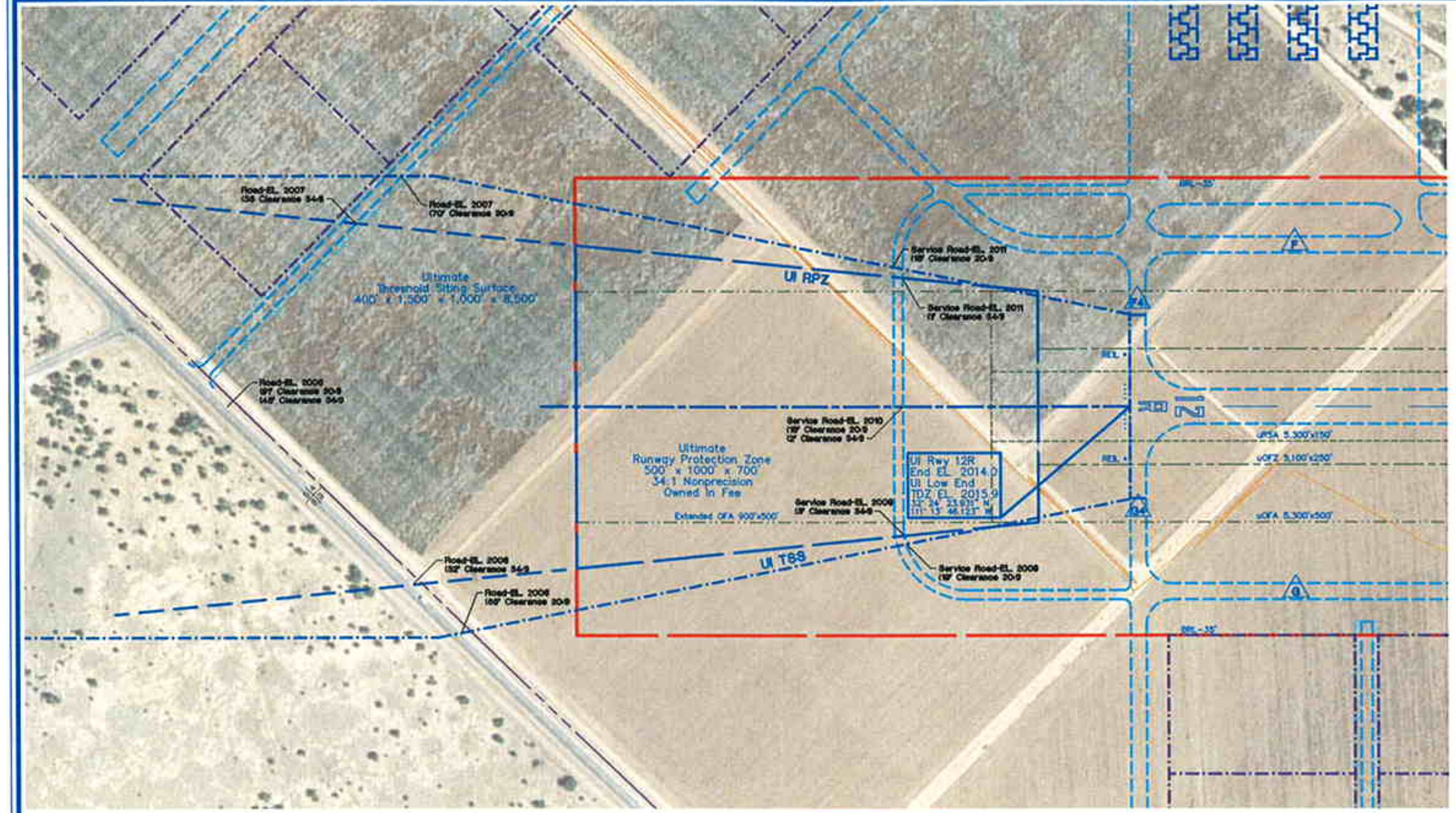
PLANNED BY: Eric S. Pfeifer
DETAILED BY: Richard A. Lolly
APPROVED BY: Steven G. Benson

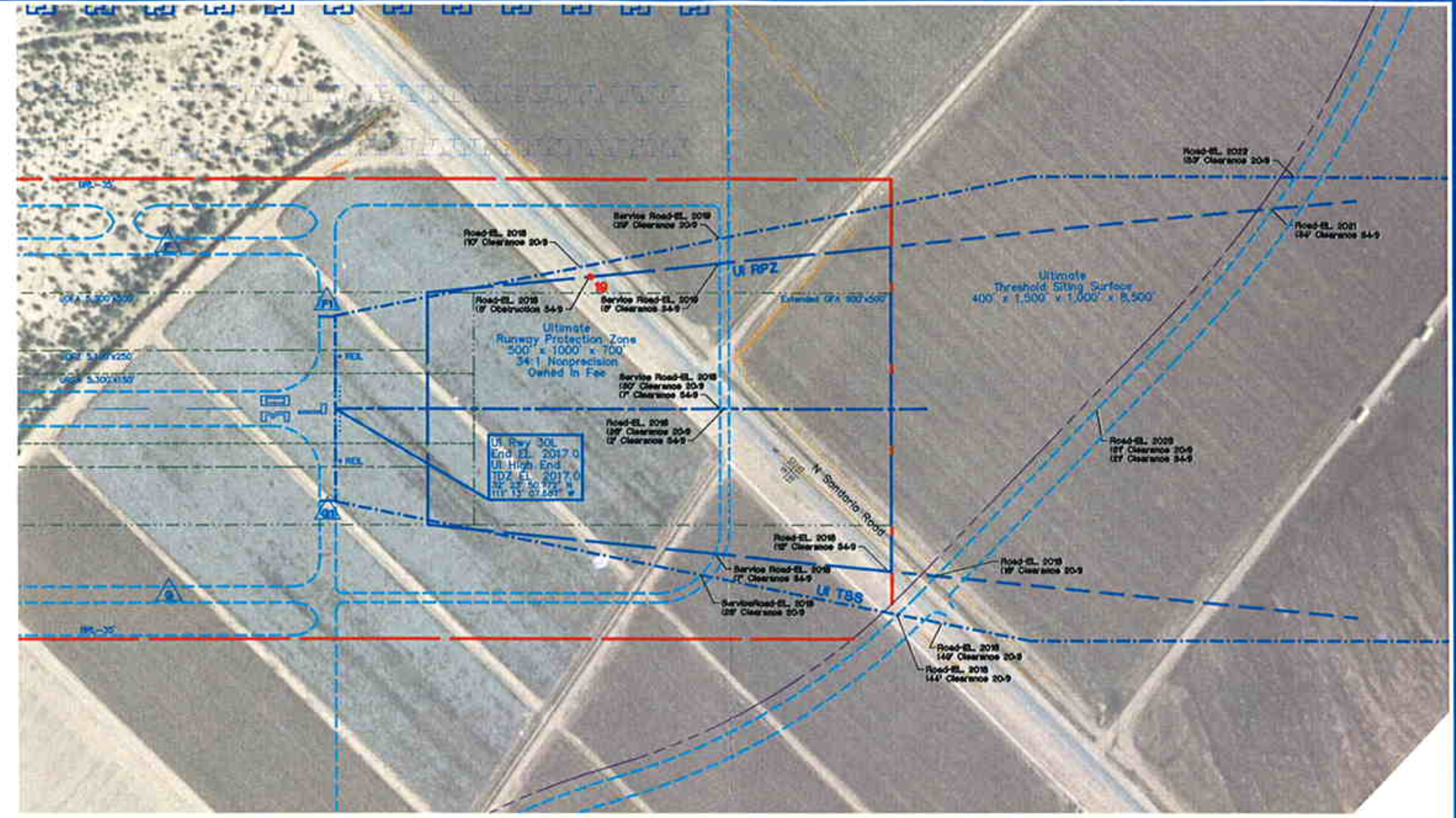
May 11, 2007

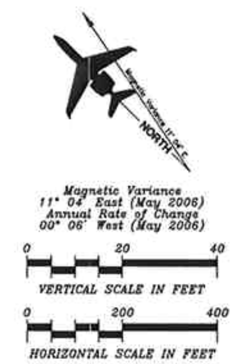
SHEET 8 OF 12

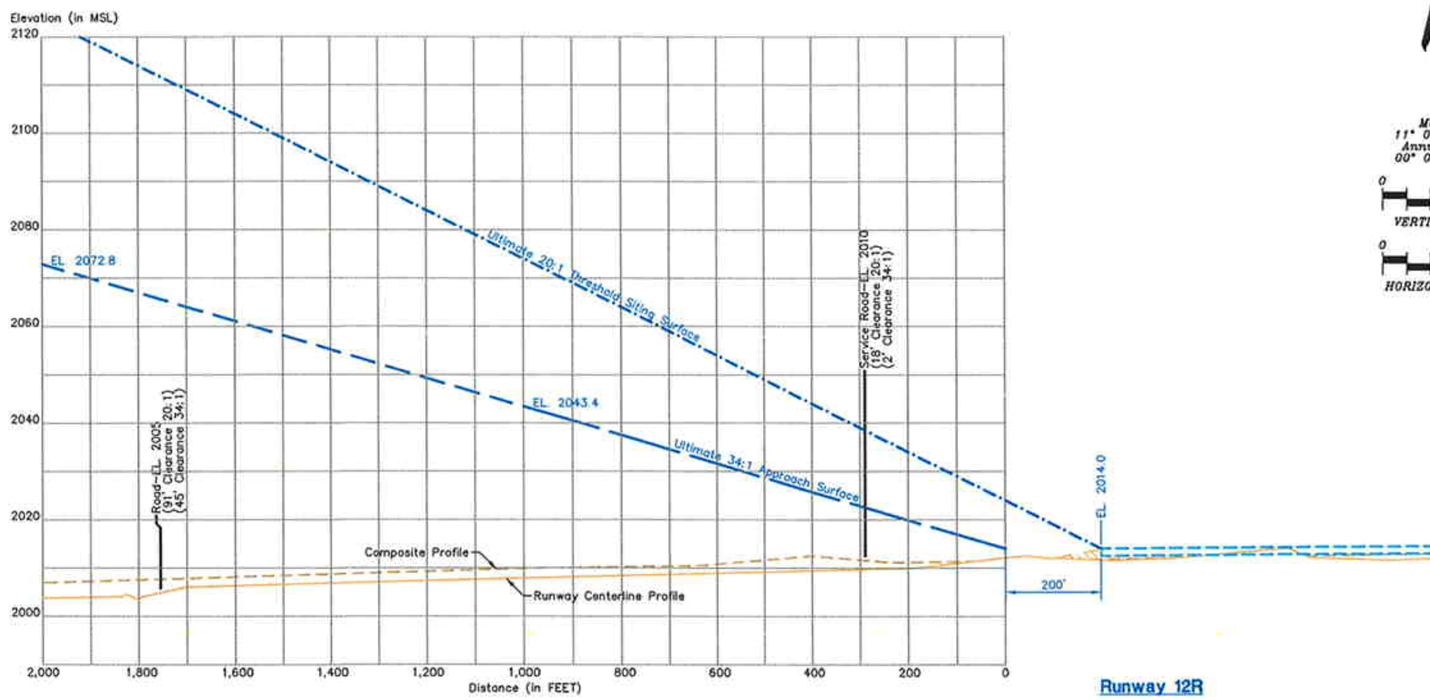
Coffman Associates Airport Consultants

Coffman Associates R:\CAD\Lolly\Master Plans\AVQ\ALP Set\AVQ ALP Set.DWG Friday May 11 2007 12:00pm

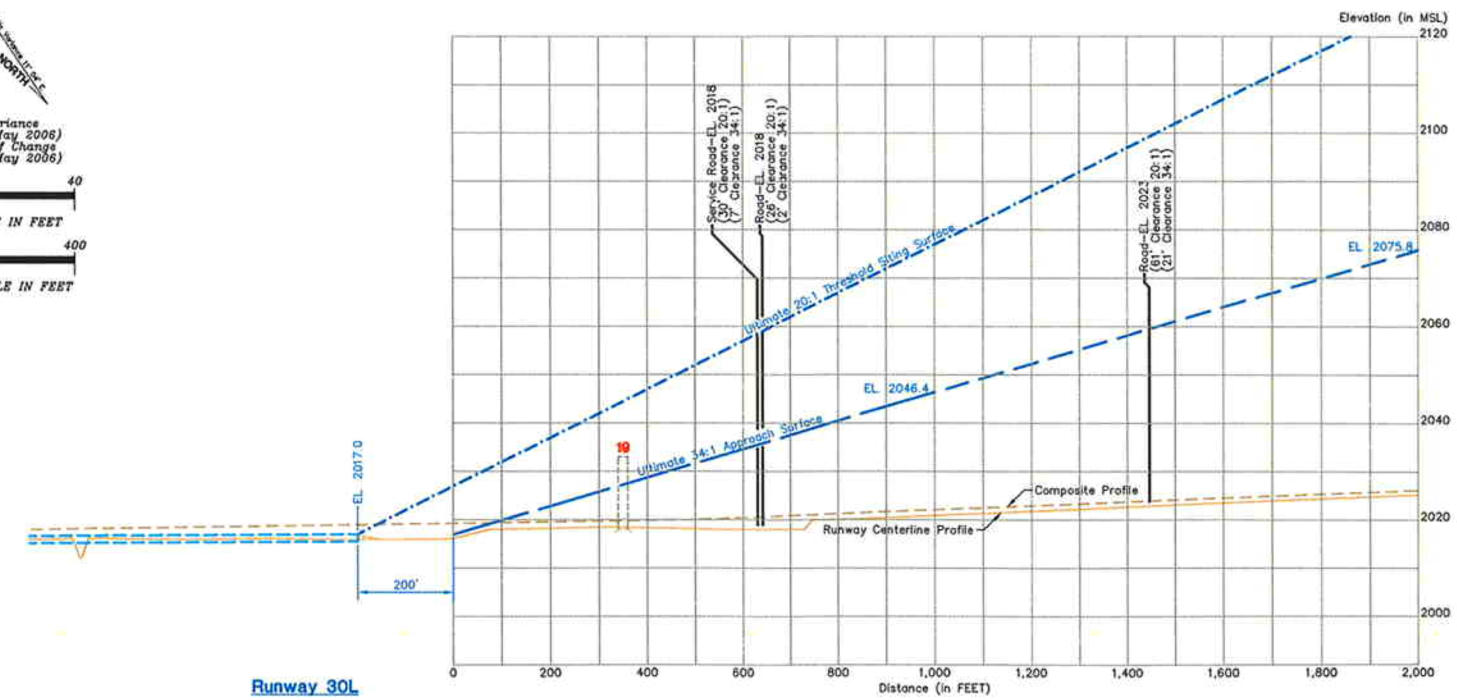








Runway 12R



Runway 30L

GENERAL NOTES:

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OBSTRUCTION TABLE

Object Description	Object Elevation	Obstructed Part 77 Surface	Surface Elevation	Object Penetration	Proposed Object Disposition
19. ROAD	2018	ULTIMATE 34:1 APPROACH	2027	6'	ROAD TO BE RELOCATE

No.	REVISIONS	DATE	BY	APP'D.
△	MASTER PLAN	5/10/07	CA	–
△	UPDATE AIRPORT MASTER PLAN	8/9/99	CA	–
△	UPDATE BASED ON SIGNIFICANT AIRPORT CHANGES SINCE 8/21/91 APPROVAL	2/18/98	FAA	–

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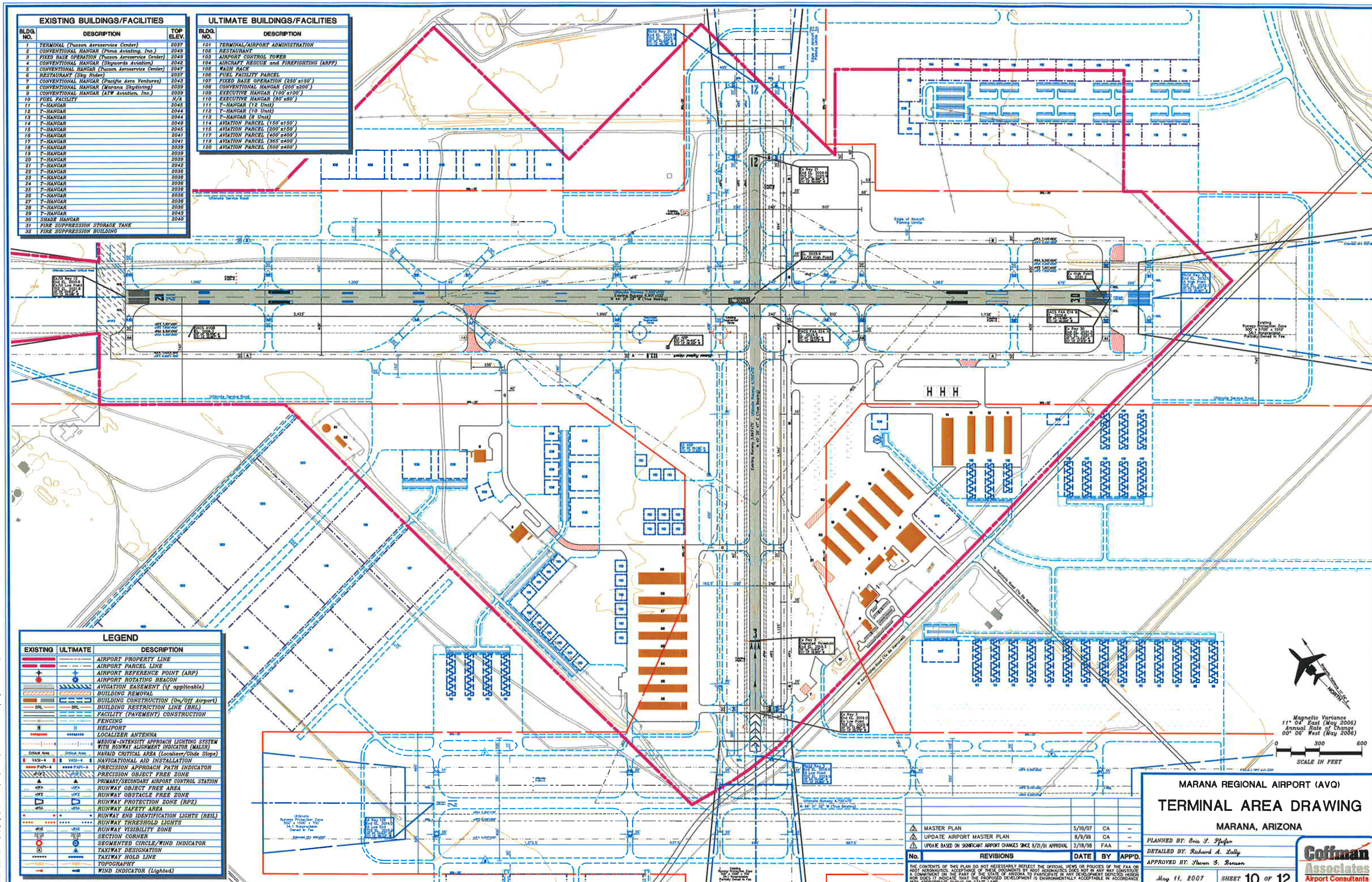
MARANA REGIONAL AIRPORT (AVQ)
INNER PORTION OF RUNWAYS 12R-30L APPROACH SURFACES DRAWING
MARANA, ARIZONA

PLANNED BY: Eric S. Pfeifer
DETAILED BY: Richard A. Lally
APPROVED BY: Steven G. Benson

May 11, 2007 SHEET 9 OF 12

Coffman Associates Airport Consultants



EXISTING BUILDINGS/FACILITIES

BLDG. NO.	DESCRIPTION	TOP ELEV.
1	TERMINAL (Tucson Aeroservice Center)	2037
2	CONVENTIONAL HANGAR (Pima Aviating, Inc.)	2049
3	FIXED BASE OPERATION (Tucson Aeroservice Center)	2049
4	CONVENTIONAL HANGAR (Skywords Aviation)	2042
5	CONVENTIONAL HANGAR (Tucson Aeroservice Center)	2047
6	RESTAURANT (Sky Rider)	2037
7	CONVENTIONAL HANGAR (Pacific Aero Ventures)	2043
8	CONVENTIONAL HANGAR (Marana Skydiving)	2039
9	CONVENTIONAL HANGAR (ATW Aviation, Inc.)	2039
10	FUEL FACILITY	N/A
11	T-HANGAR	2045
12	T-HANGAR	2044
13	T-HANGAR	2044
14	T-HANGAR	2049
15	T-HANGAR	2045
16	T-HANGAR	2041
17	T-HANGAR	2041
18	T-HANGAR	2039
19	T-HANGAR	2039
20	T-HANGAR	2039
21	T-HANGAR	2042
22	T-HANGAR	2036
23	T-HANGAR	2036
24	T-HANGAR	2036
25	T-HANGAR	2036
26	T-HANGAR	2036
27	T-HANGAR	2036
28	T-HANGAR	2036
29	T-HANGAR	2043
30	SHADE HANGAR	2040
31	FIRE SUPPRESSION STORAGE TANK	
32	FIRE SUPPRESSION BUILDING	

ULTIMATE BUILDINGS/FACILITIES

BLDG. NO.	DESCRIPTION
101	TERMINAL/AIRPORT ADMINISTRATION
102	RESTAURANT
103	AIRPORT CONTROL TOWER
104	AIRCRAFT RESCUE and FIREFIGHTING (ARFF)
105	WASH RACK
106	FUEL FACILITY PARCEL
107	FIXED BASE OPERATION (250'x150')
108	CONVENTIONAL HANGAR (200'x200')
109	EXECUTIVE HANGAR (100'x100')
110	EXECUTIVE HANGAR (80'x80')
111	T-HANGAR (12 Unit)
112	T-HANGAR (10 Unit)
113	T-HANGAR (8 Unit)
114	AVIATION PARCEL (150'x150')
115	AVIATION PARCEL (200'x150')
117	AVIATION PARCEL (400'x400')
119	AVIATION PARCEL (365'x400')
120	AVIATION PARCEL (500'x400')

LEGEND

EXISTING	ULTIMATE	DESCRIPTION
		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
H	H	HELIPORT
		LOCALIZER ANTENNA
		MEDIUM-INTENSITY APPROACH LIGHTING SYSTEM WITH RUNWAY ALIGNMENT INDICATOR (MALSR)
Critical Area	Critical Area	NAVAID CRITICAL AREA (Localizer/Glide Slope)
VASI-4	VASI-4	NAVIGATIONAL AID INSTALLATION
PAPI-4	PAPI-4	PRECISION APPROACH PATH INDICATOR
ePOFZ	uPOFZ	PRECISION OBJECT FREE ZONE
		PRIMARY/SECONDARY AIRPORT CONTROL STATION
eOFA	uOFA	RUNWAY OBJECT FREE AREA
eOFZ	uOFZ	RUNWAY OBSTACLE FREE ZONE
		RUNWAY PROTECTION ZONE (RPZ)
eRSA	uRSA	RUNWAY SAFETY AREA
		RUNWAY END IDENTIFICATION LIGHTS (REIL)
		RUNWAY THRESHOLD LIGHTS
eRVZ	uRVZ	RUNWAY VISIBILITY ZONE
		SECTION CORNER
		SEGMENTED CIRCLE/WIND INDICATOR
A	A	TAXIWAY DESIGNATION
		TAXIWAY HOLD LINE
		TOPOGRAPHY
		WIND INDICATOR (Lighted)

No.	REVISIONS	DATE	BY	APP'D.
3	MASTER PLAN	5/10/07	CA	–
2	UPDATE AIRPORT MASTER PLAN	8/9/99	CA	–
1	UPDATE BASED ON SIGNIFICANT AIRPORT CHANGES SINCE 8/21/91 APPROVAL	2/18/98	FAA	–

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MARANA REGIONAL AIRPORT (AVQ)

TERMINAL AREA DRAWING

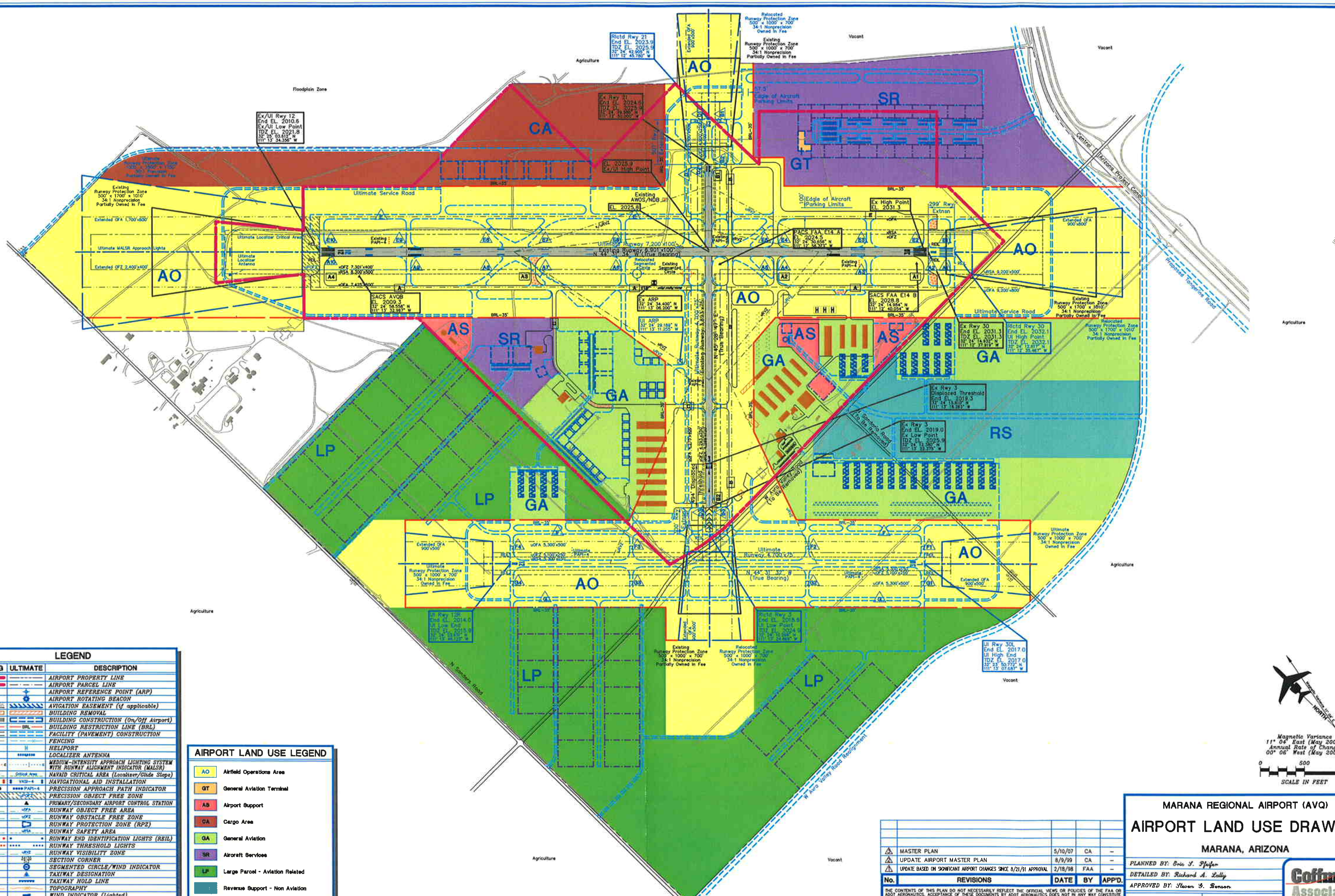
MARANA, ARIZONA

PLANNED BY: Eric S. Pfeifer
DETAILED BY: Richard A. Lally
APPROVED BY: Steven S. Benson

May 11, 2007 SHEET 10 OF 12

Coffman Associates Airport Consultants

Coffman Associates R:\CAD\LallyR\Master Plans\AVQ\ALP Set\AVQ ALP Set.DWG Friday May 11 2007 12:00pm



LEGEND

EXISTING	ULTIMATE	DESCRIPTION
		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
H	H	HELIPORT
		LOCALIZER ANTENNA
		MEDIUM-INTENSITY APPROACH LIGHTING SYSTEM WITH RUNWAY ALIGNMENT INDICATOR (MALSR)
Critical Area	Critical Area	NAVAID CRITICAL AREA (Localizer/Glide Slope)
VASI-4	VASI-4	NAVIGATIONAL AID INSTALLATION
PAPI-4	PAPI-4	PRECISION APPROACH PATH INDICATOR
POFZ	POFZ	PRECISION OBJECT FREE ZONE
		PRIMARY/SECONDARY AIRPORT CONTROL STATION
OFA	OFA	RUNWAY OBJECT FREE AREA
OFZ	OFZ	RUNWAY OBSTACLE FREE ZONE
		RUNWAY PROTECTION ZONE (RPZ)
RSA	RSA	RUNWAY SAFETY AREA
		RUNWAY END IDENTIFICATION LIGHTS (REIL)
		RUNWAY THRESHOLD LIGHTS
RVZ	RVZ	RUNWAY VISIBILITY ZONE
		SECTION CORNER
		SEGMENTED CIRCLE/WIND INDICATOR
A		TAXIWAY DESIGNATION
		TAXIWAY HOLD LINE
		TOPOGRAPHY
		WIND INDICATOR (Lighted)

AIRPORT LAND USE LEGEND

AO	Airfield Operations Area
GT	General Aviation Terminal
AS	Airport Support
CA	Cargo Area
GA	General Aviation
SR	Aircraft Services
LP	Large Parcel - Aviation Related
	Revenue Support - Non Aviation

No.	REVISIONS	DATE	BY	APP'D.
△	MASTER PLAN	5/10/07	CA	–
△	UPDATE AIRPORT MASTER PLAN	8/9/99	CA	–
△	UPDATE BASED ON SIGNIFICANT AIRPORT CHANGES SINCE 8/21/91 APPROVAL	2/18/98	FAA	–

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MARANA REGIONAL AIRPORT (AVQ)

AIRPORT LAND USE DRAWING

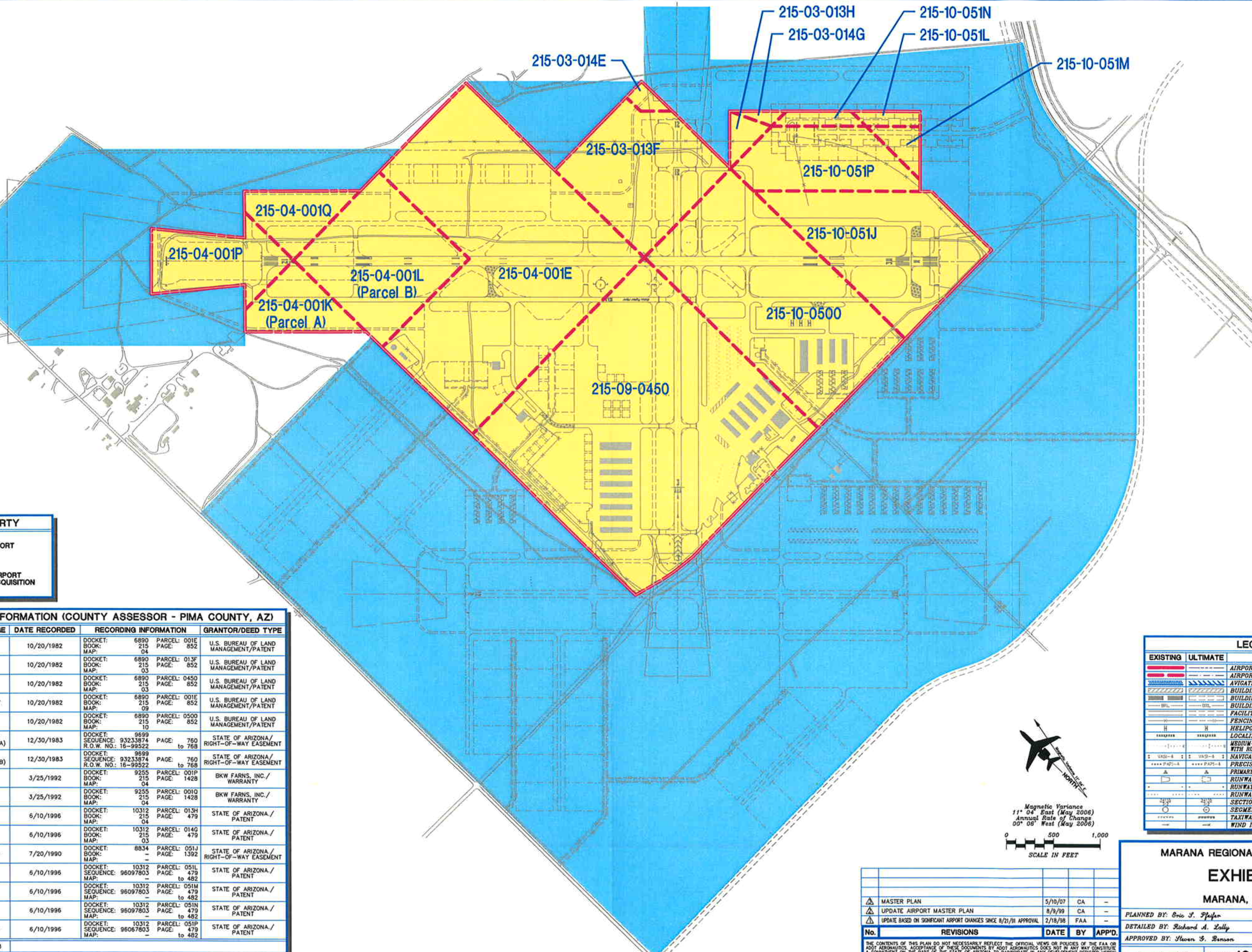
MARANA, ARIZONA

PLANNED BY: Eric S. Pfeifer
DETAILED BY: Richard A. Lolly
APPROVED BY: Steven G. Benson

May 11, 2007 — SHEET 11 OF 12

Coffman Associates Airport Consultants

Coffman Associates R:\CAD\Lolly\Master Plans\AVQ\ALP Set\AVQ ALP Set.DWG Friday May 11 2007 12:00pm



AIRPORT PROPERTY

(yellow)	EXISTING AIRPORT PROPERTY
(blue)	PROPOSED AIRPORT PROPERTY ACQUISITION

DEED RECORDING INFORMATION (COUNTY ASSESSOR - PIMA COUNTY, AZ)

OWNER/PARCEL NO.	ACREAGE	DATE RECORDED	RECORDING INFORMATION	GRANTOR/DEED TYPE
PIMA COUNTY 215-04-001E	±120	10/20/1982	DOCKET: 6890 BOOK: 215 MAP: 04 PARCEL: 001E PAGE: 852	U.S. BUREAU OF LAND MANAGEMENT/PATENT
PIMA COUNTY 215-03-013F	±38	10/20/1982	DOCKET: 6890 BOOK: 215 MAP: 03 PARCEL: 013F PAGE: 852	U.S. BUREAU OF LAND MANAGEMENT/PATENT
PIMA COUNTY 215-03-014E	±2.07	10/20/1982	DOCKET: 6890 BOOK: 215 MAP: 03 PARCEL: 0450 PAGE: 852	U.S. BUREAU OF LAND MANAGEMENT/PATENT
PIMA COUNTY 215-09-0450	±156.97	10/20/1982	DOCKET: 6890 BOOK: 215 MAP: 09 PARCEL: 001E PAGE: 852	U.S. BUREAU OF LAND MANAGEMENT/PATENT
PIMA COUNTY 215-10-0500	±80	10/20/1982	DOCKET: 6890 BOOK: 215 MAP: 10 PARCEL: 0500 PAGE: 852	U.S. BUREAU OF LAND MANAGEMENT/PATENT
PIMA COUNTY 215-04-001K R/W# 16-99522	±12.62 (PARCEL A)	12/30/1983	DOCKET: 9699 SEQUENCE: 93233874 R.O.W. NO.: 16-99522 PAGE: 760 to 768	STATE OF ARIZONA/ RIGHT-OF-WAY EASEMENT
PIMA COUNTY 215-04-001L R/W# 16-99522	±40 (PARCEL B)	12/30/1983	DOCKET: 9699 SEQUENCE: 93233874 R.O.W. NO.: 16-99522 PAGE: 760 to 768	STATE OF ARIZONA/ RIGHT-OF-WAY EASEMENT
PIMA COUNTY 215-04-001P	±19.8	3/25/1992	DOCKET: 9255 BOOK: 215 MAP: 04 PARCEL: 001P PAGE: 1428	BKW FARNS, INC./ WARRANTY
PIMA COUNTY 215-04-001Q	±11.91	3/25/1992	DOCKET: 9255 BOOK: 215 MAP: 04 PARCEL: 001Q PAGE: 1428	BKW FARNS, INC./ WARRANTY
PIMA COUNTY 215-03-013H	±2.67	6/10/1996	DOCKET: 10312 BOOK: 215 MAP: 04 PARCEL: 013H PAGE: 479	STATE OF ARIZONA./ PATENT
PIMA COUNTY 215-03-014G	±0.97	6/10/1996	DOCKET: 10312 BOOK: 215 MAP: 03 PARCEL: 014G PAGE: 479	STATE OF ARIZONA./ PATENT
PIMA COUNTY 215-10-051J R/W# 16-96341	±48.99	7/20/1990	DOCKET: 8834 BOOK: – MAP: – PARCEL: 051J PAGE: 1392	STATE OF ARIZONA./ RIGHT-OF-WAY EASEMENT
PIMA COUNTY 215-10-051L	±2.47	6/10/1996	DOCKET: 10312 SEQUENCE: 96097803 MAP: – PARCEL: 051L PAGE: 479 to 482	STATE OF ARIZONA./ PATENT
PIMA COUNTY 215-10-051M	±2.95	6/10/1996	DOCKET: 10312 SEQUENCE: 96097803 MAP: – PARCEL: 051M PAGE: 479 to 482	STATE OF ARIZONA./ PATENT
PIMA COUNTY 215-10-051N	±2.52	6/10/1996	DOCKET: 10312 SEQUENCE: 96097803 MAP: – PARCEL: 051N PAGE: 479 to 482	STATE OF ARIZONA./ PATENT
PIMA COUNTY 215-10-051P	±24.84	6/10/1996	DOCKET: 10312 SEQUENCE: 96067803 MAP: – PARCEL: 051P PAGE: 479 to 482	STATE OF ARIZONA./ PATENT
TOTAL ACERAGE	±566.78			

LEGEND

EXISTING	ULTIMATE	DESCRIPTION
		AIRPORT PROPERTY LINE
		AIRPORT PARCEL LINE
		AVIGATION EASEMENT (if applicable)
		BUILDING REMOVAL
		BUILDING CONSTRUCTION (On/Off Airport)
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		FACILITY (PAVEMENT) CONSTRUCTION
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PAPI-4	PAPI-4	PRECISION APPROACH PATH INDICATOR
		PRIMARY/SECONDARY AIRPORT CONTROL STATION
		RUNWAY PROTECTION ZONE (RPZ)
		RUNWAY END IDENTIFICATION LIGHTS (REIL)
		RUNWAY THRESHOLD LIGHTS
		SECTION CORNER
		SEGMENTED CIRCLE/WIND INDICATOR
		TAXIWAY HOLD LINE
		WIND INDICATOR (Lighted)

No.	REVISIONS	DATE	BY	APP'D.
3	MASTER PLAN	5/10/07	CA	–
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MARANA REGIONAL AIRPORT (AVQ)

EXHIBIT A

MARANA, ARIZONA

PLANNED BY: Eric S. Pfeifer
DETAILED BY: Richard A. Lally
APPROVED BY: Steven G. Benson

May 11, 2007 SHEET 12 OF 12

Coffman Associates Airport Consultants

Friday May 11 2007 12:00pm

Coffman Associates
Airport Consultants

www.coffmanassociates.com

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