AIRPORT MASTER PLAN

Working Paper No. 1

MARANA REGIONAL AIRPORT

MARANA, ARIZONA | DECEMBER 2015

ARMSTRONG

Marana Regional Airport

Airport Master Plan

Draft Working Paper No. 1

Prepared for

Town of Marana, Arizona

By

Armstrong Consultants, Inc.
2345 S. Alma School Road, Suite 208
Mesa, AZ 85210

In association with
The Genesis Consulting Group, LLC
Woolpert, Inc.

December 2015

ADOT No. E5S3N

The preparation of this document was financed in part through a planning grant from the Arizona Department of Transportation. The contents of this report reflect the analysis and finding of Armstrong Consultants, Inc. who are responsible for the facts and accuracy of the data presented herein. The contents do not necessarily reflect the official views or policy of the ADOT. Acceptance of this report by the Federal Aviation Administration (FAA) does not in any way constitute a commitment on the part of the United States to participate in any development depicted therein nor does it indicate that the proposed development is environmentally acceptable with applicable Public Laws.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

List of Exhibits

THIS PAGE WAS INTENTIONALLY LEFT BLANK

Chapter 1 – Marana Regional Airport Master Plan Overview

1.1 Introduction

The 2010 Town of Marana General Plan includes a strategic vision for the community - *New Focus, New Thinking, New Direction*. This fresh perspective and vision will also be used in preparation of the Airport Master Plan for the Marana Regional Airport. Once completed, the Airport Master Plan will ensure future airport development is designed to improve air and ground operations and enhance safety and airport services for the Town, as well as the public users of the airport.

1.2 Purpose

An airport master plan describes and depicts the overall concept for the long-term development of an airport. It presents the concepts graphically in the airport layout plan (ALP) drawing set, and also within a detailed and well thought out narrative report. The goal of the plan is to provide direction for future airport development that will satisfy aviation demand in a financially feasible manner and meet the needs of the Town of Marana with respect to the airport. This Airport Master Plan updates and replaces the September 2007 Airport Master Plan.

1.3 Objectives

The primary objectives of an airport master plan are to produce an attainable phased development plan that will satisfy the airport needs in a safe, efficient, economical, and environmentally sound manner. The plan serves as a guide to decision makers, airport users, and the general public for implementing airport development actions while considering the Town's goals and objectives. There are a number of objectives that the Town of Marana would like to achieve as a result of this Airport Master Plan for the Marana Regional Airport.

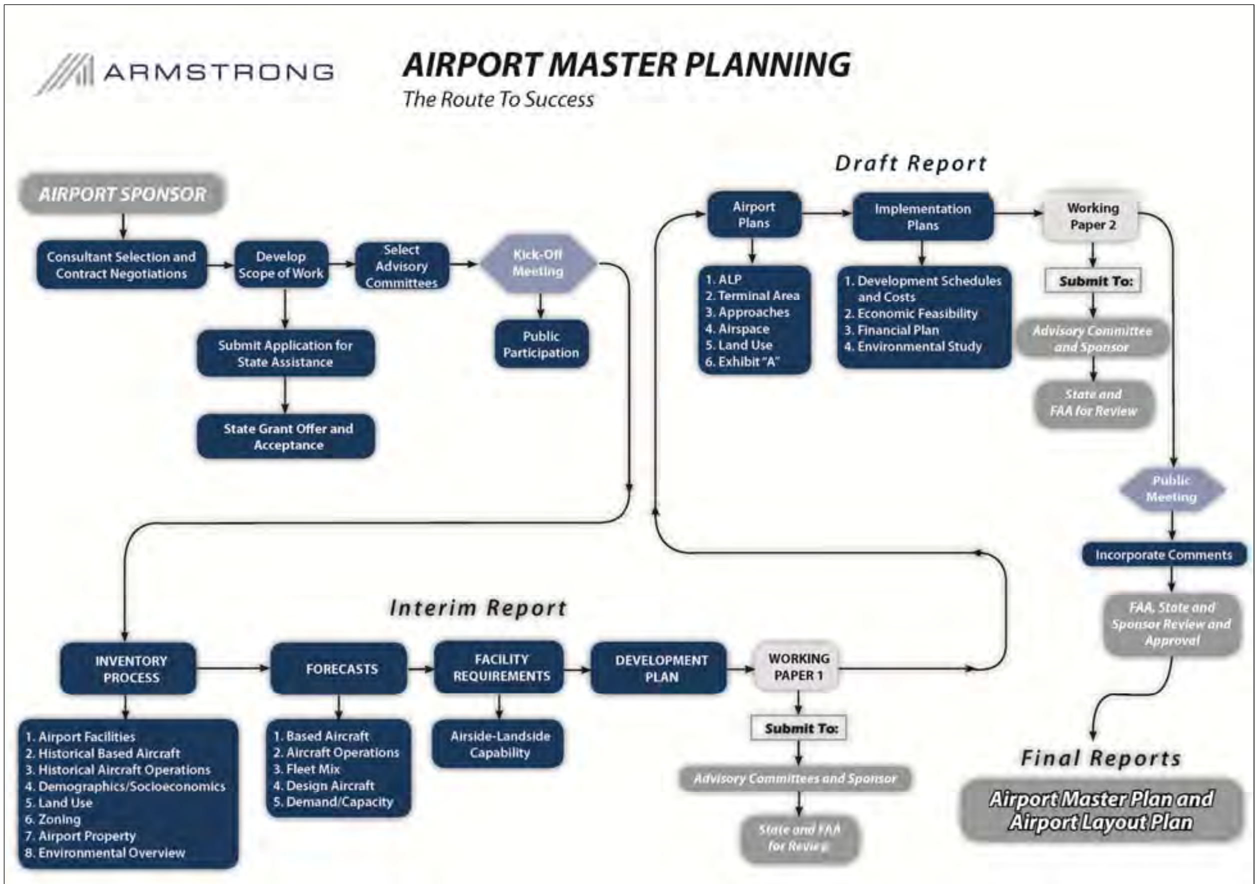
Specific goals and objectives of the project include, but are not limited to:

- Capture the issues that will determine proposed development;
- Justify the proposed development through the technical, economic, and environmental investigation of concepts and alternatives;
- Provide an effective graphic presentation of the proposed development and anticipated land uses in the vicinity of the airport;
- Establish a realistic timeframe for the implementation of the development proposed in the plan, particularly the short-term capital improvement program;
- Propose a realistic and achievable financial plan to support the prioritized implementation schedule;
- Provide sufficient project definition and detail for subsequent environmental evaluations that may be required before a project is approved;

- Present a plan that adequately addresses the issues and satisfies local, state, and Federal regulations;
- Document policies and future aeronautical demand to support municipal or local deliberations on spending, debt, land use controls, and other policies necessary to preserve the integrity of the airport and its surroundings;
- Set the stage and establish the framework for a continuing planning process that will monitor key activities and permit changes to the plan recommendation as required; and
- Review existing land uses surrounding the airport for compatibility and control.

1.4 Airport Master Plan Process and Schedule

Airport planning takes place at the national, state, regional, and local levels. These plans are formulated on the basis of overall transportation demands and are coordinated with other transportation planning and comprehensive land use planning. The National Plan of Integrated Airport Systems (NPIAS) is a ten-year plan updated biennially and published by the Federal Aviation Administration (FAA). The NPIAS lists developments at public use airports that are considered to be of national interest and thus eligible for financial assistance for airport planning and development under the Airport and Airway Improvement Act of 1982. Statewide Integrated Airport Systems Planning (SIASP) identifies the general location and characteristics of new airports and the general expansion needs of existing airports to meet statewide air transportation goals. This planning is performed by state transportation or aviation planning agencies. Regional Integrated Airport Systems Planning (RIASP) identifies airport needs for a large regional or metropolitan area. Needs are stated in general terms and incorporated into statewide systems plans. Airport master plans and ALPs are prepared by the operators of individual airports and are usually completed with the assistance of consultants. The Town of Marana completed this Airport Master Plan with the assistance of Armstrong Consultants, Inc. The last airport master plan was completed in September 2007. The airport master plan process involves collecting readily available data, forecasting future aviation demand, determining facility requirements, studying various alternatives, and developing plans and schedules. **Figure 1-1** depicts the steps in the airport master plan process. This process takes into consideration the needs and concerns of the airport sponsor, airport tenants and users, as well as the general public.



Source: Armstrong Consultants, Inc. (ACI), 2015

Figure 1-1 Airport Master Plan Flow Diagram

1.5 Advisory Committees

As a part of the planning process, the airport master plan established two advisory committees to assist with the overall future development plan for Marana Regional Airport. The Planning Advisory Committee (PAC) provided high-level guidance and advice on development plans for the future of the airport. The Technical Advisory Committee (TAC) consisted of members representing various interests in and around the airport who were very familiar with the airfield and who were able to provide technical guidance and suggestions in more detail. Both committees' involvement throughout this Airport Master Plan process helped to keep interested parties informed and fostered consensus for future development actions. Representatives for both committees are shown in **Table 1-1**.

Table 1-1 Marana Regional Airport Master Plan PAC/TAC Committee Members

NAME	TITLE	AFFILIATION	PAC	TAC
Steve Miller	Airport Manager	Town of Marana	X	X
Curt Woody	Economic Development Manager	Town of Marana	X	
Galen Beem	Airport Operations Coordinator	Town of Marana		X
Jamsheed Mehta	Deputy Town Manager	Town of Marana	X	X
Erik Montague	Finance Director	Town of Marana		
Keith Brann	Director of Engineering	Town of Marana		X
Shannon Shula	Planner	Town of Marana	X	X
Ryan Benavides	Public Works Director	Town of Marana	X	
Morris Reyna	Construction Division Manager	Town of Marana		X
Jennifer Christelman	Engineering Division Manager	Town of Marana		X
Heath Vescovi-Chiordi	Management Assistant	Town of Marana	X	
Toby Parks	Tourism and Marketing Manager	Town of Marana	X	
Lisa Shafer	Director of Community Development	Town of Marana	X	
Kyler Erhard	Community Planner	FAA	X	X
Brad Davis	Engineer	FAA	X	X
Scott Driver	Airport Grants Manager	ADOT Aeronautics	X	X
Michael Ostermeyer	Airspace Manager/Aviation Safety Officer	Arizona Army National Guard		X
Lt. Col. Chad Smith	State Aviation Officer	Arizona Army National Guard		X
Ron Anders	Director of Maintenance	Tucson Aeroservice Center	X	
Don Kriz	Engineer	DOWL	X	X
Victor Palma	Engineer	DOWL	X	X
Peter Barbier	Director of Operations	Tucson Aeroservice Center	X	
Ed Stolmaker	President/CEO	Marana Chamber of Commerce	X	
Lt. Col. David Stine	Airspace Manager	Arizona Air National Guard – 162nd Fighter Wing		X
Tim Bolton	Principal Planner	AZ State Land Department		X
Heath Evans	Battalion Chief	Northwest Fire District		X
Bruce Hensel	Lead Pilot	LifeNet		X
Mike Matthews	Owner/Flight Instructor -CFII	Marana Flight School		X
Dr. Allen Aven	Pilot	Retired Physician	X	
Jim Petty	Airport Manager	Pinal Airpark	X	
Mike McDougall	Owner	Fighting Classics	X	
Gary Abrams	President/CEO	Tucson Aeroservice Center	X	
Jaime Brown	Senior Transportation Planner	Pima Association of Governments	X	
Bill Muszala	Owner	ATW Aviation, Inc.	X	

Chapter 2 – Inventory of Airport Assets

2.1 Airport History and Ownership

Marana Regional Airport (the Airport) 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). The Airport was formerly known as Avra Valley Airport and also Marana Auxiliary No.2[1]. 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.

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 subsequently formed Avra Air to operate the Airport. In 1974, the BLM authorized the assignment of the original lease from Avra Air to Pima County which in turn maintained it as a public-use airport. In 1982, Pima County acquired fee simple interest in the Airport. In 1999, a master plan was prepared for the Avra Valley Airport. Later in 1999, the Airport was purchased by the Town of Marana and renamed the Marana Regional Airport. The Town of Marana currently owns and maintains the Airport.

Source: ACI, 2015

[1] Marana Regional Airport Master Plan, September 2007

2.2 Airport Service Levels and ASSET Category

2.2.1 Federal Service Level

Since 1970, the FAA has classified a subset of the 5,400 public-use airports in the United States as being vital to serving the public needs for air transportation, either directly or indirectly, and therefore may be made eligible for federal funding to maintain their facilities. These airports are classified within the National Plan of Integrated Airport Systems (NPIAS), where the airport service level reflects the type of public use the airport provides. The service level also reflects the funding categories established by Congress to assist in airport development.

The categories of airports listed in the NPIAS are:

Commercial Service – These are public airports that accommodate scheduled air carrier service provided by the world's certificated air carriers. Commercial service airports are either:

- Primary – a public-use airport that enplanes more than 10,000 passengers annually, or
- Non-primary - a public-use airport that enplanes between 2,500 and 10,000 passengers annually.

Reliever – This is an airport designated by the FAA as having the function of relieving congestion at a commercial service airport by providing more general aviation access. These airports comprise a special category of general aviation (GA) airports and are generally located within a relatively short distance of primary airports. Privately owned airports may also be identified as reliever airports.

General Aviation – These are public airports that do not have scheduled service, or have scheduled service with less than 2,500 passenger enplanements per year.

According to the Report of the Secretary of Transportation to the United States Congress on the National Plan of Integrated Airport Systems (NPIAS) 2015-2019, dated September 2014, there are 3,331 existing NPIAS airports and 14 proposed airports that are anticipated to open within the 5-year period covered by this report.

Arizona has a total of 59 airports included in the NPIAS according to the Report to the US Congress. The Marana Regional Airport is also one of eight airports in the state classified as a Reliever airport. To be eligible for reliever designation, an airport must be open to the public, have 100 or more based aircraft, or have 25,000 annual itinerant operations. All of the reliever airports in Arizona are publically owned. The existing 264 reliever airports in the NPIAS have an average of 177 based aircraft, which in total represent 23 percent of the Nation's general aviation fleet according to the Report to the US Congress.

2.2.2 Federal ASSET Category

In 2010, the FAA began examining the roles general aviation plays in our national airport system. At the time, general aviation airports had not been thoroughly studied at the national level for more than 40 years. The original report identified 497 unclassified airports that did not fit into one of the newly established categories and for which a separate category could not be defined. As a result, the FAA initiated a follow-on initiative known as ASSET 2 which began in early 2013. The results of ASSET 2 concluded that 212 of the original 497 unclassified airports met the criteria for inclusion as regional, local, or basic.

The new ASSET categories are:

National – Supports the national and state system by providing communities with access to national and international markets in multiple states and throughout the United States.

Regional – Supports regional economies by connecting communities to statewide and interstate markets.

Local – Supplements local communities by providing access primarily to intrastate and some interstate markets.

Basic – Supports general aviation activities such as emergency service, charter or critical passenger service, cargo operations, flight training and personal flying.

In Arizona, there are two airports in the national category, 10 in the regional, 18 in the local, and 17 in the basic. Two NPIAS airports remain unclassified. The Marana Regional Airport is one of 10 regional airports classified in the new ASSET categories.

2.2.3 State Service Level

At the State level, the Arizona Department of Transportation Multi-modal Planning Division – Aeronautics Group has long recognized the importance of planning as a proactive approach to ensuring aviation continues its role in the statewide transportation system. They created a similar plan to the FAA's NPIAS in 1978 called the Arizona State Airports System Plan (ASASP). The purpose of the ASASP is to provide a framework for the integrated planning, operation, and development of Arizona's aviation assets. The most current version of the ASASP was published in 2008.

The ASASP concluded that five airport roles best meet the needs of Arizona. The five airport roles are defined as follows:

Commercial Service Airports – Publically owned airports which enplane 2,500 or more passengers annually and receive scheduled passenger air service.

Reliever Airports – FAA-designated airports that relieve congestion at a commercial service airport.

GA-Community Airports - Airports that serve regional economies, connecting to state and national economies, and serve all types of general aviation aircraft.

GA-Rural Airports – Airports that serve a supplemental role in local economies, primarily serving smaller businesses, recreational, and personal flying.

GA-Basic – Airports that serve a limited role in the local economy, primarily serving recreational and personal flying.

Marana Regional Airport is categorized as a Reliever airport. There are a total of 82 airports included in the ASASP. The Airport is also one of eight reliever airports in Arizona.

2.2.4 Regional Service Level

The Pima Association of Governments (PAG) prepared a Regional Aviation System Plan (RASP) in 2002 for eight airports in the region. The RASP classifies airports as either Level I or Level II. Level I airports should be able to accommodate a full range of business/corporate general aviation aircraft. Level II airports should be able to accommodate all single-engine and small twin-engine general aviation aircraft. According to the RASP, Marana Regional Airport is one of four public-use airports classified as a Level I airport. It should be noted that since Davis-Monthan AFB does not play a role within the Regional System, in terms of satisfying general aviation needs, it was not included in the classification of airports in the region.

In reviewing the various service levels, ASSET categories, and classifications from the Federal, State, and regional perspectives, they all appear to accurately describe the role Marana Regional Airport plays in the country, state, region, and the local community.

2.3 Aeronautical Activities

The aircraft using the Airport are predominately single-engine piston, multi-engine piston, turbo-prop, light turbo-jet, and rotorcraft. On occasion, large corporate jets such as the Gulfstream V and Bombardier Global Express also use the airport. The role of a general aviation reliever airport lends itself to specific aeronautical activities. The types of aeronautical activities found at the Airport include the following:

Business Transportation - Business aviation users must travel to or from commerce centers to conduct activities in a single day, usually without requiring an overnight stay or extensive ground travel time. This includes travel by state and federal government agency officials. Generally, single-engine and multi-engine piston or turbo-prop aircraft are used by local or small business travelers; large corporations may utilize a wide variety of jet aircraft.

Recreational and Tourism – This category includes transient pilots and passengers flying into the region to visit recreational and tourist attractions. Single-engine piston aircraft are the most common aircraft used within this category; however, a small percentage of multi-engine piston or turbo-prop aircraft may be used. Other types of aircraft in this category include home-built, experimental aircraft, gliders, and ultralights.

Flight Training - Local and itinerant flights conducted in order to meet flight proficiency requirements for obtaining FAA pilot certifications are included in this category. These flights include touch-and-go operations, day and night local and cross-country flights, and practice instrument approach procedures. The most common aircraft operating in this category include single- or multi-engine piston or turbo-prop aircraft.

Military - Military operations are those conducted by U.S. or foreign military aircraft and personnel for the purposes of national security and defense. Almost all military operations are training or proficiency activities. A wide range of aircraft may be used for these operations, including multi-engine piston or turbo-prop, turbo-jet, jet, or rotary.

Air Medevac Services – Air medical evacuation (medevac) services provide essential emergency medical transportation for life threatening situations and assists in patient transfers by air to higher level care facilities using both fixed-wing and helicopters. The most common aircraft operated in this category include turbine-engine rotorcrafts and multi-engine piston or turbo-prop aircraft. Lifenet is an air medevac company who currently has a base on the Airport.

2.4 Airport Setting

Marana is located approximately 15 miles northwest of the City of Tucson. The Town of Marana is located in Pima County. The County covers a total area of 9,189 square miles and contains five incorporated cities. The elevation in the County ranges from 1,200 feet to the peak of Mount Lemmon at 9,185 feet above mean sea level (MSL). Approximately 15 percent of the population of Arizona resides in Pima County[2].

The Marana Regional Airport encompasses approximately 570 acres and is located at an elevation of 2,031 feet MSL. The Airport is located off of Avra Valley Road, which is approximately 11 miles west of Interstate 10 (I-10). The geographic location of the Airport is depicted in **Figure 2-1**.

Source: Google Earth, 2015

Figure 2-1 Marana Regional Airport Location Map

[2] According to the U.S. Census Quick Facts 2014 population estimates for Arizona and Pima County.

2.5 Compatible Land Use

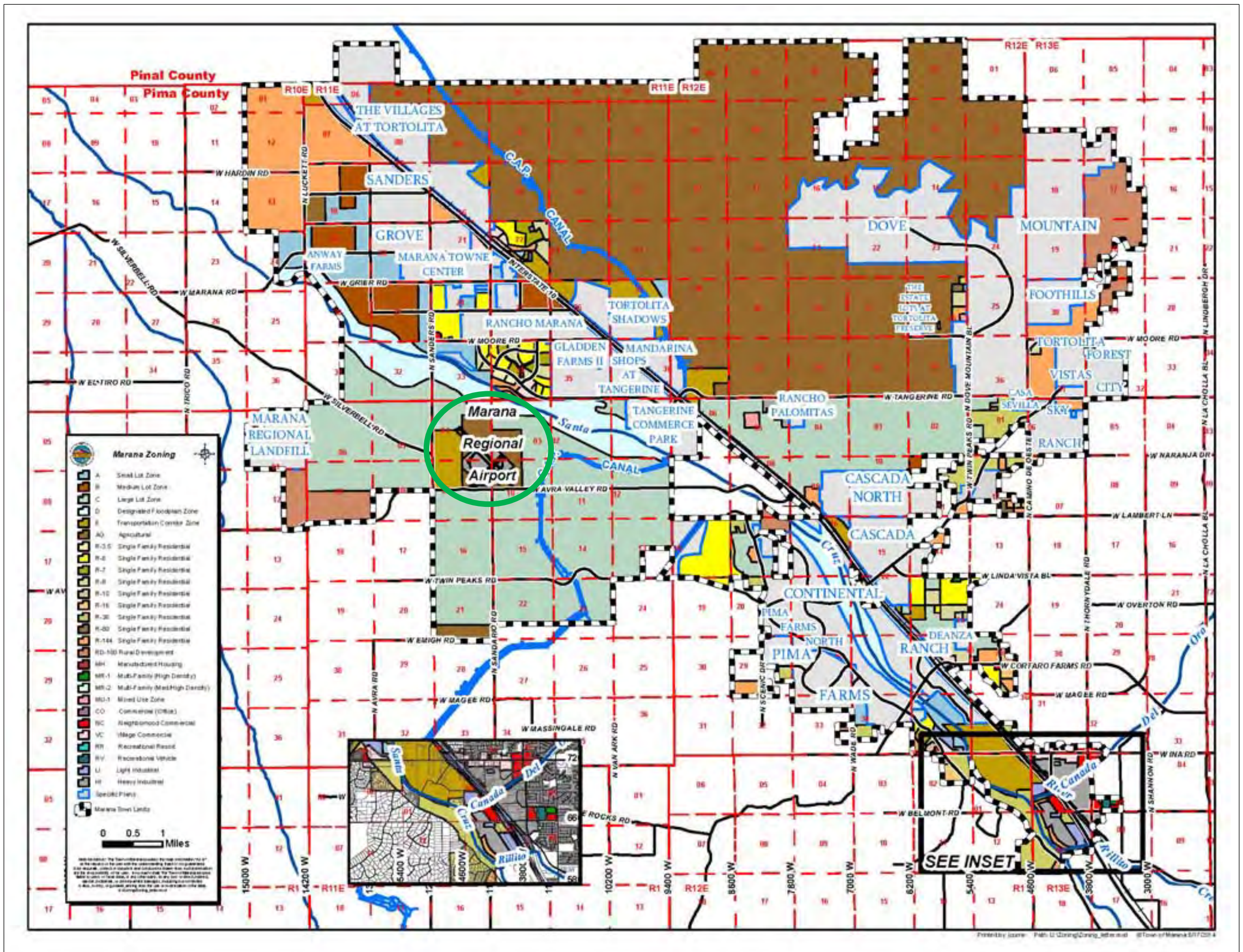
Land use compatibility conflicts are a common problem around many airports, including smaller general aviation facilities. In urban areas, as well as some rural settings, airport owners find that essential expansion to meet the demands of airport traffic is difficult to achieve due to the nearby development of incompatible land uses. Aircraft noise is generally a deterrent to residential development and other noise sensitive uses. In accordance with State of Arizona airport compatibility legislation, residential development should be placed outside of the 65 day-night average sound level (DNL) noise contour.

The Town of Marana received a Record of Approval for the Marana Regional Airport Noise Compatibility Program (NCP) in November 2008. The NCP describes the current and future non-compatible land uses based on the parameters as established in Title 1, Code of Federal Regulations (CFR), Part 150, *Airport Noise Compatibility Planning*. According to the Record of Approval, the NCP includes one recommended noise abatement element, five land use planning elements, and two program management elements. The recommended elements will be taken into consideration during the development of this study.

Conflicts may also exist in the protection of runway approach/departure and transition zones to ensure the safety of both the flying public and the adjacent property owners. Adequate land for this use should be either owned in fee or controlled through easements, as recommended in this and future sections of this Airport Master Plan.

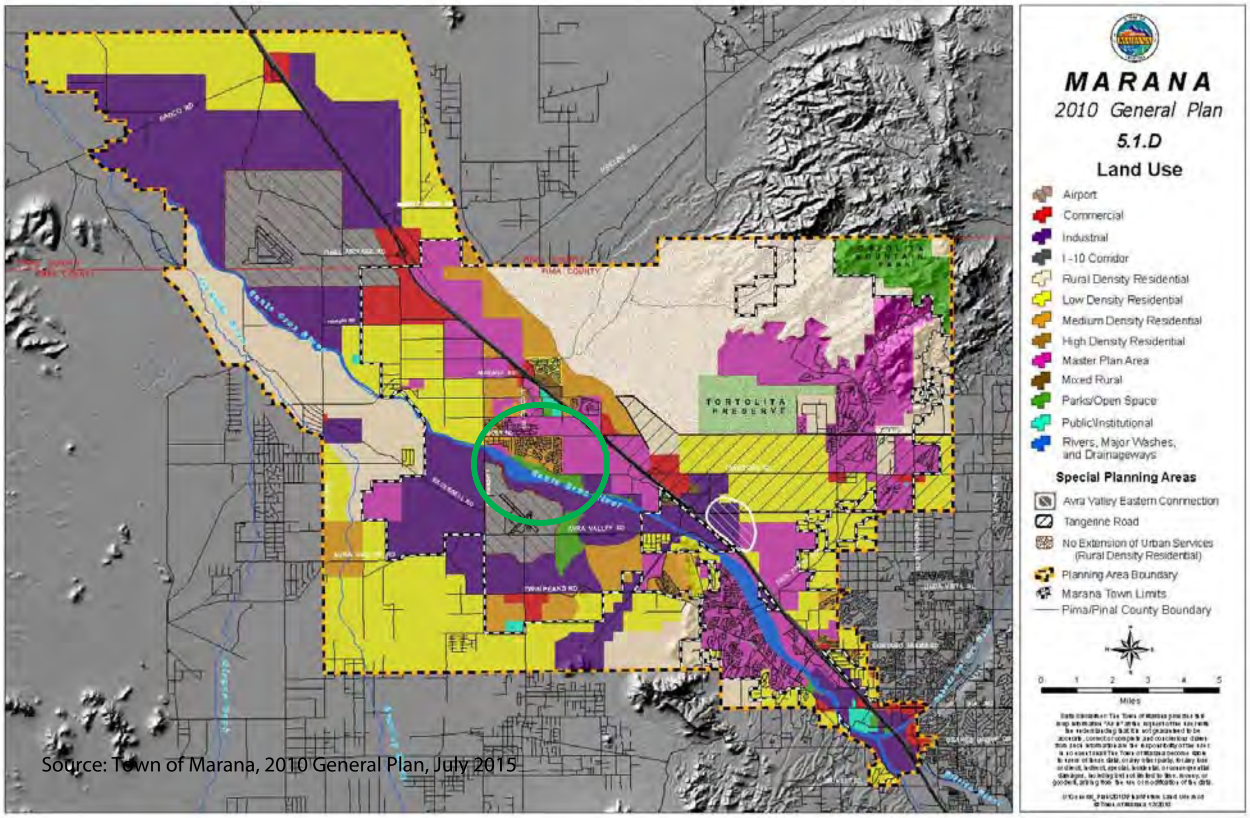
In the Town of Marana, the Land Development Code (LDC) is the regulating document for any land that is not part of a Specific Plan (Zone F). The LDC regulates land use with respect to zoning, subdivision regulations, signage, parking, landscaping, and other critical standards that promote public health, safety and welfare. The Town of Marana LDC, *Title 5 – Zoning* was last updated in April of 2014. All references to zoning contained in the Airport Master Plan will be to the April 2014 version.

Prior to April 6, 1993, the Town of Marana was divided into five zones. These zones were as follows: Zone A, Small Lot Zone; Zone B, Medium Sized Lot Zone; Zone C, Large Lot Zone; Zone D, Designated Flood Plain Zone; and Zone E, Transportation Corridor Zone. According to the LDC, these zones shall remain in place until reclassified by the property owner, or the Town. Subsequent to April 6, 1993, the Town of Marana established a new set of zones and criteria for those zones which are reflected in Section 5.10 through 5.12, inclusive of the LDC. The most recent zoning map reveals that the Airport is bordered to the north, east, and south by Zone C – Large Lot Zone, AG – Agricultural, and farther to the north, Zone D – Designated Flood Plain Zone. To the west of the airport resides Zone E – Transportation Corridor Zone. The existing zoning for the land surrounding the Airport is depicted on **Figure 2-2.** The Marana 2010 General Plan also contains a review of the land uses and their categories. The review includes the Airport as depicted on **Figure 2-3.** The closest residential developments are located approximately 1 ½ miles north of the airport. The residential developments are also north of the Santa Cruz River.



Source: Town of Marana, July 2015

Figure 2-2 Town of Marana Zoning Map



Source: Town of Marana, 2010 General Plan, July 2015

Figure 2-3 Town of Marana Land Use Plan Categories

2.6 Socioeconomic Characteristics

The socioeconomic makeup of the community surrounding an airport is always an important aspect to examine during the airport master planning process. Examining the specific socioeconomic characteristics of the Town of Marana will help determine the factors influencing aviation activity in the area and the extent to which aviation facility developments are needed. Characteristics such as employment, demographic patterns, and income will help in establishing the potential growth rate of aviation within the area. By analyzing the information in this Chapter, forecasts of aviation activity can be developed. The forecasts are provided in Chapter 3, Forecasts of Aviation Activity.

2.6.1 Local Profile

Although a relatively young municipality, the community has a long and rich history with more than 4,200 years of continuous human occupation in Marana and the surrounding middle Santa Cruz Valley.

During World War II, the impact of the rising importance of the military came quickly to Marana. The Marana airfield (1942-1945) was one of the largest pilot-training centers during WWII, training some 10,000 flyers, and Titan missile sites were later located in the area as part of a complex of ballistic missile installations built around Tucson.

In March 1977, the Town incorporated about 10 square miles and in August of that year, the 1,500 townspeople elected their first Town council. The Town is now a little more than 120 square miles with a population of 35,000[3].

2.6.2 Population

Population is a fundamental demographic element to consider when planning for the future needs of an airport. The State of Arizona has historically been one of the fastest growing states in the country. According to 2010 U.S. Census data, there are 980,263 people residing in Pima County and 34,961 in the Town of Marana; the Town of Marana's population increased at a double-digit annual growth rate from 2000-2010. Population growth in the Town has been far ahead of Pima County and the State of Arizona historically. The population trends are illustrated in **Table 2-1.**

Table 2-1 Historical Population

Location	Year 2000	Year 2010	Average Annual Growth Rate 2000-2010
Arizona	5,130,632	6,392,017	2.5%
Pima County	843,746	980,263	1.6%
Town of Marana	13,556	34,961	15.8%

Source: U.S. Census Bureau, 2000 and 2010 Census Briefs

Population projections for Pima County and Arizona were obtained from the Arizona Department of Administration, Office of Employment and Population Statistics. Based upon 2012 data, the population of Pima County is projected to grow on average 1.4 percent annually between 2015 and 2030; the population of Arizona is projected to grow on average 1.8 percent annually between 2015 and 2030.

Long-range population projections for the Town of Marana were taken from the Arizona Department of Economic Security (DES) and were approved by the DES Director in August of 1997. The projections are dated, but are still considered valid for comparison purposes. Based on the approved projections, the population was expected to be 46,078 by 2010 and 62,328 by 2015. Based on the Census data in **Table 2-1**, the Town of Marana is approximately 31.7 percent below the projected population for 2010. Therefore, to arrive at the projected populations over the course of the planning period, the data from the approved projections from 2015 to 2035 were also reduced by 31.7 percent to arrive at an approximate population for that period. These population projections are shown in **Table 2-2**.

Traditionally, population growth in an area is advantageous to airports; an increase in an area's population often means the potential for increases in an airport's user base and aviation and non-aviation related businesses.

[3] Town of Marana Web Site, www.maranaaz.gov, 2015

Table 2-2 Population Projections

	2015	2020	2025	2030	2035	Average Annual Growth Rate 2015-2035
Arizona	6,777,534	7,485,163	8,168,354	8,852,645	9,540,800	2.0%
Pima County	1,022,100	1,100,000	1,172,500	1,243,100	1,312,100	1.4%
Town of Marana	47,325	58,126	67,333	75,420	82,782	3.7%

Source: Arizona Department of Administration, Office of Employment and Population Statistics (medium series projections), retrieved July 2015

2.6.3 Employment

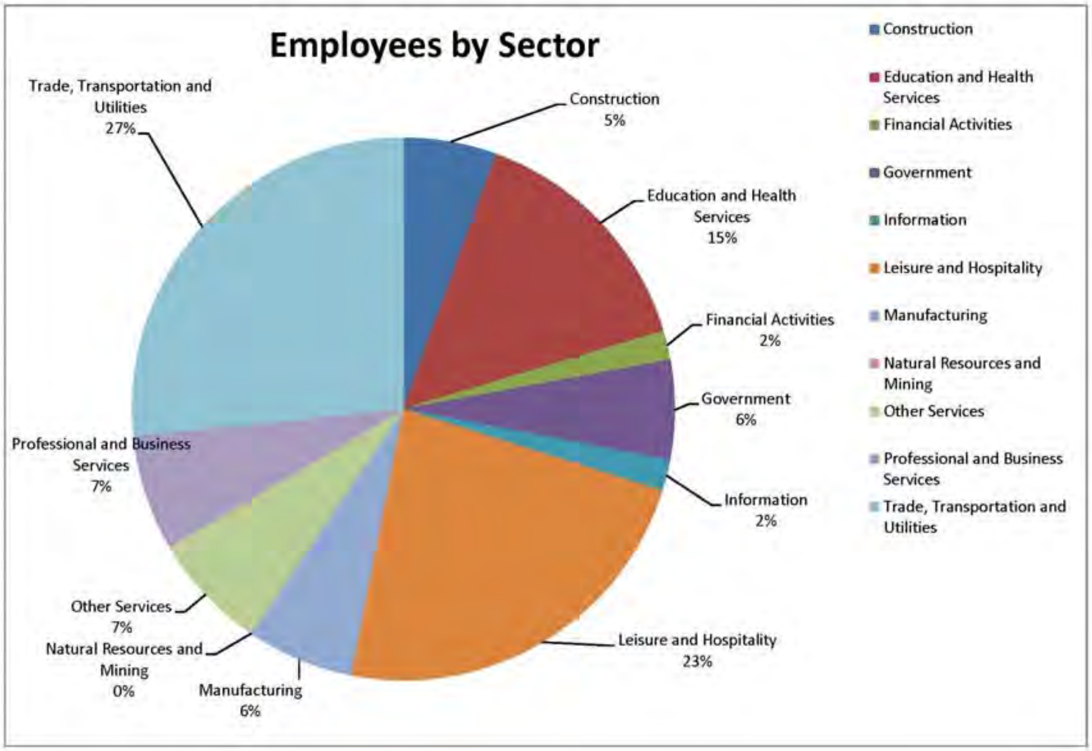
According to the U.S. Census Bureau 2012 American Community Survey 5-year Estimates, the largest industry sectors in the Town of Marana are the trade, transportation, and utilities sector, followed by leisure and hospitality, and education and health services. Employment distribution by industry sector for the Town of Marana is shown in **Table 2-3** and **Figure 2-3.**

As of April 2015, the seasonally adjusted unemployment rate in Arizona was 6 percent. For the same period the national unemployment rate was 5.4 percent. The unemployment rate in Arizona has been trending lower from a high of 7.6 percent in April 2013.

Table 2-3 Pima County Employment by Sector

	Pima County % by Sector	% of Total
Construction	5	.05
Education and Health Services	15	.15
Financial Activities	2	.02
Government	6	.06
Information	2	.02
Leisure and Hospitality	23	.23
Manufacturing	6	.06
Natural Resources and Mining	0	0
Other Services	7	.07
Professional and Business Services	7	.07
Trade, Transportation and Utilities	27	.27
Total		100%

Source: U.S. Census Bureau, 2012 American Community Survey 5 year Estimates, retrieved July 2015



2.6.4 Income

According to the U.S. Census for 2011-2013, the median household income in Arizona was approximately $49,774. Likewise, according to the same data, the median household income in Pima County was $45,841 and $73,149 in the Town of Marana. The per capita income (2013 dollars) for 2009-2013 was $25,269 for Pima County, $32,868 for the Town of Marana, and $25,358 for the State of Arizona.

The average number of persons per household was 2.5 in Pima County, 2.69 in the Town of Marana, and 2.67 for Arizona as a whole. The percentage of families living below the poverty line for 2009-2013 was 19.2 percent for Pima County, 4.3 percent for the Town of Marana, and 17.9 percent for the State of Arizona.

2.7 Climate and Meteorological Conditions

Meteorological conditions play an important role in the planning and development of an airport. Wind direction and speed are essential in determining optimum runway orientation. Temperatures substantially affect aircraft performance and are a major factor in runway length determination. The percentage of time an airport experiences low visibility because of meteorological conditions is a key factor in determining the need for instrument approach procedures and the type of procedure and facilities needed. The type of instrument approach procedure that might be needed, in turn, determines airspace and imaginary surface requirements. The amount and type of precipitation that occurs at an airport affects visibility and runway friction, or runway braking effectiveness. It also affects the type of maintenance equipment required, for example, snow and ice removal equipment.

2.7.1 Local Climatic Data

According to the Western Regional Climate Center, the monthly average maximum temperature for the hottest month (July) is 101.4 degrees Fahrenheit. August is the month with the largest amount of precipitation (2.84 inches). The total annual average precipitation is 12.69 inches. The temperature and precipitation is summarized in **Table 2-4**.

Table 2-4 Temperature and Precipitation

Month	Mean Maximum Temperature (Fahrenheit)	Mean Minimum Temperature (Fahrenheit)	Precipitation (inches)
January	66.7	40.8	0.97
February	69.2	43.0	0.97
March	75.0	47.1	0.92
April	82.7	53.0	0.38
May	92.2	61.1	0.22
June	100.9	70.1	0.33
July	101.4	75.0	2.00
August	99.0	73.4	**2.84**
September	96.3	69.0	1.29
October	86.6	58.0	0.90
November	74.4	46.6	0.70
December	65.4	39.7	1.17
Annual	84.1	56.4	12.69

Source: Western Regional Climate Center, retrieved July 2015

2.8 Neighboring Airports/Service Area

As previously discussed, Marana Regional Airport is located in the southern region of Arizona. The region's mild climate and terrain serve as an ideal location for an airport. A general comparison of several other notable public airports in the vicinity of Marana Regional Airport was conducted in order to illustrate their proximity to the study airport and to give an overall picture of the types of aeronautical facilities available to the surrounding communities. This type of comparison is typically performed in order to define an airport's service area. An airport service area is defined by the communities and surrounding areas served by the airport facility. For example, factors such as the airport's surrounding topographical features (mountains, rivers, etc.), proximity to its users, quality of ground access, required driving time to the airport and the proximity of the facility to other airports that offer the same or similar services can all affect the size of a particular airport's service area. To define the service area for Marana Regional Airport, the public airports in the area and the general services and facilities they provide were reviewed. **Table 2-4** summarizes the closest public airports and their services. The service area includes the area within half the distance (in nautical miles) of the nearest airport with a published instrument approach procedure as shown on **Figure 2-4.** In this instance, Ryan Field is the closest airport with published instrument approach procedures.

Table 2-4 Neighboring Airports

	FAA Identifier	Distance (Nautical Miles) and Direction	Distance (Highway Miles)	Federal Service Level (NPIAS)	Primary Runway (Length and Width)	Pavement Type	Instrument Procedures	Fuel
Pinal Airpark	MZJ	8 NW	12	GA	6,849' x 150'	Asphalt	None	No
Ryan Field	RYN	16 S	24	R	5,503' x 75'	Asphalt	ILS or LOC, NDB/DME, GPS	Yes
Tucson International Airport	TUS	23 SE	30	P	10,996' 150'	Asphalt	ILS, RNP, GPS, VOR/DME	Yes
Eloy Municipal Airport	E60	30 NW	40	GA	3,901' x 75'	Asphalt	None	Yes
Coolidge Municipal Airport	P08	33 NW	58	GA	3,873' x 75'	Asphalt	GPS, VOR/DME	Yes

Note. Abbreviations: P=Commercial Service - Primary, GA=general aviation, R=Reliever, N/A=not applicable.
Source: www.AirNav.com, 2015

Source: Google Maps, 2015

Figure 2-4 Service Area for Marana Regional Airport

2.9 Airport Ownership and Management

Marana Regional Airport is owned, operated, and maintained by the Town of Marana. The Town Council is responsible for the administration and financial oversight of the airport. The Town Council is made up of seven members who serve four-year terms. The Mayor of the Town also serves a four-year term. The Town of Marana currently employs an airport manager (who reports to the Town Council on matters pertaining to the Airport), two airport maintenance workers, and a part-time administrative person. The airport manager handles the administrative duties at the airport.

2.10 Grant History

The Town of Marana has received numerous grants from the Federal Aviation Administration (FAA) over the years through the Airport Improvement Program (AIP) for the development of the Airport. The AIP is funded through the Aviation Trust Fund which was established in 1970 to provide funding for eligible projects as defined in the AIP Handbook.

The Arizona Department of Transportation (ADOT) has also provided numerous grants to the Town of Marana for the development of the Airport. The Arizona Revised Statutes

(A.R.S.) are laws established by the state of Arizona which encourage and advance the safe and orderly development of aviation in the state.

The combined grant history for the last 10 years of capital improvements at Marana Regional Airport is depicted in **Table 2-5.**

Table 2-5 Marana Regional Airport 10-year Grant History

Federal Fiscal Year	State Fiscal Year	Federal AIP Grant Number	State Grant Number	Grant Description and Project Type	Federal Grant Amount	State Grant Amount	Local Share Amount	Total Amount
-	2005	-	ADOT E 5S09	Update Master Plan	-	$180,000	$20,000	$200,000
-	2005	-	ADOT E 5S10	Apron Reconstruct	-	$450,000	$50,000	$500,000
-	2005	-	ADOT E 5S80	EA for Land Acquisition	-	$465,388	$51,710	$517,098
2004	2005	3-04-0058-10	ADOT E 5F71	Rehabilitate Runway 12-30	$175,000	$4,606	$4,605	$184,211
2004	2005	3-04-0058-10	ADOT E 5F72	Acquire Land for Approaches	$125,000	$3,290	$3,290	$131,579
-	2005	-	ADOT E 5S87	APMS	-	$248,409	$0	$248,409
2005	2006	3-04-0058-013	ADOT E 6F57	Construct Taxiway E	$2,157,395	$56,776	$56,775	$2,270,946
2005	2006	3-04-0058-012	ADOT E 6F56	Conduct PAR Part 150 Study	$200,000	$5,264	$5,263	$210,527
-	2006	-	ADOT E 6S24	Construct Security Fence	-	$315,000	$35,000	$350,000
-	2006	-	ADOT E 6S26	Taxiway B Electrical Upgrades	-	$1,080,000	$120,000	$1,200,000
-	2006	-	ADOT E 6S88	Replacement of Runway 12-30 MIRLS	-	$397,736	$44,193	$441,929
-	2007	-	ADOT E 7S147	Fire Protection – Phase 1	-	$1,350,000	$150,000	$1,500,000
-	2007	-	ADOT E 7S75	New Airport Terminal – Design Only	-	$360,000	$40,000	$400,000
-	2007	-	ADOT E 7S15	Large Aircraft Apron Reconstruct	-	$1,250,000	$138,888	$1,388,888
2006	2007	3-04-0058-014	ADOT E 7F66	Rehabilitate Runway 03-21. Taxiway A, E and others (Design); Taxiway E Apron and Access Road (Design & Construct)	$5,007,750	$131,787	$131,787	$5,271,324
2007	2008	3-04-0058-15	ADOT E 8F63	Construct Air Traffic Control Tower – Design Only (Phase I)	$150,000	$3,948	$3,947	$157,895

Federal Fiscal Year	State Fiscal Year	Federal AIP Grant Number	State Grant Number	Grant Description and Project Type	Federal Grant Amount	State Grant Amount	Local Share Amount	Total Amount
-	2008	-	ADOT E 8S09	Fire Protection - Phase II	-	$540,000	$60,000	$600,000
-	2008	-	ADOT E 8S10	Bypass Apron (Design & Construct)	-	$760,387	$84,487	$844,874
-	2008	-	ADOT E 8S11	Construct Security Fence and Gates	-	$220,000	$24,444	$244,444
-	2008	-	ADOT E 8S12	Reconstruct & Expand South Apron	-	$429,613	$47,734	$477,347
2007	2008	3-04-0058-015	ADOT E 8F6	Acquire Land for Approaches (90 acres)	$880,000	$23,159	$23,158	$926,317
2008	2009	3-04-0058-016	ADOT E 9F24	Construct Air Traffic Control Tower - Design Only (Phase II)	$111,240	$2,928	$2,927	$117,095
2008	2009	3-04-0058-017	ADOT E 9F65	Construct Air Traffic Control Tower - Design Only (Phase III)	$68,073	$1,792	$1,791	$71,656
2009	2010	3-04-0058-018	ADOT E 10F25	Construct Air Traffic Control Tower - Design Only (Phase IV)	$120,687	$3,176	$3,176	$127,039
-	2012	-	ADOT E 2S81	APMS	-	$539,679	$59,964	$599,643
-	2015	-	ADOT E 5S1C	APMS	-	$1,382,725	$153,636	$1,536,361
-	2015	-	ADOT E 5S10	Runway/Taxiway Guidance Sign Replacement and Taxiway In-pavement Light Replacement	-	$463,500	$51,500	$515,000
-	2015	-	ADOT E 5S3N	Master Plan Update, GIS, Business Plan, Rates and Charges	-	$414,000	$46,000	$460,000
				Total amount	$8,995,145	$11,083,163	$1,414275	$21,492,582

Note: Grant amounts represent the original amount granted to the Sponsor. The final close-out amounts may be different and are not shown.
Source: ADOT MPD - Aeronautics Group, July 2015

2.11 Airport Financial Data

Financial data was obtained for the Marana Regional Airport from 2012 to 2014 in order to conduct a review of the revenue and expenditures. The data provides a baseline for the financial status of the airport and allows for further evaluation in the Airport Development and Financial Plan chapter. It is important to note that Town of Marana fiscal year is from July 1st to June 30th.

Revenue reports for the last three fiscal years (2012 through 2014) were fairly consistent indicating between $251,000 and $285,000 in annual revenue, or approximately an 11% maximum variance over the period. Operating expenses over the same period have been on the rise with the largest increases in the Fuel and Supplies categories. The net difference of expenses over income has risen from $26,600 in 2012 to $138,500 annually in 2014 due to general increases in airfield maintenance, operating costs, and salaries.

The airport's aging infrastructure and need for new capital programs will continue to contribute to increasing costs associated with the airport's operational and maintenance requirements. However, opportunities for new revenue source development to offset operating and development costs, including new proposed Capital Improvement Projects, also exist and will be evaluated in the Strategic Business Plan for the Marana Regional Airport which is also currently under development.

Table 2-6 Marana Regional Airport Financial Data

	2014	2013	2012
Annual Revenues			
Fuel (Jet A, AVGAS)	$26,000	$26,000	$24,000
Open tie-downs	$25,000	$37,000	$30,000
Land Leases for Private Hangars	$180,000	$185,000	$184,000
Charges for Services	$20,000	$37,000	$19,000
Total Revenue	$251,000	$285,000	$257,000
Operating Expenditures			
Salaries and Benefits	$144,000	$138,000	$135,000
Fuel and Supplies	$89,500	$16,000	$15,000
Maintenance	$109,000	$100,000	$85,000
Insurance	$12,000	$12,000	$12,000
General Administration	$24,000	$23,000	$22,000
Equipment	$11,000	$15,000	$14,000
Total Operating Expenditures	$389,500	$304,000	$283,000
Net - Loss/+ Gain	-$138,500	-$19,000	-$26,000

Source: Marana Airport Manager, June 2015

2.12 Based Aircraft and Operations

There are various federal, state, and local sources available for determining existing activity levels at an airport. These include, but are not limited to, FAA Form 5010-1 *Airport Master Record*, FAA Terminal Area Forecast (TAF), on-site inventory, and airport management records.

The FAA Form 5010-1 *Airport Master Record* is the official record kept by the FAA to document airport physical conditions and other pertinent information. The information is typically collected from the airport sponsor and includes an annual estimate of aircraft activity as well as the number of based aircraft. The accuracy of the information contained in the 5010-1 form varies directly with the airport manager's record keeping system and the date of its last revision. The current (August 2015) FAA 5010-1 Form for Marana Regional Airport indicates there are 227 based aircraft. The 5010-1 form also reports 90,000 annual operations; this is based upon a 12-month reporting period which ended in April of 2015.

The TAF is a historical record and contains forecast projections of based aircraft and annual operations. The TAF is maintained and utilized by the FAA for planning and budgeting purposes. The 2015-2035 TAF data for the Airport projects 237 based aircraft in 2015, increasing to 356 by 2035, and approximately 114,000 annual operations in 2015, increasing to approximately 165,000 by 2035. The TAF data may not accurately reflect the based aircraft and operations numbers, as it is dependent on when it was last updated by the FAA. Furthermore, it is difficult to accurately record aircraft operations at airports that are not equipped with an air traffic control tower. Normally, operations are recorded by air traffic controllers and reported to the FAA. Marana Regional Airport does not have an air traffic control tower.

According to discussions with airport management, there were 260 based aircraft and 80,000 annual operations in 2014. Historical based aircraft and operations are discussed in more detail in Chapter 3, Forecasts of Aviation Demand.

2.13 Certified Pilots and Registered Aircraft

The FAA databases of certificated airmen and registered aircraft were reviewed to determine the current distribution of pilots and registered aircraft in Pima County. This data indicates that there are 2,379 certificated pilots and 1,224 aircraft registered in Pima County as of June 2015. Aircraft are not always based where they are registered.

2.14 Design Standards

Airport design standards provide basic guidelines for a safe, efficient, and economic airport system. The standards cover the wide range of size and performance characteristics of aircraft that are anticipated to use an airport. Various elements of airport infrastructure and their functions are also covered by these standards. Choosing the correct aircraft characteristics for which the airport will be designed needs to be done carefully so that future requirements for larger and more demanding aircraft are taken into consideration;

furthermore, planners must remain mindful that designing for large aircraft that may never serve the airport is not economical.

2.14.1 Design Aircraft

According to FAA Advisory Circular 150/5300-13A, *Airport Design*, planning a new airport or improvement to an existing airport requires the selection of one or more "design aircraft." In most cases, the design aircraft (for the purpose of airport geometric design) is a composite aircraft representing a collection of aircraft classified by the parameters:

- Aircraft Approach Category (AAC)
- Airplane Design Group (ADG)
- Taxiway Design Group (TDG)

For the purpose of selecting a design aircraft, the FAA recommends that the most demanding aircraft, or family of aircraft, which conducts at least 500 operations per year at the airport be selected as the design aircraft. Additionally, when an airport has more than one active runway, a design aircraft is selected for each runway.

According to the 2007 Airport Master Plan, the existing design aircraft for Runway 12-30 is a Bombardier Challenger CL-600, which has a maximum take-off weight of 41,250 pounds. The existing design aircraft for Runway 3-21 is a Beechcraft King Air 100, which has a maximum take-off weight of 11,800 pounds.

2.14.2 Runway Design Code (RDC)

To arrive at the RDC, the AAC, ADG, and approach visibility minimums are combined to form the RDC of a particular runway. The RDC provides the information needed to determine certain design standards that apply. The first component, depicted by a letter, is the AAC and relates to aircraft approach speed (operational characteristics). The second component, depicted by a Roman numeral, is the ADG and relates to the aircraft wingspan or tail height (physical characteristics). The final component relates to the visibility minimums expressed by runway visual range (RVR) values in feet of 1,200, 1,600, 2,400, 4,000, and 5,000. If a runway is only used for visual approaches, the term "VIS" should appear as the third component. The FAA AC 150/5300-13A, *Airport Design*, RDC components are illustrated in **Table 2-8**.

Table 2-8 Runway Design Code

Aircraft Approach Category	Approach Speed	
Category A	less than 91 knots	
Category B	91 to 120 knots	
Category C	121 knots to 140 knots	
Category D	141 knots to 165 knots	
Category E	165 knots or more	
Airplane Design Group	**Wingspan**	**Tail Height**
Group I	< 49 feet	<20 feet
Group II	49 to 78 feet	20 to 29 feet
Group III	79 to 117 feet	30 to 44 feet
Group IV	118 to 170 feet	45 to 59 feet
Group V	171 to 213 feet	60 to 65 feet
Group VI	214 to 261 feet	66 to 79 feet
Runway Visual Range (ft.)	**Flight Visibility Category (statute mile)**	
VIS	Visual approach only	
5000	Not lower than 1 mile	
4000	Lower than 1 mile but not lower than 3/4 mile	
2400	Lower than 3/4 mile but not lower than 1/2 mile (CAT-I PA)	
1600	Lower than 1/2 mile but not lower than 1/4 mile (CAT-II PA)	
1200	Lower than 1/4 mile (CAT-III PA)	

Source: FAA Advisory Circular 150/5300-13A, *Airport Design*, 2015

Based on the above criteria the existing RDC for the Runways at the Airport are as follows:

- Runways 12 is C/II/5000
- Runway 30 is C/II/VIS
- Runways 3 and 21 are B/I/5000

2.14.3 Taxiway Design Group (TDG)

The TDG design standards are based on the overall main gear width (MGW) and the cockpit-to-main gear (CMG) distance. Taxiway/taxilane width and fillet standards, and in some instances, runway to taxiway and taxiway/taxilane separation requirements, are determined by the TDG. The FAA advises that it is appropriate for a series of taxiways on an airport to be built to a different TDG standards based on anticipated use.

For airports with two or more active runways, it is advisable to design all airport elements to meet the requirements of the most demanding RDC and TDG. However, it may be more practical and economical to design some airport elements such as a secondary runway to standards associated with a lesser demanding RDC and TDG. For example, it would not be prudent for an air carrier airport that has a separate general aviation runway, or a crosswind runway for general aviation traffic, to design that runway for air carrier traffic.

The existing taxiways at the Airport vary in width from 35 to 50 feet. Taxiway design standards have been revised by the FAA since the previous Airport Master Plan was prepared; therefore, a TDG was not previously established for the Airport. Based on the existing taxiway widths, the TDGs for the Airport are TDG 2 and 3. However, it should be noted that the existing design aircraft for Runway 12-30 (Bombardier Challenger CL-600) falls within TDG-1B, and the design aircraft for Runway 3-21 (Beechcraft King Air 100) falls within TDG-1A. As such, the existing taxiway widths appear to exceed the minimum design standards. Further analysis on the existing TDG and the recommended TDG will be further discussed in the Facility Requirements chapter.

2.14.4 Airport Reference Code (ARC)

The ARC is not a design standard, rather it is an airport designation that signifies the airport's highest Runway Design Code (RDC), minus the third (visibility) component of the RDC. The ARC is used for planning purposes only, and does not limit the aircraft that may be able to operate safely on the airport.

According to the previous Airport Master Plan, the current ARC for the Airport is C-II. Examples of the types of design aircraft and their corresponding ARC are depicted in **Figure 2-5**.

AI
Primarily Single-Engine Propeller Aircraft, some light twins

BI
Primarily Light Twin-Engine Propeller Aircraft

Example Type: Cessna 172 Skyhawk

Example Type: Piper Navajo

BII
(<12,500 lbs)
Primarily Light Turboprops

BII
(>12,500 lbs)
Mid-sized corporate jets and commuter airliners

Example Type: Beechcraft King Air

Example Type: Cessna Citation II

A/BIII
Primarily large commuter-type aircraft

CI, DI
Primarily small and fast corporate jets

Example Type: De Havilland Dash 8

Example Type: Lear Jet 36

C/DII
Large corporate jets and regional-type commuter jets

C/DIII
Commercial airliners (approx. 100-200 seats)

Example Type: Gulfstream IV

Example Type: Boeing 737

C/DIV
Large commercial airliners (approx. 200-350 seats)

DV
Jumbo commercial airliners (approx. 350+ seats)

Example Type: Boeing 767

Example Type: Boeing 747

Figure 2-5 Typical Design Aircraft and Corresponding ARC

2.14.5 Safety Areas

Runway and Taxiway Safety Areas (RSAs and TSAs) are defined surfaces surrounding the runway and taxiway prepared specifically to reduce the risk of damage to aircraft in the event of an undershot, overshot, or excursion from the runway or taxiway. The safety areas must be:

- Cleared and graded and have no potentially hazardous surface variations;
- Drained so as to prevent water accumulation;
- Capable, under dry conditions, of supporting snow removal equipment, aircraft rescue and fire fighting (ARFF) equipment, and the occasional passage of aircraft without causing structural damage to the aircraft; and
- Free of objects, except for objects that need to be located in the runway or taxiway safety area because of their function.

The runway safety areas for Runway 12-30 and Runway 3-21 at the Airport are in good condition and appear to meet FAA standards. No apparent violations were noted at the time of the site visit. The taxiway safety areas were also reviewed and no apparent deficiencies were noted. The Airport did undergo a FAA Airport Master Record 5010 Update whereby Aviation Technologies, LLC performed a site visit and published their findings via a letter dated April 16, 2015. Based on the letter, some fill material is needed just prior to the thresholds for Runways 12 and 30 in order to meet FAA criterion for a maximum drop-off from a pavement. No other safety area concerns were presented in the letter from Aviation Technologies, LLC.

2.14.6 Obstacle Free Zone (OFZ) and Object Free Area (OFA)

The OFZ is a three dimensional volume of airspace which supports the transition of ground to airborne aircraft operations. The clearing standard precludes taxiing and parked airplanes and object penetrations, except for frangible visual Navigational Aids (NAVAIDs) that need to be located in the OFZ because of their function. The OFZ is similar to the 14 CFR Part 77 primary surface in that it represents the volume of space longitudinally centered on the runway. It extends 200 feet beyond the end of each runway. The Runway Object Free Area (ROFA) is a two-dimensional ground area surrounding the runway. The ROFA standard precludes parked airplanes, agricultural operations and objects, except for objects that need to be located in the ROFA for air navigation or aircraft ground maneuvering purposes.

The OFZ and OFA appear to be in good condition and appear to meet FAA standards. No apparent violations were noted at the time of the site visit.

2.14.7 Runway Protection Zone (RPZ)

The Runway Protection Zone (RPZ) is trapezoidal in shape and centered about the extended runway centerline. The RPZ dimension for a particular runway end is a function of the type of aircraft and approach visibility minimums associated with that runway end. The existing RPZ dimensional standards for both runways at the Airport are presented in **Table 2-9**.

Based on a site visit, all of the existing RPZ appear to be incompliance with current FAA standards.

The land uses currently not recommended by FAA to be within the RPZ include residences and places of public assembly (churches, schools, hospitals, office buildings, shopping centers, and other uses with similar concentrations of persons typifying places of public assembly). The FAA also recommends the Sponsor (Town of Marana) control the RPZs through fee simple ownership, or avigation easements.

The FAA issued a memorandum on September 27, 2012 regarding land uses within a RPZ. The memorandum outlines interim policy guidance to address what constitutes a compatible land use and how to evaluate proposed land uses that would reside in an RPZ.

Based on a site visit, all of the existing RPZs appear to be incompliance with current FAA standards with the exception of the Runway 3 and Runway 30 existing RPZs. West Avra Valley Road goes through both Runway 3 and Runway 30 RPZs. The FAA recommends in their interim policy guidance that airport sponsor work with FAA to remove or mitigate the risk of any existing incompatible land uses in the RPZ as practical. Therefore, as part of the Alternative Development process, this topic will be further evaluated to determine if any action is necessary.

2.14.8 Summary of Existing Design Standards

In summary, the FAA has numerous design standards in which airports must comply with. A review of the existing design standards for the Airport's runways and taxiways are depicted in **Table 2-9** and **Table 2-10**.

Table 2-9 Existing Dimensional Standards – Runways

Design Standards	Runway 12-30		Runway 3-21	
	Existing Dimension (ft)	Standard Dimension (ft)[1]	Existing Dimension (ft)	Standard Dimension (ft)[1]
Runway Design Code (RDC)	C-II	C-II	B-I	B-I
Runway length	6,901	--	3,893	--
Runway width	100	100	75	60
Runway Safety Area (RSA) width	500	500	120	120
Runway Safety Area (RSA) length beyond runway end	1,000	1,000	240	240
Runway Object Free Area (ROFA) width	800	800	400	400
Runway Object Free Area (ROFA) length beyond runway end	1,000	1,000	240	240
Runway Obstacle Free Zone (ROFZ) width	400	400	400	400
Runway Obstacle Free Zone (ROFZ) length beyond runway end	200	200	200	200
Approach Runway Protection Zone (RPZ) length	1,700	1,700	1,000	1,000
Approach Runway Protection Zone (RPZ) inner width	500	500	500	500
Approach Runway Protection Zone (RPZ) outer width	1,010	1,010	700	700

[1] Standard dimensions are based on visual and not lower than 1 mile visibility minimums.
Source: FAA AC 150/5300-13A, *Airport Design*, 2015

Table 2-10 Existing Dimensional Standards – Taxiways/Taxilanes

Design Standards (Taxiway B)	Existing Dimensions (ft) ADG-I	Design Standard Dimensions (ft) ADG-I
Taxiway Protection		
Taxiway Safety Area (TSA)	49	49
Taxiway Object Free Area (TOFA)	89	89
Taxilane Object Free Area (OFA)	79	79
Taxiway Separation		
Taxiway Centerline to Parallel Taxiway/Taxilane Centerline	70	70
Taxiway Centerline to Fixed or Movable Object	44.5	44.5
Taxilane Centerline to Parallel Taxilane Centerline	64	64
Taxilane Centerline to Fixed or Movable Object	39.5	39.5
Wingtip Clearance		
Taxiway Wingtip Clearance	20	20
Taxilane Wingtip Clearance	15	15
Design Standards (Taxiways A,C,E,H)	Existing Dimensions (ft) ADG-II	Design Standard Dimensions (ft) ADG-II
Taxiway Protection		
Taxiway Safety Area (TSA)	79	79
Taxiway Object Free Area (TOFA)	131	131
Taxilane Object Free Area (OFA)	115	115
Taxiway Separation		
Taxiway Centerline to Parallel Taxiway/Taxilane Centerline	105	105
Taxiway Centerline to Fixed or Movable Object	65.5	65.5
Taxilane Centerline to Parallel Taxilane Centerline	97	97
Taxilane Centerline to Fixed or Movable Object	57.5	57.5
Wingtip Clearance		
Taxiway Wingtip Clearance	26	26
Taxilane Wingtip Clearance	18	18
Taxiway Design Group (TDG) Design Standards	Existing Dimensions (ft)	Design Standard Dimensions (ft)[1]
Taxiway B	**TDG 2**	**TDG2**
Taxiway Width	35	35
Taxiway Edge Safety Margin (TESM)	7.5	7.5
Taxiway Shoulder Width	15	15
Taxiways A,C,E,H	**TDG 3**	**TDG 3**
Taxiway Width	40[2] & 50	50
Taxiway Edge Safety Margin (TESM)	10	10
Taxiway Shoulder Width	20	20

Source: FAA AC 150/5300-13A, *Airport Design*, 2015
[1]The existing design aircraft for each runway fall within TDG 1A and 1B categories. [2]Taxiway C has a pavement width of 40 feet.

2.15 Title 14, Code of Federal Regulations (14 CFR) Part 77 Imaginary Surfaces

The 14 CFR Part 77 *Safe, Efficient Use, and Preservation of Navigable Airspace* establishes several imaginary surfaces that are used as a guide to provide a safe and unobstructed operating environment for aviation. These surfaces, which are typical for civilian airports, are shown in **Figure 2-6**. The primary, approach, transitional, horizontal and conical surfaces identified in 14 CFR Part 77 are applied to each runway at both existing and new airports on the basis of the type of approach procedure available or planned for that runway and the specific 14 CFR Part 77 runway category criteria. For the purpose of this section, a utility runway is a runway that is constructed for and intended for use by propeller driven aircraft of a maximum gross weight of 12,500 pounds or less. A larger than utility runway is a runway constructed for and intended for the use of aircraft of a maximum gross weight of 12,500 pounds or greater. A visual runway is a runway intended for the operation by aircraft of any weight and using only visual approach procedures, with no straight-in instrument approach procedure and no instrument designation indicated on an FAA approved airport layout plan, a military service approved military airport layout plan, or by any planning document submitted to the FAA by competent authority. A non-precision instrument runway is a runway with an approved or planned straight-in instrument approach procedure.

Runway 12-30 and Runway 3-21 are the runways currently in use at Marana Regional Airport. Runway 12 is classified as a larger than utility, non-precision instrument runway and has a RNAV (GPS) and a NDB non-precision instrument approach. Runway 30 is classified as a larger than utility, visual runway. Runways 3 and 21 are larger than utility, non-precision instrument runways each with a RNAV (GPS) approach. The 14 CFR Part 77 imaginary surfaces for these classifications are further described below.

2.15.1 Primary Surface

The primary surface is an imaginary surface of specific width, longitudinally centered on a runway. The primary surface extends 200 feet beyond each end of the paved surface of runways, but does not extend past the end of soft field runways. The elevation of any point on the primary surface is the same as the elevation of the nearest point on the runway centerline. The width is 1,000 feet for precision runways, 500 feet for visual, larger than utility runways, and 250 feet for visual-utility runways.

2.15.2 Approach Surface

The approach surface is a surface longitudinally centered on the extended runway centerline and extending outward and upward from each end of the primary surface. An approach surface is applied to each end of the runway based upon the type of approach available or planned for that runway, with approach gradients of 20:1, 34:1, or 50:1. The inner edge of the surface is the same width as the primary surface. It expands uniformly to a width corresponding to the 14 CFR Part 77 runway classification criteria. At Marana Regional Airport, these dimensions are 500 feet by 3,500 feet by 10,000 feet, with a 34:1 approach surface gradient for Runway 12, 3, and 21, and 500 feet by 1,500 feet by 5,000 feet, with a 20:1 approach surface gradient for Runway 30.

2.15.3 Transitional Surface

The transitional surface extends outward and upward at right angles to the runway centerlines from the sides of the primary and approach surfaces at a slope of 7:1 and end at the horizontal surface.

2.15.4 Horizontal Surface

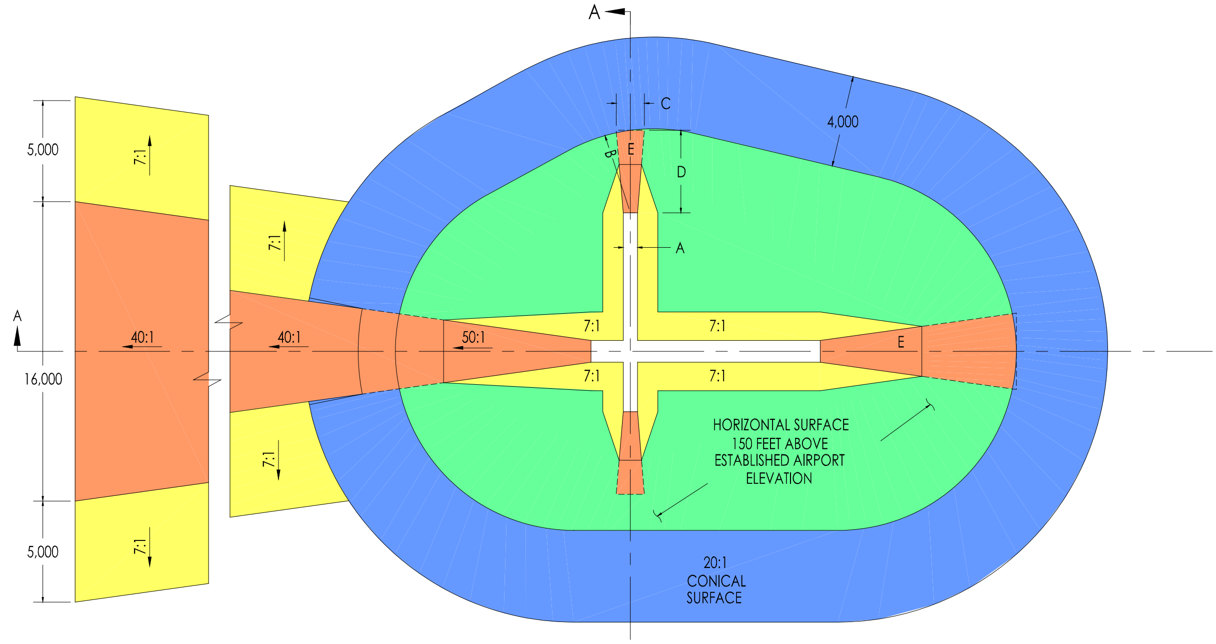
The horizontal surface is considered necessary for the safe and efficient operation of aircraft in the vicinity of an airport. As specified in 14 CFR Part 77, the horizontal surface is a horizontal plane 150 feet above the established airport elevation. The airport elevation is defined as the highest point of an airport's useable runways, measured in feet above mean sea level. The perimeter is constructed by arcs of specified radius from the center of each end of the primary surface of each runway. The radius of each arc is 5,000 feet for runways designated as utility or visual and 10,000 feet for all other runways.

2.15.5 Conical Surface

The conical surface extends outward and upward from the periphery of the horizontal surface at a slope of 20:1 for a horizontal distance of 4,000 feet.

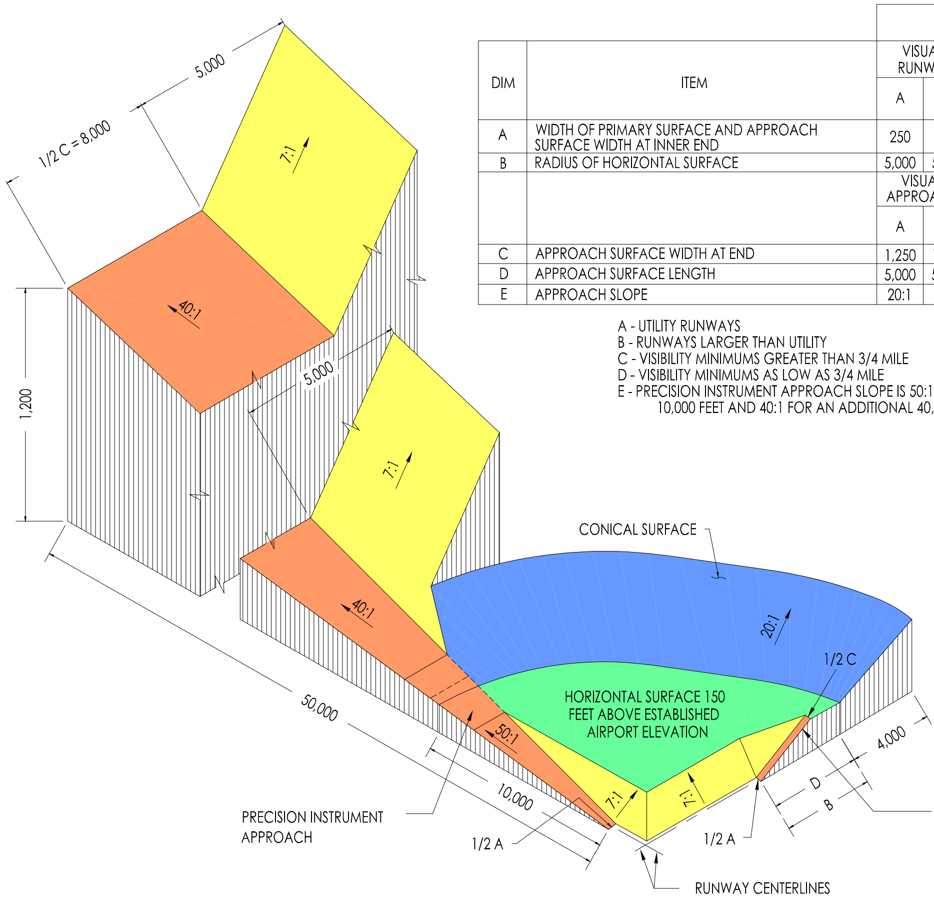
2.15.6 Penetrations to Imaginary Surfaces

A preliminary review of the airspace around the Airport was performed based on available information. No apparent penetrations were observed, although it's important to note that a more detailed penetration analysis will be conducted as part of the FAA Airports Geographic Information Systems (AGIS) data gathering. That portion of the master plan is currently underway; this section will be updated to describe any known penetrations to imaginary surfaces once that analysis is completed.



DIM	ITEM	DIMENSIONAL STANDARDS (FEET)					
		VISUAL RUNWAY		NON-PRECISION INSTRUMENT RUNWAY			PRECISION INSTRUMENT RUNWAY
		A	B	A	B		
					C	D	
A	WIDTH OF PRIMARY SURFACE AND APPROACH SURFACE WIDTH AT INNER END	250	500	500	500	1,000	1,000
B	RADIUS OF HORIZONTAL SURFACE	5,000	5,000	5,000	10,000	10,000	10,000
		VISUAL APPROACH		NON-PRECISION INSTRUMENT APPROACH			PRECISION INSTRUMENT APPROACH
		A	B	A	B		
					C	D	
C	APPROACH SURFACE WIDTH AT END	1,250	1,500	2,000	3,500	4,000	16,000
D	APPROACH SURFACE LENGTH	5,000	5,000	5,000	10,000	10,000	*
E	APPROACH SLOPE	20:1	20:1	20:1	34:1	34:1	*

A - UTILITY RUNWAYS
B - RUNWAYS LARGER THAN UTILITY
C - VISIBILITY MINIMUMS GREATER THAN 3/4 MILE
D - VISIBILITY MINIMUMS AS LOW AS 3/4 MILE
E - PRECISION INSTRUMENT APPROACH SLOPE IS 50:1 FOR INNER 10,000 FEET AND 40:1 FOR AN ADDITIONAL 40,000 FEET



ISOMETRIC VIEW OF SECTION A-A

SURFACE LEGEND

- PRIMARY
- APPROACH
- HORIZONTAL
- CONICAL
- TRANSITIONAL

Source: 14 CFR, Part 77 *Safe, Efficient Use, and Preservation of Navigable Airspace*, 2015

Figure 2-6 14 CFR Part 77 Imaginary Surfaces

2.15.7 Summary of Dimensional Criteria

The 14 CFR Part 77 imaginary surfaces depicted in **Table 2-11** represent the existing dimensions for the Marana Regional Airport. These surfaces will be used to determine if any existing or potential obstacles exist depending on the planned development at the Airport. Any changes to the existing dimensions based on the selection of a different RDC for the Airport will be noted on the Airport Data Table included on the Airport Layout Plan set. Obstacles will be identified on the Airport Layout Plan and any potential mitigation will also be identified, such as obstruction marking or the recommended removal of an obstacle.

Table 2-11 14 CFR Part 77 Imaginary Surfaces

	Runway 12; Runway 3-21	Runway 30
Primary Surface width	500	500
Primary Surface beyond RW end	200	200
Radius of Horizontal Surface	10,000	5,000
Approach Surface dimensions	500 x 3,500 x 10,000	500 x 1,500 x 5,000
Approach Surface slope	34:1	20:1
Transitional Surface slope	7:1	7:1
Conical Surface slope	20:1	20:1

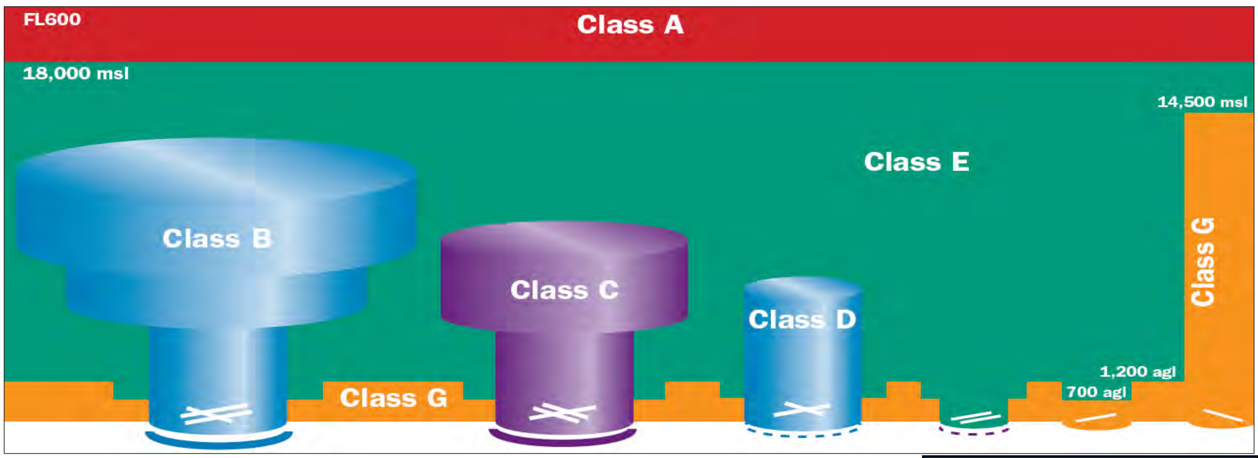
Note. All dimensions are in feet.
Source: 14 CFR, Part 77 *Safe, Efficient Use, and Preservation of Navigable Airspace*, 2015

2.16 Airspace Characteristics

The National Airspace System consists of various classifications of airspace that are regulated by the FAA. Airspace is either controlled or uncontrolled. Pilots flying in controlled airspace are subject to Air Traffic Control (ATC) and must follow either Visual Flight Rules (VFR) or Instrument Flight Rules (IFR) requirements. These requirements include combinations of operating rules, aircraft equipment and pilot certification, and vary depending on the Class of airspace. These rules are described in Federal Aviation Regulations (FAR) Part 71, *Designation of Class A, Class B, Class C, Class D, and Class E Airspace Areas; Airways; Routes; and Reporting Points* and FAR Part 91, *General Operating and Flight Rules*. A graphical representation of the different airspace classes is shown in **Figure 2-7**. General definitions of the classes of airspace are provided below:

- **Class A Airspace** - Airspace from 18,000 feet MSL up to and including flight level (FL) 600.
- **Class B Airspace** - Airspace from the surface to 10,000 feet MSL surrounding the nation's busiest airports in terms of IFR operations or passenger enplanements.

- **Class C Airspace** - Generally, airspace from the surface to 4,000 feet above the airport elevation (charted in MSL) surrounding those airports that have an operational control tower.
- **Class D Airspace** - Airspace from the surface up to 2,500 feet above the airport elevation (charted in MSL) surrounding those airports with an operational control tower.
- **Class E Airspace** - Generally, controlled airspace that is not Class A, Class B, Class C or Class D.
- **Class G Airspace** - Generally, uncontrolled airspace that is not designated Class A, Class B, Class C, Class D or Class E.
- **Victor Airways** - These airways are low altitude flight paths between ground based VHF Omni-directional Range receivers (VORs).



Source: Aircraft Owners and Pilots Association, 2015

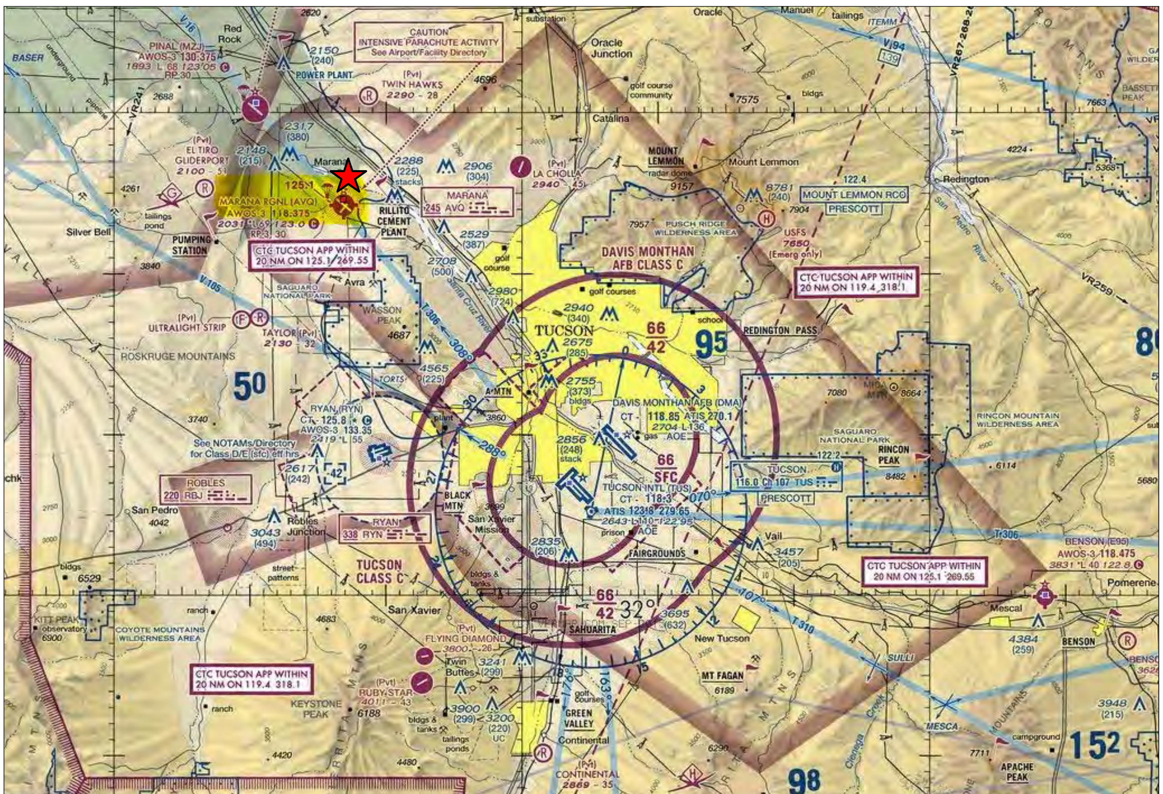
Figure 2-7 Classes of Airspace

The Airport is situated under Class E airspace starting at 700 feet above ground level (AGL) and extends to Class A 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. This transition area is intended to provide protection for aircraft transitioning from enroute flights to the airport for landing. Glass G airspace extends below the floor of the Class E airspace and extends to the surface at the Airport. Pilots should check Notices to Airmen (NOTAMs) or the Airport/Facility Directory (A/FD) for Class E (surface) effective hours.

The traffic patterns at the Airport are standard left traffic for Runways 12 and 21, and right traffic for Runways 3 and 30. Traffic Pattern Altitude (TPA) is 2,800 feet MSL according to the A/FD for all aircraft. Pilots should also be aware of high levels of parachute training at high and low levels during all hours in the northwest quadrant of the airport from the surface up to 5,000 feet MSL.

A Victor Airway is a special kind of Class E airspace and is like a "highway" in the sky. Many powered aircraft follow these routes. The routes connect VOR stations that radiate a signal in all directions. These stations are usually located at or near airfields. North-South Victor Airways have odd numbers while East-West airways have even numbers. These federal or Victor Airways are used by both IFR and VFR aircraft. The airspace set aside for a Victor Airway is eight miles wide with a floor at 1,200 feet AGL and extend up to FL 180 (18,000 feet MSL).

Victor Airway 16 (V16) transverses the Airport directly overhead; V16 connects the Tucson (TUS) VORTAC located approximately 24 nautical miles (nm) southeast of the Airport at Tucson International Airport to other VORTACs located further north. V105, also originating at the TUS VORTAC, is located southwest of the Airport (approximately 10 nm). Increased air traffic can be expected in and around Victor Airways and the originating and terminating VOR/VORTAC.



Source: www.VFRmap.com, retrieved 2015

Figure 2-8 FAA Phoenix Sectional Chart

2.16.1 Airspace Jurisdiction

Marana Regional Airport is located within the jurisdiction of the Albuquerque Air Route Traffic Control Center (ARTCC) and the Prescott Flight Service Station (FSS). The altitude of radar coverage by the Albuquerque ARTCC may vary as a result of the FAA navigational/radar facilities in operation, weather conditions and surrounding terrain. The

Prescott FSS provides additional weather data and other pertinent information to pilots on the ground and en route.

2.16.2 Airspace Restrictions

Military Operation Areas (MOAs) and Military Training Routes (MTRs) are established for the purpose of separating certain military training activities, which routinely necessitate acrobatic or abrupt flight maneuvers, from IFR traffic. IFR traffic can be cleared through an active MOA if IFR separation can be provided by Air Traffic Control (ATC), otherwise ATC will reroute or restrict the IFR traffic. Restricted areas are defined as "airspace designated under FAR Part 73, within which the flight of aircraft, while not wholly prohibited, is subject to restriction. Most restricted areas are designated joint-use and IFR/VFR operations in the area may be authorized by the controlling ATC facility when it is not being utilized by the using agency." Restricted areas are typically associated with military operations and indicate the existence of unusual, often invisible, hazards to aircraft such as artillery firing, aerial gunnery, or guided missiles.

The closest MOA to the Airport is the Sells 1/Sells Low MOA to the southwest. The MOAs do not overly influence the civilian aircraft activity that occurs in the vicinity of the Airport.

In addition to MOAs, pilots should be aware of Military Training Routes. The MTR program is a joint venture by the FAA and the Department of Defense (DOD). MTRs are mutually developed for use by the military to conduct low-altitude, high-speed training. Increased vigilance is recommended for pilots operating in the vicinity of these training routes. The nearest MTR (VR 239-244) passes within approximately 14 nm northwest of the Airport and is operational when the visibility is 5 statute miles or more and the ceiling is at least 3000 feet AGL. Each of these VR routes is flown at altitudes ranging from 300 feet AGL to 9500 above MSL. Aircraft announce their flight intensions on a UHF frequency intended for air-to-air communications, a frequency that is not typically monitored by civilian aircraft. Again, the MTRs do not have a significant impact on civilian aircraft within the airspace in close proximity of the Airport.

Special Conservation Areas are also located in the vicinity of the Airport. This type of airspace surrounds many national parks, wildlife refuges, and other noise sensitive areas. Pilots are requested to avoid flight below 2,000 feet AGL in these areas. The Saguaro National Park is located approximately 5 nm south-southeast of the Airport, and the Pusch Ridge Wilderness Area is located approximately 13 nm east of the Airport.

2.16.3 Instrument Approach Procedures

Airport safety and capacity are greatly enhanced at airports where instrument approach procedures (IAP) are available during times of inclement weather. As the ceiling and visibility around an airport decreases, electronic guidance provided by specialized equipment to aircraft (also equipped with specialized equipment) allows pilots to safely operate and land in weather where visibility is restricted. Additionally, the availability of instrument approach capabilities at an airport increases capacity by allowing continued use of the airport by aircraft equipped to fly instrument procedures because they can still land at the airport while aircraft which can only fly during visual conditions cannot.

The instrument capabilities of an airport are typically broken into two categories: precision and non-precision. Precision instrument approach procedures provide very accurate electronic lateral and vertical guidance to aircraft. Non-precision instrument approach procedures also provide electronic guidance to aircraft, but the accuracy is less refined and is mainly limited to lateral guidance only. The type and accuracy of an instrument approach is highly dependent upon the airspace obstructions in the vicinity of the airport. Runways with no instrument approach capabilities are considered visual runways. Airports with published instrument approach procedures are known as Instrument Flight Rules (IFR) airports while airports with no published instrument approach procedures are considered Visual Flight Rules (VFR) airports.

The most common type of precision approach in use today is the Instrument Landing System (ILS). Non-precision approach capabilities have been greatly increased by the evolution of satellite technology, specifically Global Positioning System (GPS). The FAA has recently developed new approach procedures know as Localizer, or Lateral Performance with Vertical Guidance (LPV). This new capability utilizes the Wide Area Augmentation System (WAAS). While not considered a precision approach, LPV provides vertical guidance to aircraft to "near precision" accuracy. Another type of instrument approach is area navigation (RNAV). This is a method of instrument flight rules (IFR) navigation that allows an aircraft to choose any course within a network of navigation beacons, rather than navigating directly to and from the beacons. RNAV can be defined as a method of navigation that permits aircraft operation on any desired course within the coverage of station-referenced navigation signals or within the limits of a self-contained system capability, or a combination of these. This can conserve flight distance, reduce congestion, and allow flights into airports without navigational beacons.

Instrument approach procedures are developed by the FAA. GPS/RNAV and/or LPV approaches require no ground based equipment; thus, the FAA can now develop approach procedures at airports where it was previously not economically feasible. Combined with evolving technology, more and more aircraft are able to safely operate in more airport environments.

The types of instrument approaches found at the Airport were described in Section 2.14. To view the published instrument approach procedures for the Airport, please see **Appendix B**.

2.17 Runway Wind Coverage

Wind direction and speed determine the desired alignment and configuration of the runway system. Aircraft land and takeoff into the wind and therefore can tolerate only limited crosswind components (the percentage of wind perpendicular to the runway centerline). The ability to land and takeoff in crosswind conditions varies according to pilot proficiency and aircraft type.

FAA Advisory Circular 150/5300-13, *Airport Design*, recommends that a runway should yield 95 percent wind coverage under stipulated crosswind components. If one runway does not meet this 95 percent coverage, then construction of an additional runway may be advisable. The crosswind component of wind direction and velocity is the resultant vector, which acts at a right angle to the runway. It is equal to the wind velocity multiplied by the trigonometric sine of the angle between the wind direction and the runway direction. The allowable crosswind component for each RDC is shown in **Table 2-11**. The allowable crosswind component and corresponding wind coverage percentage for the Airport is shown in **Table 2-12**.

Historical wind data from Tucson International Airport was used to create a wind rose and corresponding wind coverage data as seen in **Figure 2-9**. The existing runway configuration provides a combined 99.24 percent crosswind coverage for 10.5 knots, 99.83 percent for 13.0 knots, and 99.97 percent for 16.0 knots. This is more than the recommended 95 percent coverage for A-I through C-II aircraft.

Table 2-11 Crosswind Component

Allowable Crosswind	Runway Design Code (RDC)
10.5 knots	A-I & B-I
13 knots	A-II & B-II
16 knots	A-III, B-III & C-I through D-III
20 knots	A-IV through D-VI, E-I through E-VI

Source: FAA AC 150/5300-13A, *Airport Design*, 2015

Table 2-12 Wind Coverage – All Weather

Runway	Crosswind (knots)	Wind Coverage
12-30	10.5	94.61%
12-30	13.0	96.93%
12-30	16.0	98.88%
3-21	10.5	92.25%
3-21	13.0	95.61%
3-21	16.0	98.67%
Combined	10.5	99.24%
Combined	13.0	99.83%
Combined	16.0	99.97%

Source: Tucson International Airport; 2,643' MSL; Time Period: 2005-2014; 97,864 wind observations

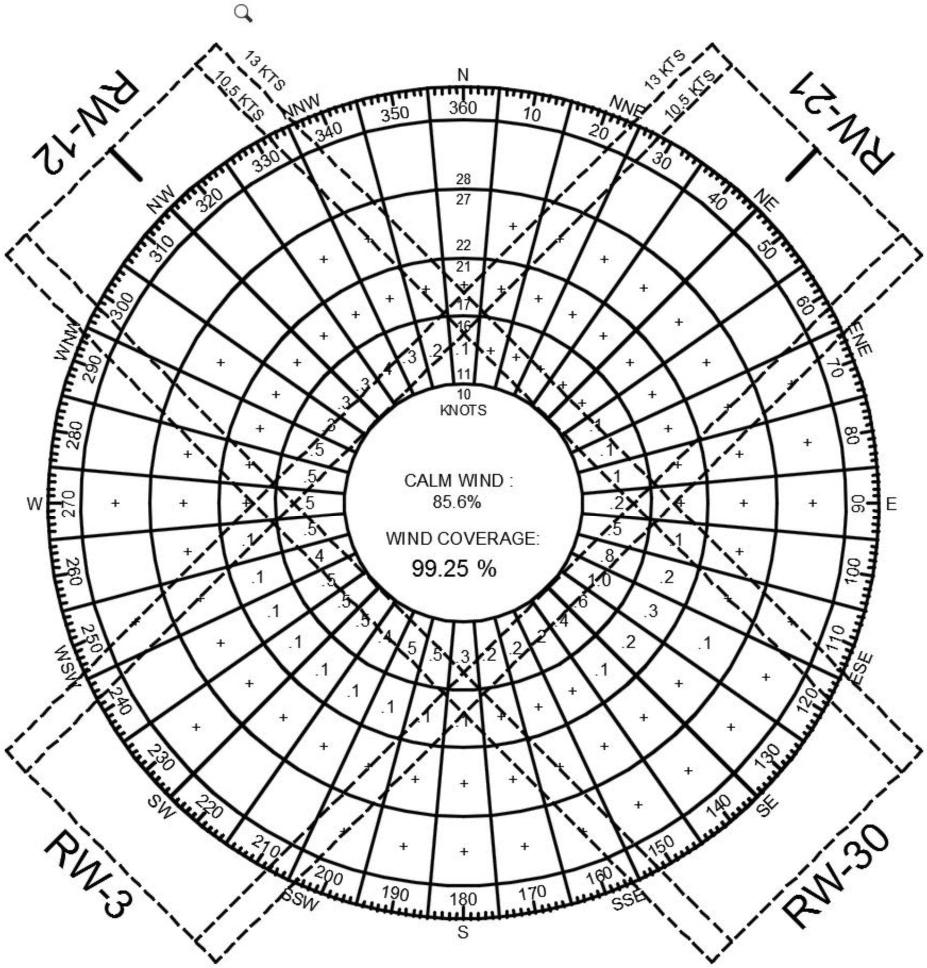


Figure 2-9 Wind Rose

2.18 Existing Airside Facility Inventory

The definition of airside is that portion of the airport (typically within the public safety and security fenced perimeter) in which aircraft, support vehicles, and equipment are located, and in which aviation-specific operational activities take place. The inventory of airside facilities provides the basis for the airfield demand/capacity analysis and the determination of any facility change requirements that might be identified. The various airside facilities are depicted on **Exhibit A** at the end of this section.

Some of the unique physical constraints and/or apparent FAA design standard concerns at the Airport are also identified herein, as applicable. It is important to note that no subsurface investigations or topographic surveys were performed as part of this study or inventory. Furthermore, any physical constraints identified are based on visual observations made only during onsite-visits to the Airport.

Airfield pavements consist of runways, taxiways/taxilanes, and aircraft aprons. The pavements are essentially the skeleton of an airport, supporting and connecting airside activities to landside facilities. The maintenance and preservation of an airport's system of pavement is essential in order to provide safe and efficient operational capabilities. A general description and condition of the existing airside facilities are described below.

2.18.1 Runways

There are two active runways at Marana Regional Airport: Runway 12-30 and Runway 3-21. According to latest FAA *Airport Master Record,* Form 5010-1 dated August 20, 2015, Runway 12-30 is 6,901 feet long, 100 feet wide, is orientated in a northwest to southeast direction, and serves as the primary runway for the Airport. Runway 12-30 is also equipped with non-precision runway pavement markings on both ends. It was noted at the time of the site visit that the pavement markings are faded; recommendations for improvements are discussed in a later chapter. The overall general condition of Runway 12-30 appears fair as depicted in **Figure 2-10.**

Figure 2-10 Runway 12-30

Runway 3-21 serves as the Airport's crosswind runway and is 3,892 feet long, 75 feet wide, and intersects Runway 12-30 at a right angle. The threshold on Runway 3 is displaced 494 feet to meet extended safety area requirements according to the previous Airport Master Plan. At the time of the site visit it was observed that Runway 3-21 is also equipped with basic runway pavement markings on both ends. This was noted as a non-standard condition since both Runway 3 and 21 both have published non-precision instrument approaches. Recommendations to correctly mark the runway pavement will be further discussed in Chapter 4, Facility Requirements. The overall general condition of Runway 3-21 appears poor as depicted in **Figure 2-11.**

Figure 2-11 Runway 3-21

According to FAA guidance on pavement strength, the aircraft types and the critical aircraft expected to use the airport during the planning period are used to determine the required pavement strength, or weight bearing capacity, of airfield surfaces. The required pavement design strength is an estimate based on average levels of activity and is expressed in terms of aircraft landing gear type and configurations. Pavement design strength is not the maximum allowable weight; limited operations by heavier aircraft other than the critical aircraft may be permissible. It is important to note that frequent operations by heavier aircraft will shorten the lifespan of the pavement. The existing runway pavement composition and strength ratings for the Airport are illustrated in **Table 2-13**.

Table 2-13 Runway Pavement Composition and Strength

Runway	Pavement Composition	Existing Pavement Strength (Landing gear configuration in thousands of pounds)
12-30	Asphalt	75.0-SW; 100.0-DW; 300.0-DTW
3-21	Asphalt	75.0-SW; 100.0-DW; 150.0-DTW

Abbreviations: SW = single-wheel landing gear, DW = dual-wheel landing gear, DTW = dual-tandem wheel landing gear
Source: FAA Airport Master Record, August 2015

2.18.2 Taxiway System

The Airport is equipped with two full-length parallel taxiways and a series of connector taxiways. The pavement widths and the presence of paved shoulders vary depending on location. The following is a brief summary of each existing taxiway:

Taxiway A:

Taxiway A is parallel to Runway 12-30 and is located 400 feet from the runway centerline, 50 feet wide (no shoulders), and is in good condition.

Taxiway B:

Taxiway B is parallel to Runway 3-21 and is located 240 feet from the runway centerline. The taxiway is 35 feet wide from the Runway 3 end to the intersection of Taxiway A, and is in poor condition. Taxiway B is 50 feet wide between Taxiway A and Runway 12-30, and is in poor condition. Taxiway B from the intersection of Runway 12-30 to the end of Runway 21 is 35 feet wide, and is also in poor condition. Taxiway B has 12 ½-foot wide shoulders from the Runway 3 end to the south hangar apron. Taxiway B also has 15-foot wide shoulders from the end of Runway 21 to the intersection of Runway 12-30. All shoulder pavements on Taxiway B are in poor condition.

Taxiway C:

Taxiway C begins on the north side of Runway 3-21 across from taxiway connector B-2 and continues to the intersection of taxiway connector A-3. The taxiway is 40 feet wide, and is in fair condition.

Taxiway E:

Taxiway E is a partial-parallel taxiway beginning at the Runway 30 end and continuing to the intersection of Taxiways B and B-3. Taxiway E is 50 feet wide and is in fair condition. Taxiway E also has 15-foot wide shoulders.

Taxiway H:

Taxiway H provides access to existing T-hangars and conventional hangars on the north-west side of the airport. Taxiway H is 50 feet wide and is in fair condition. Taxiway H also has 12 ½-foot wide shoulders.

In addition there are a series of connector taxiways serving the Airport. **Table 2-14** lists the connector taxiways and their general condition.

Table 2-14 Connector Taxiways

Connector Taxiway Designation	Pavement Width (ft)	Shoulder (Y/N)/ Width (ft)	General Pavement Condition
A-1	50	N	Good
A-2	50	N	Good
A-3	50	N	Good
A-4	50	N	Good
B-1	35	Y / 12.5	Poor
B-2	35	Y / 15	Poor
B-3	50	Y / 15	Poor
E-1	50	Y / 15	Fair
E-2	50	Y / 15	Fair

Source: ACI, 2015

All of the taxiways and taxiway connectors are constructed of asphalt and appear to have the correct pavement markings, although many of the pavement markings are faded.

2.18.3 Aircraft Aprons

The Airport has several aircraft parking aprons for transient and based aircraft. A list of airport aprons and their commonly referred to name are shown on **Table 2-15**. All of the aircraft parking aprons are asphalt and appear to have adequate pavement markings to guide aircraft movement.

Table 2-15 Aircraft Parking Aprons

Aircraft Aprons	Approximate Apron Size (sy)	General Pavement Condition
Terminal/FBO Apron	8,200	Poor
Itinerant Parking Apron	34,000	Poor
Helicopter Apron	35,200	Fair
West Hangar Apron	66,800	Good
South Hangar Apron	58,300	Poor
East Hangar Apron	25,800	Good
East Apron	90,000	Good
Bypass Apron (T/W A & C)	6,600	Good

Note: Apron size is inclusive of the existing hangars that reside on the pavement.
Source: ACI, 2015

2.18.4 Pavement Condition Index (PCI)

According to the Arizona Department of Transportation (ADOT), the airport system in Arizona is a multimillion dollar investment of public and private funds that must be protected and preserved. The Arizona Pavement Preservation Program (APPP) has been established to assist in the preservation of the Arizona airport system infrastructure. Every year ADOT's Aeronautics Group, using the Airport Pavement Management System (APMS), identifies airport pavement maintenance projects eligible for funding for the upcoming five years. These projects will appear in the state's Five-Year Airport Capital Improvement Program. Once a project has been identified and approved for funding by the State Transportation Board, the airport sponsor may elect to accept a state grant for the project and not participate in the APPP, or the airport sponsor may sign an inter-government agreement (IGA) with the Aeronautics Group to participate in the APPP.

ADOT also conducts pavement surveys using the procedure as documented in the following publications:

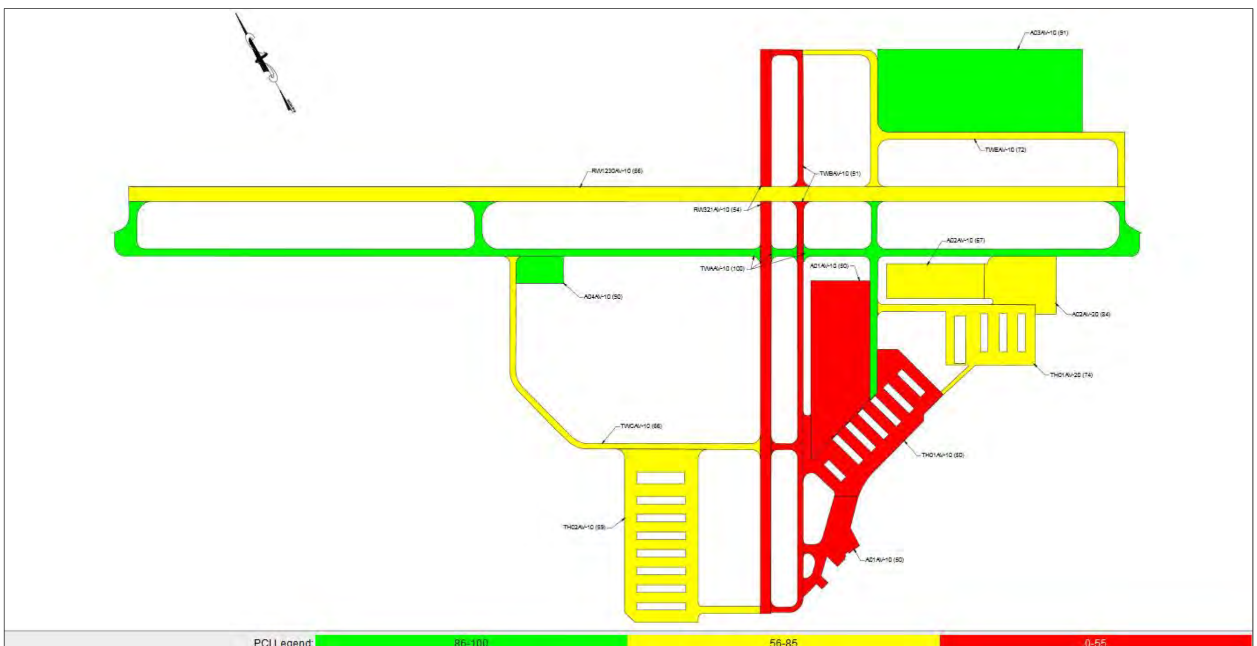
- The FAA's Advisory Circular 150/5380-6B, *Guidelines and Procedures for Maintenance of Airport Pavements*.
- The American Society for Testing and Material's (ASTM's) standard D-5340, Standard Test Method for Airport Pavement Condition Index Surveys.

The PCI procedure is the standard used by the aviation industry to visually assess pavement condition. It was developed to provide engineers with a consistent, objective, and repeatable tool to represent the overall pavement condition. During a PCI survey, visible signs of deterioration within a selected sample area are identified, recorded, and analyzed.

According to ADOT, the results of a PCI evaluation provide an indication of the structural integrity and functional capabilities of the pavement. However, it should be recognized that during a PCI inspection only the top layer of the pavement is examined and that no direct measure is made of the structural capacity of the pavement system. Nevertheless, the PCI does provide an objective basis for determining maintenance and repair needs as well as for establishing rehabilitation priorities in the face of constrained resources. Furthermore, the results of repeated PCI monitoring over time can be used to determine the rate of deterioration and to estimate the time at which certain rehabilitation measures can be implemented.

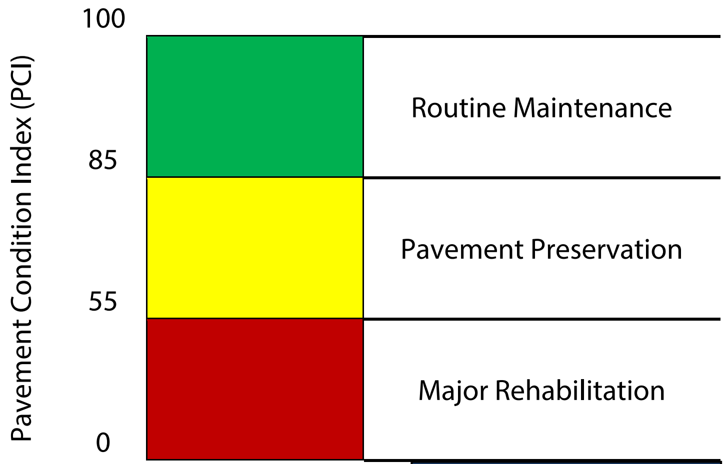
Pavement defects are characterized in terms of type of distress, severity level of distress, and amount of distress. This information is then used to develop a composite index (PCI number) that represents the overall condition of the pavement in numerical terms, ranging from 0 (failed) to 100 (excellent). In general terms, pavements above a PCI of 85 that are not exhibiting significant load-related distress will benefit from routine maintenance actions, such as periodic crack sealing or patching. Pavements with a PCI of 56 (65 for PCC pavements) to 85 may require pavement preservation, such as a surface treatment, thin overlay, or PCC joint resealing. Often, when the PCI is 55 or less, major rehabilitation, such as a thick overlay, or reconstruction are the only viable alternatives due to the substantial damage to the pavement structure.

For Marana Regional Airport, **Figure 2-11** depicts the most recent PCI inspection reported in the 2013 APMS update. **Figure 2-12** depicts how the appropriate repair type varies with the PCI of a pavement section.



Source: ADOT MPD – Aeronautics Group, retrieved 2015 from ADOT APMS IDEA website
http://wwwa.azdot.gov/applications/Airports/APTech_DAP/index.html#path=3/4

Figure 2-11 Existing PCI



Source: ADOT MPD – Aeronautics Group, 2013 Arizona APMS Update Statewide Summary Report, retrieved 2015

Figure 2-12 PCI Repair Scale

In addition to determining the PCI for airfield pavement, as part of the Arizona Pavement Preservation Program includes determining the Pavement Classification Number (PCN) for the same airfield pavement. The Aircraft Classification Number-Pavement Classification Number (ACN-PCN) system of reporting pavement strength was developed by the International Civil Aviation Organization (ICAO). Since the United States is a member of this organization, the FAA is obligated to adhere to this system. The ACN-PCN procedure is structured so that a pavement with a given PCN can support an aircraft that has an ACN equal or less than the PCN. The PCN should be recalculated if the aircraft mix or volume changes significantly according to the Marana Regional Airport Pavement Classification Number Report dated October 2014 prepared by Applied Pavement Technology, Inc.

Table 2-16 summarizes the Pavement Condition Index data and **Table 2-17** summarizes the Pavement Condition Number results from the Marana Regional Airport Pavement Classification Number Report dated October 2014 prepared by Applied Pavement Technology, Inc.

Table 2-16 Summary of Pavement Condition Index Data

Location	Section	2013 PCI Index
A01AV	10	50 - Major Rehabilitation
A02AV	10	67 - Pavement Preservation
	20	84 - Pavement Preservation
A03AV	10	91 - Routine Maintenance
A04AV	10	90 - Routine Maintenance
RW 1230AV	10	56 - Pavement Preservation
RW 321 AV	10	54 - Major Rehabilitation
TWAAV	10	100 - Routine Maintenance
TWBAV	10	51 - Major Rehabilitation
TWCAV	10	66 - Pavement Preservation
TWEAV	10	72 - Pavement Preservation

Source: Marana Regional Airport Pavement Classification Number Report, Applied Pavement Technology, Inc., October 2014

Table 2-17 Summary of Pavement Condition Number Results

Branch	Section	PCN Designation
A01AV	10	2/F/D/Y/T[1]
A02AV	10	4/F/D/X/T
	20	3/F/D/X/T[1]
A03AV	10	3/F/D/X/T[1]
A04AV	10	5/F/C/X/T
RW 1230AV	10	2/F/C/Y/T[1]
RW 321 AV	10	3/F/C/Y/T
TWAAV	10	4/F/D/W/T
TWBAV	10	2/F/D/Y/T[1]
TWCAV	10	2/F/D/Y/T[1]
TWEAV	10	3/F/D/X/T[1]

[1]This section is not structurally adequate to handle regular operations of the analyzed traffic according to the October 2014 report.
Source: Marana Regional Airport Pavement Classification Number Report, Applied Pavement Technology, Inc., October 2014

The ADOT APPP program is provided to give the airport sponsor sound pavement repair recommendations and is accepted by the FAA as complying with Public Law 103-305's requirement regarding airport pavement maintenance management as related to AIP funding eligibility. The APPP is not meant to replace a sponsor's efforts for preserving the pavement infrastructure at the airport, but to assist the sponsor in prioritizing and scheduling pavement maintenance and reliable actions. The airport sponsor is expected to provide routine inspections, monitoring, and routine maintenance as part of this joint effort.

2.18.5 Airfield Lighting, Signage, and Visual Aids

2.18.5-1 Airfield Lighting

Pavement edge lighting is essential for the safe operation of aircraft during night and/or periods of low visibility. Edge lighting is placed along the edge of pavement to define the lateral limits of the pavement. Threshold lights are also placed at the end of a runway (either in-bound or out-bound) to delineate the usable runway.

Runways 12-30 and 3-21 are both equipped with Medium Intensity Runway Lights (MIRL) that appear to be in good condition (**Figure 2-13**). The MIRLs are all incandescent fixtures.

The taxiways that are equipped with based mounted (incandescent) Medium Intensity Taxiway Lights (MITL) include:

- Taxiway A (and all taxiway connectors)
- Taxiway B (and all taxiway connectors)
- Taxiway E (and all taxiway connectors)
- Taxiway H

Taxiway C does not currently have either taxiway edge lighting or retro-reflective markers. Taxiway E also has omni-directional semi-flush medium intensity taxiway edge lights delineating the edge of the taxilane and aircraft parking apron (East Apron). An example of a MITL found at the Airport is shown in **Figure 2-14**.

Figure 2-13 Existing Runway Edge Light

Figure 2-14 Existing Taxiway Edge Light

2.18.5-2 Signage

Lighted airfield destination signs are installed at some of the connector taxiways. These signs are in poor condition. The Airport is currently in the process of replacing the airfield guidance signs. The new signs will be light-emitting diode (LED) fixtures.

Figure 2-15 Existing Airfield Destination Signage

2.18.5-3 Visual Aids

Precision Approach Path Indicators

Precision Approach Path Indicator (PAPI) systems equip the pilot with visual slope information to provide safe descent guidance. It provides vertical visual guidance to aircraft during approach and landing by radiating a directional pattern of high intensity red and white focused light beams which indicate to the pilot that they are "on path" if they see red/white, "above path" if they see white/white and "below path" if they see red/red.

The Airport is equipped with precision approach path indicators (PAPI-4) on Runways 12 and 30. Precision approach path indicators (PAPI-2) are provided on Runways 3 and 21.

Figure 2-16 Existing 4-Box Precision Approach Path Indicator

Runway End Identifier Lights

Runway End Identifier Lights (REIL) are flashing strobe lights which aid the pilot in identifying the runway end at night or in bad weather conditions. REILs are typically used on runways with no other approach lighting system and are located laterally on each side of the runway threshold facing the approaching aircraft. The Airport is equipped with REILs on Runway 12 and 30.

Figure 2-17 Existing Runway End Identifier Light

Wind Cone and Segmented Circle

Wind cones are conical texile tubes designed to indicate wind direction and relative wind speed. Wind direction is the opposite of the direction in which the wind cone is pointing. There are two styles of wind cones – lighted and unlighted. Typically found surrounding a wind cone is a segmented circle. A segmented circle is a visual indicator designed to show a pilot in the air the direction of the traffic pattern at that airport. The primary wind cone at an airport will typically have a segmented circle. If an airport has more than one wind cone, the additional ones are referred to as supplemental wind cones and are normally found near the runway threshold.

The Airport is equipped with two lighted wind cones; a primary (internally lighted) wind cone with a segmented circle is located at the mid-field of the Airport, and one supplemental (externally lighted) wind cone is located near the Runway 3 threshold. Both wind cones and the segmented circle appear to be in good condition.

Figure 2-18 Existing Primary Wind Cone and Segmented Circle

Rotating Airport Beacon

A rotating airport beacon is a visual navigational aid (NAVAID) operated at many airports. At civil airports, alternating white and green flashes indicate the location of the airport. Rotating beacons are designed primarily for night operation as identification and location markers for airports and will have a visibility range of 30 to 40 miles and a candlepower range from 190,000 to 400,000.

The rotating beacon is located adjacent to the existing electrical building. The rotating beacon appears to be in good condition, although the fixture and tower are considered to be outdated.

Figure 2-19 Existing Rotating Beacon

2.18.6 Weather Reporting Systems

Automated airport weather stations are automated sensor suites which are designed to serve aviation and meteorological observing needs for safe and efficient aviation operations, weather forecasting, and climatology. There are several types of automated airport weather reporting stations. These include the Automated Weather Observing System (AWOS), the Automated Surface Observing System (ASOS), and the Automated Weather Sensor System (AWSS).

During the inventory of the Airport, it was observed that the airport has an AWOS-III. This system generally reports the following parameters: barometric pressure, altimeter setting, wind speed and direction, temperature and dew point in degrees Celsius, density altitude, visibility, and cloud ceiling), while also having the additional capabilities of reporting temperature and dew point in degrees Fahrenheit, present weather, icing, lightning, sea level pressure and precipitation accumulation. Data dissemination is usually via an automated VHF air band radio frequency (108-137 MHz) at each airport, broadcasting the automated weather observation. This is often times via the Automatic Terminal Information Service (ATIS). Most automated weather stations also have discrete phone numbers to retrieve real-time observations over the phone or through a modem. The data output, monitoring equipment, and the modem for the AWOS is located in the FBO building. A METAR data broadcast service was installed in November 2014. METAR is the primary observation code used in the United States to satisfy requirements for reporting surface meteorological data. METAR contains a report of wind, visibility, runway visual range, present weather, sky condition, temperature, dew point, and altimeter setting collectively referred to as "the body of the report". In addition, coded and/or plain language information which elaborates on data in the body of the report may be appended to the METAR.

The radio frequency for the Airport AWOS is 118.375, and the phone number is (520) 682-4104. The AWOS is located on the west of the Runway 21 threshold. The AWOS is in good working condition.

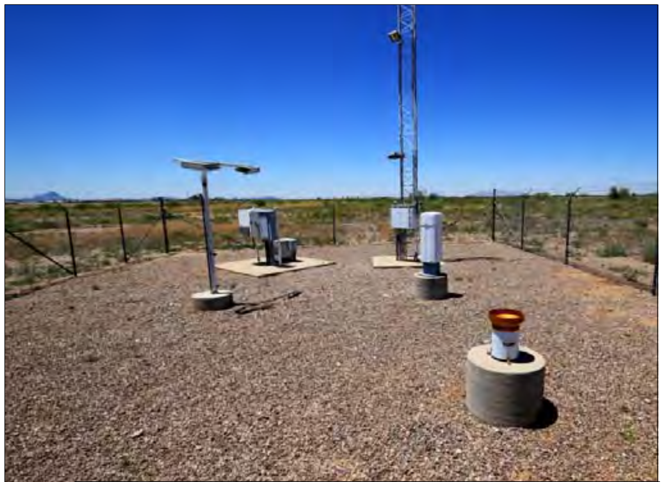


Figure 2-20 Existing Automated Weather Observing System

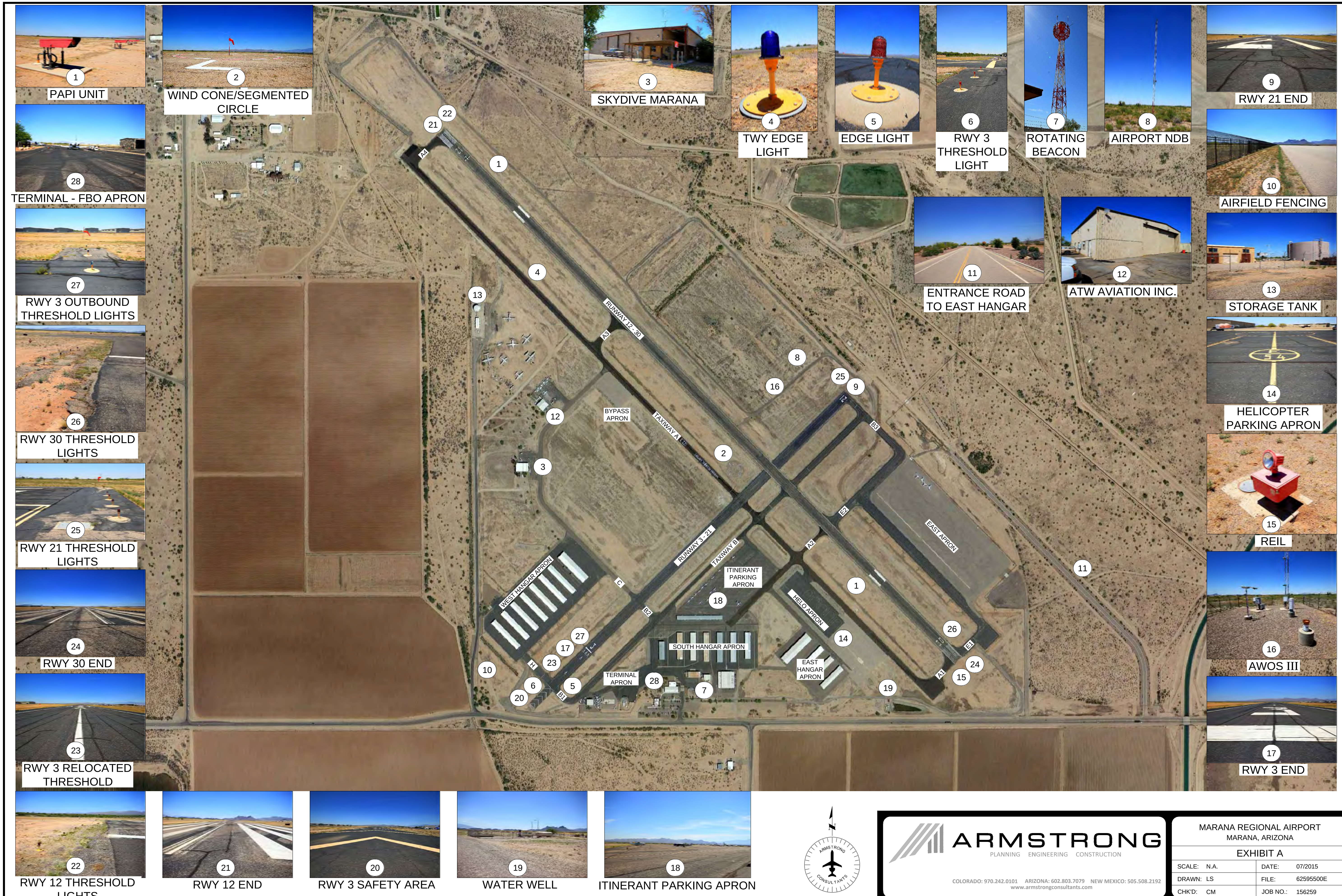
2.18.7 Radio Navigational Aids

A navigational aid (NAVAID) is any ground based visual or electronic device used to provide course or altitude information to pilots. Radio NAVAIDs include Very High Omni-directional Range (VORs), Very High Frequency Omni-directional Range with Tactical Information (VOR-TACs), Non-directional Beacons (NDBs), and Tactical Air Navigational Aids (TACANs), as examples.

The NDB at the Airport is located adjacent to the existing AWOS-III west of the Runway 21 threshold. The NDB transmits non-directional radio signals, whereby the pilot of properly equipped aircraft can determine the bearing to or from the NDB facility and then track to or from the station.

The Tucson VORTAC serves the Tucson metropolitan area including the Marana Regional Airport. The Tucson VORTAC is located approximately 24 nautical miles southeast of the Marana Regional Airport.

Figure 2-21 Existing Non-directional Beacon (NDB)



ARMSTRONG
PLANNING ENGINEERING CONSTRUCTION
COLORADO: 970.242.0101 ARIZONA: 602.803.7079 NEW MEXICO: 505.508.2192
www.armstrongconsultants.com

MARANA REGIONAL AIRPORT
MARANA, ARIZONA

EXHIBIT A

SCALE:	N.A.	DATE:	07/2015
DRAWN:	LS	FILE:	62595500E
CHK'D:	CM	JOB NO.:	156259

2.19 Existing Landside Facility Inventory

The definition of landside is that portion of the airport designed to serve passengers or other airport users typically located outside of the public safety and security fenced perimeter; landside facilities include terminal buildings, parking areas, entrance roadways, and other buildings that may not necessarily conduct aviation related activities. The inventory of landside facilities provides the basis for the airfield demand/capacity analysis and the determination of any facility change requirements that might be identified. The various landside facilities are depicted on **Exhibit B** at the end of this section.

2.19.1 Terminal Building

The existing terminal building is approximately 9,500 square-feet and is located at the entrance of the Airport off Avra Valley Road. The terminal building was constructed in 1982 and consists of a lobby, restroom, conference room, pilot's lounge, and multiple offices. The Tucson Aeroservice Center is the Fixed Based Operator (FBO) and is located in the building. The terminal building is a steel-frame, metal-sided building and is in good condition.

Figure 2-22 Existing Terminal Building

2.19.2 Airport Services/Fixed Base Operator

A fixed base operator (FBO) is usually a private or commercial enterprise that leases land from the airport sponsor on which to provide services to based and transient aircraft. The extent of the services provided varies from airport to airport. These services frequently include aircraft fueling, minor maintenance and repair, aircraft rental and/or charter services, flight instruction, pilot lounge and flight planning facilities, and aircraft tie-down and/or hangar storage. Tucson Aeroservice Center is the FBO at the Airport and is located in the terminal building, as mentioned above. With an employment base of 20, they provide the following services:

- Aviation fuel
- Oxygen service
- Passenger terminal and lounge area
- Aerial tours
- Aircraft charters
- Aircraft rental
- Aircraft maintenance
- Flight training
- Avionics sales and services

2.19.3 Aircraft Hangars

There are three types of hangar facilities found at most airport; conventional hangars, T-hangars, and shade structures. Conventional hangars provide aircraft storage and are often referred to as box hangars, which are square or rectangular in shape and can be built in various sizes. T-hangars are rectangular aircraft storage hangars with several interlocking "T" units that minimize the need to build individual units; they are usually two-sided with either bi-fold or sliding doors. Shade structures provide a more economical way to keep an aircraft protected from the elements because they only have a roof over an aircraft. Power may or may not be available under a shade structure. The Airport has conventional hangars, T-hangars and a shade structure available. The following is a description of the hangars and structures currently available.

Conventional hangars:

There are six conventional hangars at the Airport. The cumulative size of the hangars is nearly 52,000 square-feet. All of the conventional hangars are steel-framed, metal-sided buildings. The location, current occupants, and general condition of the conventional hangars are summarized in **Table 2-17.**

Table 2-17 Summary of Conventional Hangars

Location		Current Occupant(s)	General Condition
Hangar 1	Adjacent to Taxiway C	ATW Aviation Inc.	Good
Hangar 2	Adjacent to Taxiway C	Marana Skydiving	Fair
Hangar 3	Adjacent to Taxiway B	Pacific Aero Ventures	Fair
Hangar 4	South hangar apron	Pima Aviating Inc./Tucson Aeroservice Center (maintenance)	Good
Hangar 5	South hangar apron	Skywords Aviation	Good
Hangar 6	South hangar apron	Tucson Aeroservice Center (maintenance)	Good

Source: Airport management, June 2015

Figure 2-23 Existing Conventional Hangar Facility

T-hangars:

There are 19 T-hangars at the Airport. The cumulative size of the T-hangars is nearly 300,000 square-feet. All of the T-hangars are steel-framed, metal-sided buildings. The T-hangars are grouped into three areas on the Airport. Four T-hangars are located on the east hangar apron, seven T-hangars are located on the south hangar apron, and eight T-hangars are located on the west hangar apron. Three of the T-hangars on the west hangar apron also have restroom facilities incorporated into the buildings.

Figure 2-24 Existing T-hangar Facility

Shade Structure:

In addition to aircraft hangars, the Airport also provides one shade structure. The shade structure is approximately 17,000 square-feet and can accommodate up to 27 aircraft. The shade structure is steel-framed with a metal roof and appears to be in good overall condition. The shade structure is owned by Pima Aviation.

Figure 2-25 Existing Shade Structure

A summary of the aircraft hangars and structures available at the Airport is contained in **Table 2-18**.

Table 2-18 Summary of Aircraft Hangars

	Conventional Hangars	T-hangars	Shade Structure	Total
Hangar Area (sf)	300,000	52,000	17,000	369,000
Number of Units (ea)	6	232	27	265

Source: Marana Regional Airport Management, 2015

2.19.4 Other Airport Buildings

Airport Restaurant

The Sky Rider Coffee Shop is also located at the Airport adjacent to the terminal building. The restaurant is open seven days a week from 6:30 am to 3:00 pm. The building is approximately 2,900 square-feet and is a masonry building with a flat roof and appears to be in good condition. Adjacent to the restaurant is an outdoor seating/viewing area for public use. The Town of Marana owns the building and leases it to the restaurant.

Figure 2-26 Existing Airport Restaurant and Outdoor Seating Area

Airport Electrical Building

Electrical power for the Airport is fed from an existing concrete block electrical building located next to the Tucson Aeroservice Center maintenance hangar and adjacent to the south hangar apron. The electrical building houses the airfield regulators and is in overall good condition.

Figure 2-27 Existing Electrical Building

Figure 2-28 Existing Electrical Building Equipment

2.19.5 Access Roads and Signage

The Airport can be accessed directly from Avra Valley Road, which is a two-lane paved road and runs along the south side of the Airport; Avra Valley Road serves as the main entrance road. From Exit 242 on Interstate 10, the Airport is approximately two miles west. A concrete sign that displays the name of the Airport is located at the entrance from Avra Valley Road.

2.19.6 Automobile Parking

There are approximately 40 vehicle parking spaces located adjacent to the terminal building. The lot serves as parking for the restaurant as well. To increase safety and convenience overhead lighting of the parking lot is provided. The asphalt pavement is in good condition.

Figure 2-29 Existing Airport Vehicle Parking Lot

2.19.7 Utilities

Electricity, water, sewer, refuse, telephone, natural gas, and Internet services are available at the Airport. Electrical service is provided by Trico Electric Cooperative Inc., and the Town of Marana Water Department provides the water and sewer service. Southwest Gas Corporation provides natural gas, VoIP is the telephone service provider, and Centurylink provides Internet service.

2.19.8 Fencing and Security

Keeping the aircraft operations area (AOA) clear of non-essential and/or un-authorized vehicles and pedestrians is very important at all airports. As a result, fencing and access control gates are very effective at reducing inadvertent entry of non-authorized people and vehicles, and wildlife as well. The Airport has two types of fencing around the entire perimeter of the Airport. The majority of the fencing consists of 6-foot high, chain-link fence with three strands of barbed wire. Additionally, ornamental security fencing is also in place. Typical fencing and security access gates found at the Airport are illustrated in **Figure 2-30**.

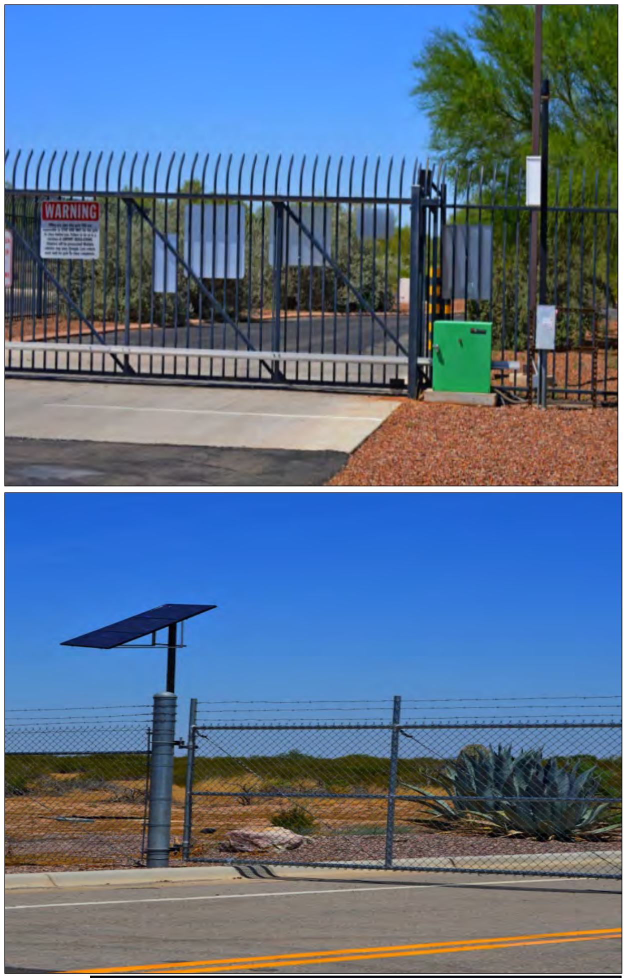


Figure 2-30 Airport Perimeter Fence and Access Gates

2.19.9 Aviation Fuel Facilities

There are currently two fuel storage tanks on the Airport that are owned and operated by the FBO. Each fuel tank has a capacity of 12,500 gallons; 100LL AvGas and Jet A are available. A self-service system is also available 24 hours per day for AvGas. After hours fueling is available, but for a fee. Three fuel trucks are available: two 1,200 gallon capacity trucks with 100LL AvGas and one 5,000 gallon capacity truck with Jet A. The Airport also has a Spill Prevention, Control and Countermeasure (SPCC) Plan on location with airport operations staff.

Figure 2-31Fuel Storage Tanks

Figure 2-32 Self-Serve Fuel Island

Figure 2-33 Fuel Truck - Jet A

2.19.10 Emergency Services

Emergency response is provided by the Northwest Fire District via Station 36 located approximately 5.5 miles north of the Airport. The District currently provides emergency and community services to 110,000 residents and 3,300 commercial occupancies over a 140 square-mile area. Ten strategically located stations are staffed 365 days a year with 192 firefighters that are Paramedics or Emergency Medical Technicians. Despite explosive growth, the District's ratio of Paramedics to residents remains one of the best in the state at 1:9000.

Station 36 was built in anticipation of projected growth of north Marana and includes capacity for additional apparatus and personnel as the region expands. Station 36 provides coverage for the Airport with a light Aircraft Rescue and Firefighting Response Truck (ARFF) capable of handling small airplane crash fires. The District's Metropolitan Medical Response System (MMRS) truck is also housed at Fire Station 36 along with a Water Tender for additional water supply that might be needed in some of the outlying areas. Station members are trained in the deployment of the MMRS apparatus (used for mass casualty incidents), and the associated equipment it carries.

The nearest hospital is the Oro Valley Hospital located at 1551 E. Tangerine Road and is approximately 20 miles east of the Airport. The Oro Valley Hospital Emergency Room is a Level IV Trauma Center, as designated by the Southern Arizona Emergency Medical Services. Designation as a Level IV means the facility is capable of handling the less serious traumatic injuries and has procedures in place to quickly transfer patients requiring a higher level of care to a higher level facility. In addition, the Marana Health Center located at 11981 W Grier Road is approximately 5 miles to the north of the Airport.

2.19.11 Airport Support and Maintenance

The airport has limited staff to perform airport support and maintenance. In addition, the Airport does not have a dedicated airport maintenance facility. All airfield maintenance is currently operating out of an existing hangar. The location for a future airport maintenance facility will be included in the development plan of the airfield and will be presented in the Alternative Chapter of the master plan.

The following maintenance equipment is used at the Airport:

(to be inserted once information is received)

2.19.12 Airport Sustainability

The FAA began focusing on sustainability at airports in 2010, and has said that their objective is to make sustainability a core objective in airport planning. The FAA has provided airports across the United States with funding to develop comprehensive sustainability planning documents. These documents, called sustainability master plans and airport sustainability plans, include initiatives for reducing environmental impacts, achieving economic benefits, and increasing integration with local communities. To date, the FAA has funded 45 airports across the United States.

The FAA Reform and Modernization Act of 2012, Section 133 of H.R. 658, requires airport master plans to address the feasibility of solid waste recycling at an airport, minimizing the generation of waste, operation and maintenance requirements, the review of waste management contracts, and the potential for cost savings or revenue generation. The FAA is in the process of crafting guidance for airport sponsors to use in developing a recycling program at their airport as part of an airport master plan. Solid waste is being collected from the terminal building and disposed of by a waste collection company, however, it is not known if any recycling is taking place by any of the airport tenants. Recommendations for ways to implement a recycling program and other sustainability practices will be discussed in the Facility Requirements chapter.

Figure 2-34 Airport Solid Waste Disposal Practice

2.19.13 Dark-Sky Compliance

The International Dark-Sky Association's work includes initiatives to protect the night skies and fragile ecosystems in parks and protected areas worldwide. In Arizona there are three International Dark Sky Communities:

- City of Flagstaff, established in 2001
- City of Sedona, established in 2014
- The Kaibab Paiute Reservation, established in 2015

In addition, there are two International Dark Sky Parks in Arizona:

- Oracle State Park, a Silver-tier International Dark Sky Park, established in 2014

- Grand Canyon – Parashant National Monument, a Gold-tier International Dark Sky Park, established in 2014

The Town of Marana is a regional leader in adopting a lighting ordinance to help reduce light emissions from residential, commercial, and industrial properties. The Town of Marana Outdoor Lighting Code Ordinance 2008.18, adopted in 2008, provides regulations about the types of light fixtures and lamps that will help reduce light emissions.

Although the Town of Marana code is meant to reduce light emissions throughout the town, large portions of the Airport are exempt from these standards. The FAA has strict lighting regulations for airports related to airfield lighting. Therefore, modification to airfield lighting to reduce illumination and glare cannot be considered. The Airport can explore ways to reduce light emissions (and costs) by considering FAA approved energy efficient lighting such as LEDs.

Based on a cursory review of the existing lighting at the Airport, there may be some opportunities to replace existing light fixtures to shielded light fixtures. These recommendations will be discussed further in the Facility Requirements chapter.

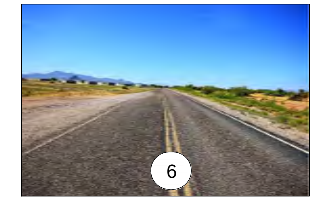
AIRPORT RESTAURANT

EAST HANGAR APRON T-HANGAR

ELECTRICAL BUILDING

FBO MAINTENANCE HANGAR 1

AIRCRAFT SHADE STRUCTURE



NORTH ACCESS ROAD

WEST HANGAR APRON T-HANGARS

TERMINAL - FBO FACILITY

SELF-SERVE FUEL ISLAND

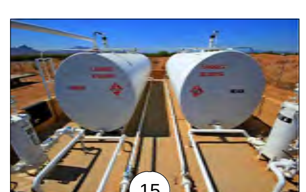
FBO AVIONICS SHOP, HANGAR AND AIRPORT ADMINISTRATION OFFICE

AIRPORT VEHICLE PARKING LOT

AIRPORT ENTRANCE SIGN

SOUTH HANGAR APRON T-HANGARS

OUTDOOR SEATING AREA



FUEL STORAGE TANKS

FBO HANGAR 2

PACIFIC AERO VENTURES

ARMSTRONG
PLANNING ENGINEERING CONSTRUCTION

COLORADO: 970.242.0101 ARIZONA: 602.803.7079 NEW MEXICO: 505.508.2192
www.armstrongconsultants.com

MARANA REGIONAL AIRPORT
MARANA, ARIZONA

EXHIBIT B

SCALE:	N.A.	DATE:	07/2015
DRAWN:	LS	FILE:	62595500E
CHK'D:	CM	JOB NO.:	156259

2.20 Environmental Inventory

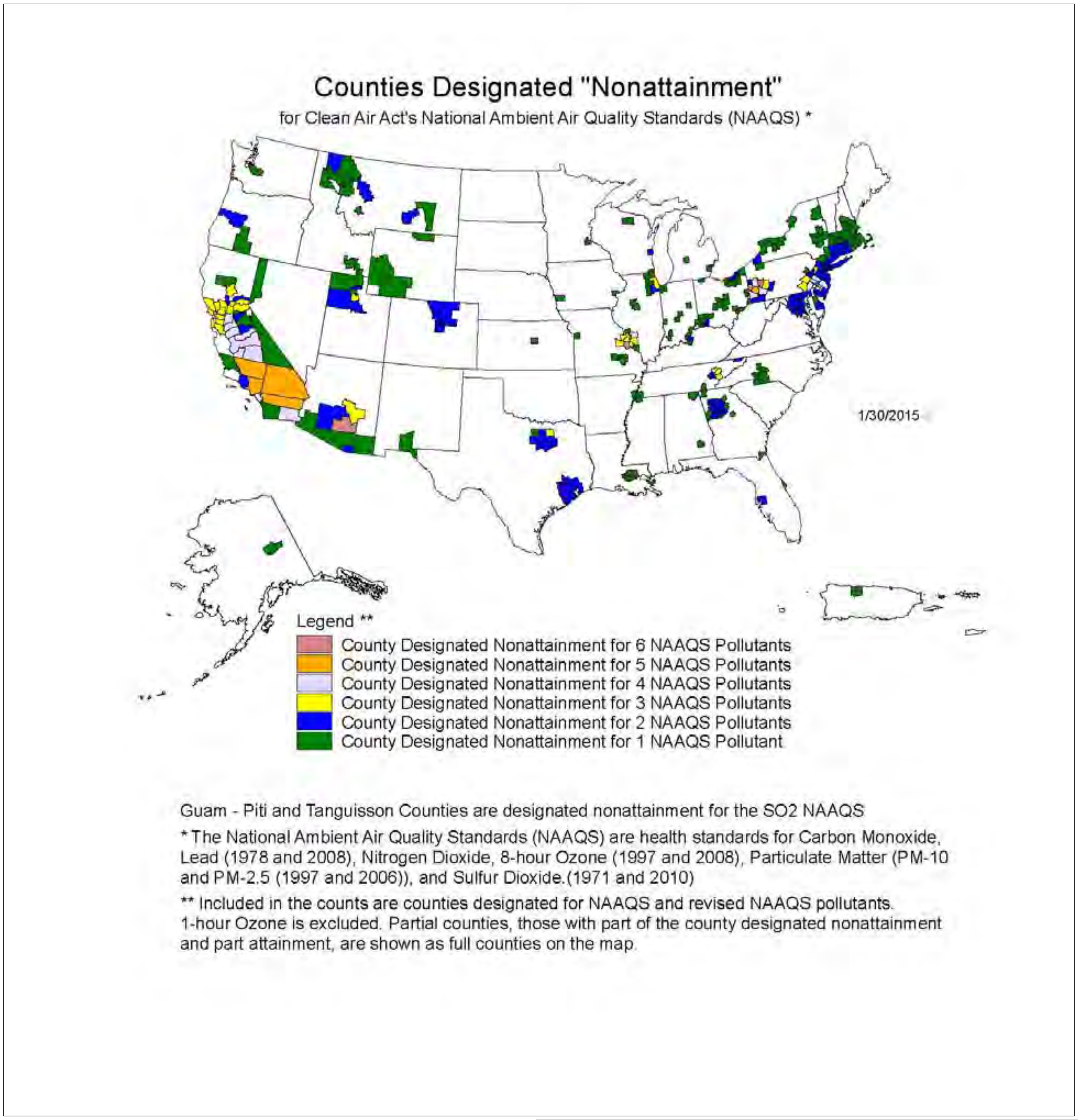
In the airport master planning process, it is required to identify potential key environmental impacts of the various airport development alternatives so that those alternatives can avoid or minimize impacts on sensitive resources. The evaluation of potential environmental impacts should only be done to the level necessary to evaluate and compare how each alternative would involve sensitive environmental resources. The data compiled in this section will be used in evaluating proposed airport development alternatives and to identify any required environmental permits for the recommended projects.

2.20.1 Air Quality

The U.S. Environmental Protection Agency (EPA) has established National Ambient Air Quality Standards (NAAQS) based on health risks for six pollutants: carbon monoxide, nitrogen dioxide, sulfur dioxide, lead, ozone, and two sizes of particulate matter (PM) measuring 10 micrometers or less in diameter and PM measuring 2.5 micrometers in diameters.

According to the EPA, an area with ambient air concentrations exceeding the NAAQS for a criteria pollutant is said to be a nonattainment area for the pollutant's NAAQS, while an area where ambient concentrations are below the NAAQS is considered an attainment area. The EPA requires areas designated as nonattainment to demonstrate how they will attain the NAAQS by an established deadline. To accomplish this, states prepare State Implementation Plans (SIPs) which are typically a comprehensive set of reduction strategies and emissions budgets designed to bring the area into attainment.

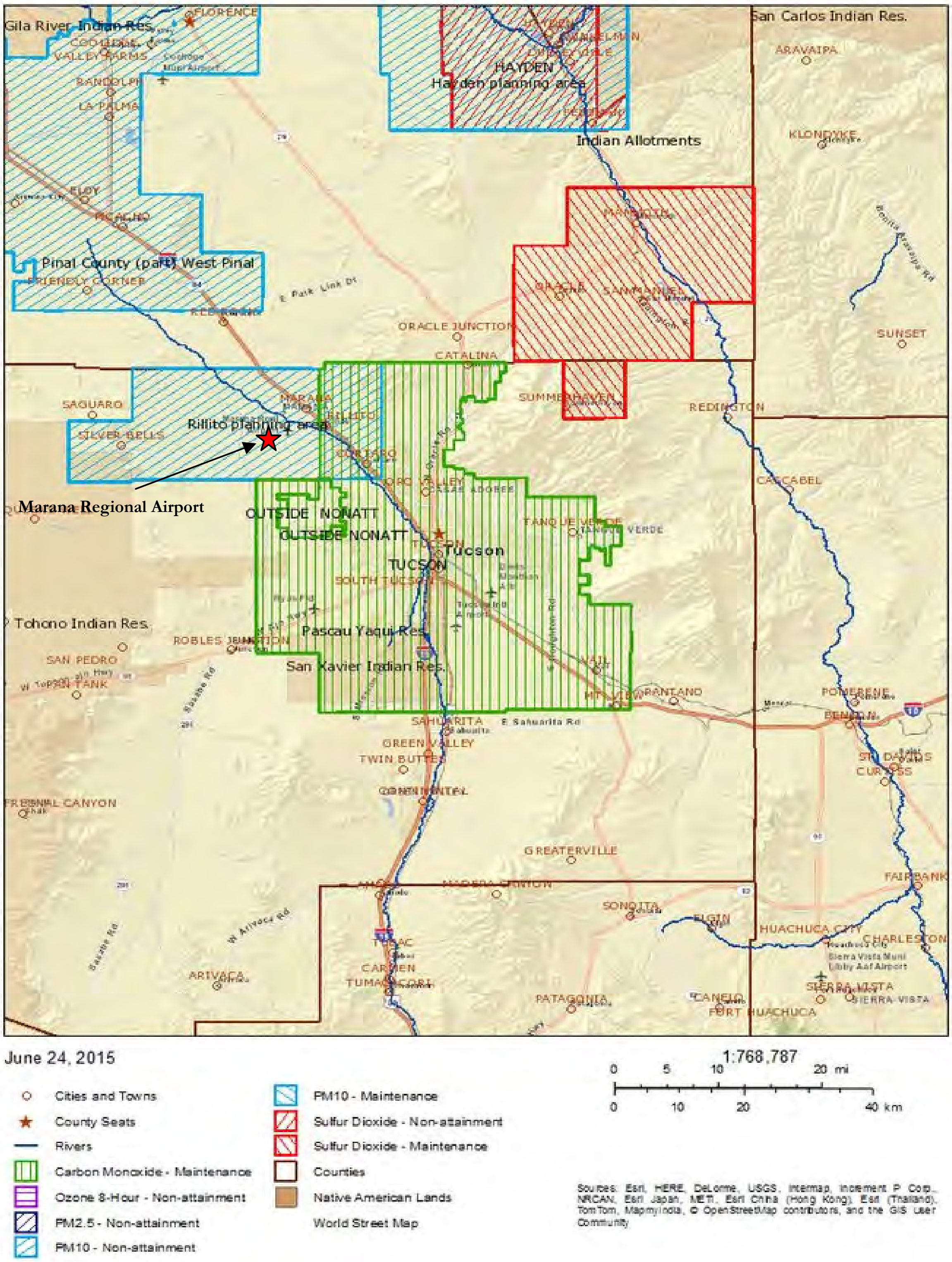
According to NAAQS, Marana Regional Airport is located in a nonattainment area for one NAAQS pollutant. A graphical illustration of counties designated nonattainment for NAAQS are depicted in **Figure 2-35**. Likewise, according to the Arizona Department of Environmental Quality (ADEQ), the Airport is located in a nonattainment area. A graphical illustration of the ADEQ nonattainment and attainment areas are depicted in **Figure 2-36**. Further evaluation of any potential air quality impacts will be discussed in the Environmental Overview chapter.



Source: U.S.EPA, January 2015

Figure 2-35 EPA - Counties Designated Nonattainment (NAAQS)

Nonattainment and Attainment Areas



Source: ADEQ, June 2015

Figure 2-36 ADEQ - Nonattainment and Attainment Areas

2.20.2 Biotic Communities/Endangered and Threatened Species of Flora and Fauna

Consideration of biotic communities and endangered and threatened species is required for all proposals under the Endangered Species Act as Amended. Section 7 of the Endangered Species Act as Amended requires each Federal agency to insure that any action the agency carries out "is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat" of critical species.

All of the federally listed threatened and endangered species within Pima County are shown in **Table 2-19**. Pima County encompasses a large area, and therefore all of the threatened, endangered, and candidate species listed on **Table 2-19** are not necessarily found at the Marana Regional Airport.

Table 2-19 Threatened, Endangered, and Candidate Species (Pima County, Arizona)

Common Name	Scientific Name	Status
Chiricahua leopard frog	Rana chiricahuensis	Threatened
Masked bobwhite (quail)	Colinus virginianus ridgwayi	Endangered
American peregrine falcon	*Falco peregrinus anatum*	Recovery
California least tern	Sterna antillarum browni	Endangered
Yellow-billed Cuckoo	Coccyzus americanus	Threatened
Mexican spotted owl	Strix occidentalis lucida	Threatened
Southwestern willow flycatcher	*Empidonax traillii extimus*	Endangered
Gila topminnow	Poeciliopsis occidentalis	Endangered
Gila chub	Gila intermedia	Endangered
Desert pupfish	Cyprinodon macularius	Endangered
Acuna Cactus	Echinomastus erectocentrus var. acunensis	Endangered
Nichol's Turk's head cactus	*Echinocactus horizonthalonius var. nicholii*	Endangered
Kearney's blue-star	Amsonia kearneyana	Endangered
Pima pineapple cactus	*Coryphantha scheeri var. robustispina*	Endangered
Huachuca water-umbel	*Lilaeopsis schaffneriana var. recurva*	Endangered
Sonoran pronghorn	Antilocapra americana sonoriensis	Endangered
Jaguar	Panthera onca	Endangered
Ocelot	Leopardus Felis	Endangered
Lesser long-nosed bat	*Leptonycteris curasoae yerbabuenae*	Endangered
Northern Mexican gartersnake	*Thamnophis eques megalops*	Threatened
Sonoyta mud turtle	Kinosternon sonoriense longifemorale	Candidate
Sonoran desert tortoise	*Gopherus morafkai*	Candidate

Source: US Fish and Wildlife Service, June 2015

2.20.3 Coastal Zone Management Program and Coastal Barriers

Marana Regional Airport is not located within or adjacent to a coastal zone. Any proposed action and reasonable alternatives will not adversely impact the coastal zone natural resources protected by the National Oceanic and Atmospheric Administration (NOAA) regulations under 15 CFR Part 930.

2.20.4 Department of Transportation (DOT) Act, Section 4(f)

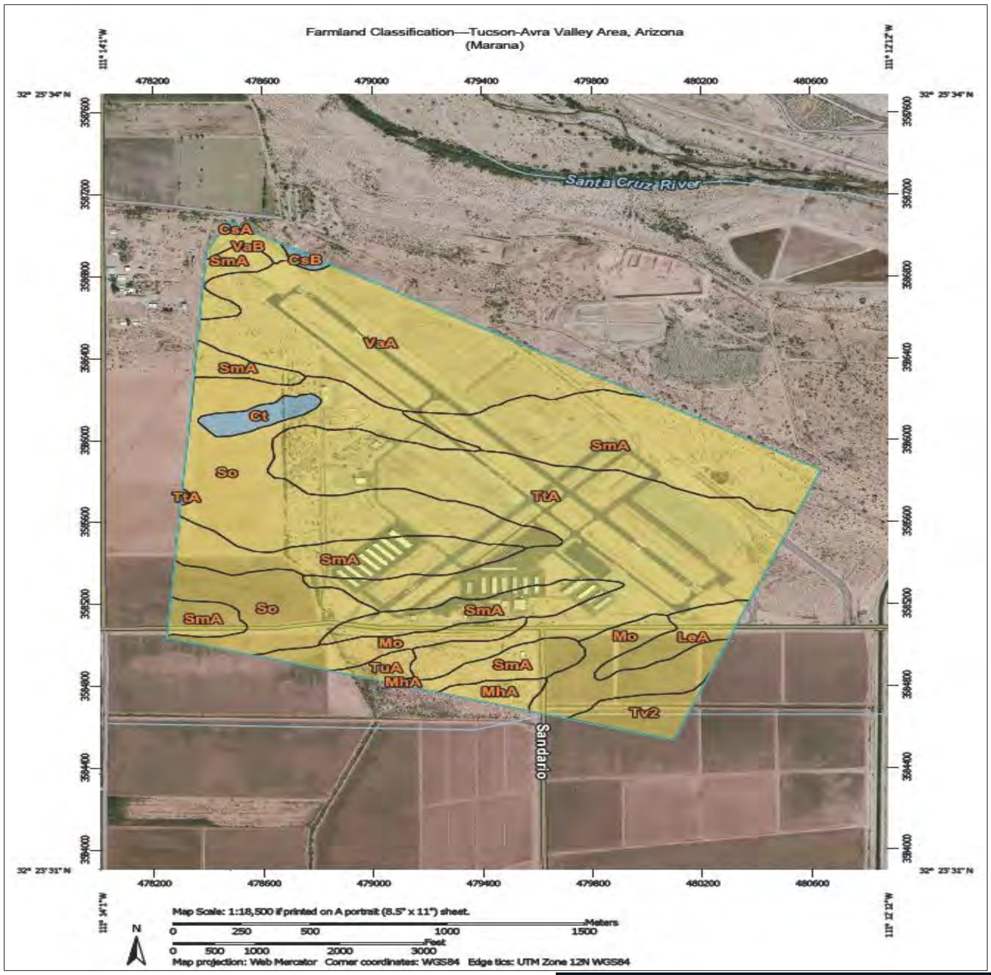
Section 4(f) of the DOT Act places restrictions on the use of any publicly-owned recreational land, public park, recreation area, or wildlife and waterfowl refuge of national, state, or local significance. There are no Section 4(f) resources in the near vicinity of the Marana Regional Airport. The nearest Section 4(f) resource is Marana Park, which is located approximately six miles north of the Airport.

2.20.5 Farmland

The Farmland Protection Policy Act (Public Law 97-98) directs federal agencies to use criteria developed by the U.S. Department of Agriculture to identify and analyze impacts related to the conversion of farmland to nonagricultural uses. According to the U.S. Department of Agriculture, Natural Resources Conservation Services (NRCS), the area consist of the following soil ratings:

- Three small areas with farmland of unique importance; soils found include Cowan loamy sand/sandy loam
- The large remainder of the area prime farmland if irrigated; soils found include Laveen loam, Mohave loam/clay loam, Sonoita sandy loam/sandy clay loam, Tubac sandy loam/sandy clay loam/clay, and Valencia sandy loam

It is important to note that there are currently no active farming activities taking place on the Airport property. According to the Farmland Protection Policy Act, the regulation does not apply to land already committed to "urban development or water storage," i.e., airport developed areas, regardless of its importance as defined by the NRCS. The farmland soil classifications in the vicinity of the Marana Regional Airport are shown on **Figure 2-37**.



Source: U.S. Department of Agriculture, Natural Resources Conservation Services, June 2015

Figure 2-37 Farmland Soil Classification Map

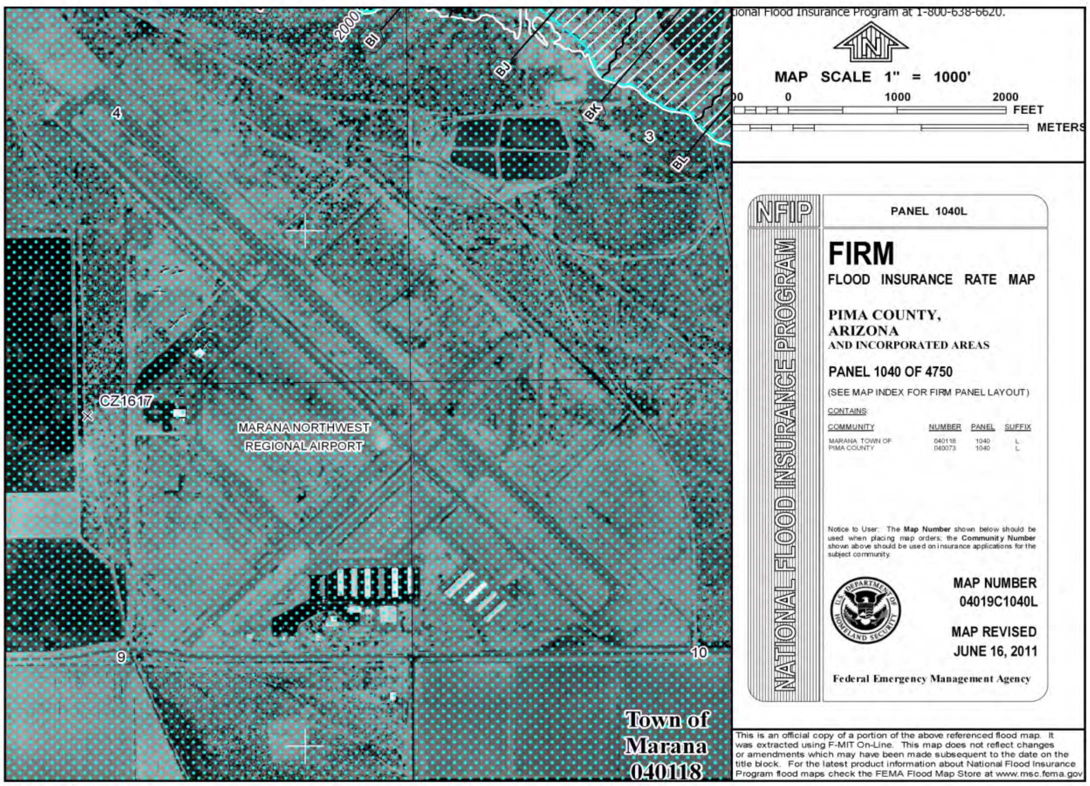
2.20.6 Floodplains

Floodplains are defined as "the lowland and relatively flat areas adjoining inland and coastal waters including flood-prone areas of offshore islands, including at a minimum, that area subject to a one percent or greater chance of flooding in any given year."

The Threshold of Significance (TOS) is exceeded when there is an encroachment on a base floodplain (100-year flood). An encroachment involves:

- A considerable probability of loss of life;
- Likely future damage associated with encroachment that could be substantial in cost or extent, including interruption of service or loss of vital transportation facilities; or
- A notable adverse impact on natural and beneficial flood plain values.

According to the Federal Emergency Management Agency (FEMA) National Flood Insurance Rate Map, the Airport property is located in Special Flood Hazard Area labeled Zone AO, which according to FEMA is defined as the area that will be inundated by the flood event having a 1-percent chance of being equaled or exceeded in any given year. The FEMA designated floodplains in the vicinity of the Marana Regional Airport are illustrated in **Figure 2-38**.



Source: FEMA, 2015

Figure 2-38 FEMA National Flood Insurance Rate Map

2.20.7 Hazardous Materials

According to the EPA, there are no existing hazardous materials located on the Airport. If hazardous materials are encountered during construction on future projects, the Arizona Department of Environmental Quality will be contacted regarding procedures for the handling and the disposal of the hazardous materials.

2.20.8 Stormwater Pollution Prevention Plan (SWPPP)

Stormwater runoff is rainfall that flows over the ground surface. It is created when rain falls on roads, driveways, parking lots, rooftops and other paved surfaces that do not allow water to soak into the ground. When stormwater runs through property that is being used for industrial or that is under construction it has the potential to carry pollutants into national waterways thereby affecting water quality.

2.20.8-1 Governing Law

In 1972, Congress passed the Clean Water Act (CWA). The CWA seeks to protect and improve the quality of the nation's waters. Toward this end, the Clean Water Act prohibits the discharge of any pollutants to waters of the United States unless that discharge is authorized by a National Pollutant Discharge Elimination System (NPDES) permit. Initial efforts under the NPDES program focused on reducing pollutants in discharges of industrial process wastewater and municipal sewage. As pollution control measures were implemented, it became evident that there were other sources contributing to the degradation of water quality.

In 1990, the U.S. Environmental Protection Agency (EPA) published regulations governing storm water discharges under the NPDES program. These regulations established requirements for permitting storm water discharges from industrial facilities, construction sites, and municipal storm sewer systems (not affiliated with the Airport system).

In December 2002, EPA delegated the State's NPDES storm water program to the Arizona Department of Environmental Quality (ADEQ). The Arizona Pollutant Discharge Elimination System (AZPDES) program now has regulatory authority other discharges of pollutants to Arizona surface water.

2.20.8-2 Airport SWPPP

The Marana Regional Airport is eligible to be covered under the Arizona Department of Environmental Quality (ADEQ) Arizona Pollutant Discharge Elimination System General Permit for Stormwater Discharges Associated with Industrial Activity from Non-Mining Facilities to Waters of the United States, also referred to as the General Permit. The General Permit became effective on February 1, 2011, and expires on January 31, 2016. The Airport has a Multi-Sector General Permit which requires the preparation of a SWPPP. The Airport has a SWPPP in place that is updated annually according to airport management. The Airport SWPPP also includes the tenants on the Airport. Separate permits are required for construction activities that disturb one or more acres of land.

2.20.8-3 Spill Prevention

The Airport has an approved spill prevention plan in place to direct airport staff in case of a chemical or fuel spill.

2.20.8-4 Drainage Plan

The Town of Marana prepared a Master Drainage Plan in 2007. The Plan looked at the existing drainage pattern on the Airport and made recommendations for improving the overall drainage on the Airport. The Airport Master Plan will incorporate any applicable recommendations from the Master Drainage Plan in the development of the new Airport Layout Plan.

2.20.9 Historic, Architectural, Archeological, and Cultural Resources

The National Historic Preservation Act (NHPA) of 1966, as amended, requires that an initial review be made to determine if any properties that are in, or eligible for inclusion in, the National Register of Historic Places are within the area of a proposed action's potential environmental impact. The Archeological and Historic Preservation Act (AHPA) of 1974 provides for the survey, recovery, and preservation of significant scientific, prehistoric, historical, archeological, or paleontological data when such data may be destroyed or irreparably lost due to a federally licensed or funded project.

The Preliminary Draft Environmental Assessment for Property Acquisition and Airport Traffic Control Tower conducted in 2008 for the Airport was referenced regarding historic and cultural resources. An archaeological records review and pedestrian survey was conducted. The report states that eligibility for listing in the National Register of Historic Places cannot be determined without subsurface testing to determine whether intact archaeological deposits are present. There were no sites listed that would be eligible on the National Register of Historic Places according to the 2008 Environmental Assessment. No other cultural resource surveys are known to have been conducted at the Airport.

2.20.10 Noise

Most land uses are considered to be compatible with airport noise that does not exceed 65 decibels (dB), although FAR Part 150 declares that "acceptable" sound levels should be subject to local conditions and community decisions. Nevertheless, 65 dB is generally identified as the threshold level of aviation noise which is "significant." The FAA has established 65 DNL as the threshold above which aircraft noise is considered to be incompatible with residential areas. In addition, the FAA has determined that a significant impact occurs if a proposed action would result in an increase of 1.5 DNL or more on any noise-sensitive area within the 65 DNL exposure areas.

As mentioned in Section 2.5, the Airport prepared a CFR Part 150 *Airport Noise Compatibility Planning* study resulting in the publication of the Marana Regional Airport Noise Compatibility Program (NCP). According to the Federal Register, the Town of Marana submitted to the FAA on October 11, 2006, the Noise Exposure Maps, descriptions, and other documentation produced during the noise compatibility planning study conducted from December 13, 2005 through July 27, 2006. The Marana Regional Airport Noise Exposure Maps were determined by FAA to be in compliance with applicable requirements on December 7, 2007. Notice of this determination was published in the Federal Register on December 17, 2007. This information will be used in the planning process to evaluate any potential noise impacts resulting from the proposed development plan.

2.20.11 Light Emissions

Light emissions are expected to be localized and should not have any impacts beyond the area of concern. Lighting is confined to area of illumination generally runways, parking aprons, and roadway lighting as required. No impacts are known to occur based on the existing configuration of the airfield.

2.20.12 Wetlands

Wetlands are defined in Executive Order 11990, Protection of Wetlands, as "those areas that are inundated by surface or ground water with a frequency sufficient to support...a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs, and similar areas..."

As depicted on **Figure 2-39**, and according to the U.S. Fish and Wildlife Service's National Wetlands Inventory, approximately three acres of wetlands exists on the north side of the Airport. The wetland is designated as "Freshwater Pond" according to the U.S. Fish and Wildlife Service vicinity map. The area designated as a wetland is a storm water detention basin. A "Riverine" is also depicted east of the Airport which is an irrigation canal. No other wetlands exist on or adjacent to the Airport property.

Source: U.S. Fish and Wildlife Service, June 2015

Figure 2-39 National Wetlands Inventory Vicinity Map

Chapter 3 - Forecasts of Aviation Demand

3.1 Introduction

The forecast chapter presents projections of aviation activity at Marana Regional Airport. These projections are used for evaluating the capability of the existing Airport facilities to meet current and future demand, and to estimate the extent to which facilities should be provided in the future.

Activity projections are made based on historical data, estimated growth rates, area demographics, industry trends, and other indicators. Forecasts are prepared for the short-term (0-5 years), the medium-term (6-10 years), and the long-term (11-20 years) planning period. Using forecasts within these time frames allows airport improvements to be phased in order to meet demand.

There are four types of aircraft operations considered in the planning process – local, based, itinerant, and transient. They are defined as follows:

Local operations - are defined as aircraft movements (departures or arrivals) for the purpose of training, pilot currency, or leisure flying within the immediate area of the local airport. These operations typically consist of touch-and-go operations, practice instrument approaches, flights to and within local practice areas and leisure flights that originate and terminate at the airport under study.

Based operations - are defined as the total operations made by aircraft based (stored at the airport on a permanent, seasonal, or long-term basis) with no attempt to classify the operations as to purpose.

Itinerant operations - are defined as arrivals and departures other than local operations and generally originate or terminate at another airport. These types of operations are closely tied to local demographic indicators, such as local industry and business use of aircraft and usage of the facility for recreational purposes.

Transient operations - are defined as the total operations made by aircraft other than those based at the airport under study. These operations typically consist of business or leisure flights originating at other airports, with termination or a stopover at the study airport.

The terms transient and itinerant are sometimes erroneously used interchangeably. This study will confine analysis to local and itinerant operations.

Aviation activity forecasting is an analytical and subjective process. Actual activity that develops in future years may differ from the forecasts developed in this section as a result of future changes in local conditions, the dynamics of the general aviation industry, as well as economic and political changes for the local service area and the nation as a whole. Future facility improvements should be implemented as demand warrants rather than at set future timeframes. This will allow the Airport to respond to changes in demand, either higher or lower than the forecast, regardless of the year in which those changes take place.

3.2 National and General Aviation Trends

3.2.1 National Trends

As the economy recovers from the most serious economic downturn since World War II and the slowest expansion in recent history, aviation will continue to grow over the long run. Fundamentally, over the medium and long-term, demand for aviation is driven by economic activity. According to the *FAA Aerospace Forecast, Fiscal Years 2015-2035*, the forecast calls for U.S. carrier passenger growth over the next 20 years to average 2.0 percent per year, slightly lower than last year's forecast. The U.S. economy began to show improvement in the latter half of 2014 while the economies in the rest of the world showed mixed results. With lower energy prices, U.S. carrier profitability should remain steady or increase as an economy in its sixth year of recovery leads to strengthening demand and increased revenues, while operating costs are falling or stable. Over the long term, the industry should see a competitive and profitable aviation industry characterized by increasing demand for air travel and airfares growing more slowly than inflation, reflecting over the long term a growing U.S. economy.

3.2.1 General Aviation Trends

The general aviation market continues its recovery. Again, according to the *FAA Aerospace Forecast, Fiscal Years 2015-2035*, the general aviation industry has made some notable gains within the past few years. For example, in 2014, the turbo jet sector recorded its first increase in deliveries by U.S. manufacturers since 2008. Furthermore, for a third year in a row, single-engine piston deliveries have increased. The long-term outlook for general aviation is favorable, and the near-term also looks promising especially for piston aircraft activity which is sensitive to fuel price movements. While it is slightly lower than predicted last year, the growth in business aviation demand over the long-term continues. As the fleet grows, the number of general aviation hours flown is projected to increase an average of 1.4 percent per year through 2035.

The general aviation market showed improvements in business jet and single-engine piston segments, while declines in turboprop and multi-engine piston markets translated into a slight overall improvement. Overall deliveries were up by 1.0 percent in calendar year (CY) 2014; with a 5.6 percent increase in U.S. billings. Single-engine piston shipments were up for the third year in a row, by 6.2 compared to the previous year. Because of a 10.0 percent decrease in the smaller multi-engine category, total piston aircraft shipments by U.S. manufacturers went up by 4.5 percent. Business jet shipments increased by 12.3 percent.

However, an 11.2 percent decline in the turbo-prop deliveries generated a 2.1 percent decrease in turbine aircraft shipments (total of turboprop and business jets) by U.S. manufacturers in CY 2014. Turboprop shipments, which had increased by 13.8 percent in 2013, were nearly back to their 2012 levels. General aviation activity at FAA and contract tower airports recorded a 1.1 percent decline in 2014, which was caused by a decrease in itinerant activity; local operations were slightly down (0.6 percent) compared to previous year.

The active general aviation fleet is projected to increase at an average annual rate of 0.4 percent over the 21-year forecast period, growing from an estimated 198,860 in 2014 to 214,260 aircraft by 2035 (**Figure 3-1**). The more expensive and sophisticated turbine-powered fleet (including rotorcraft) is projected to grow to a total of 45,905 aircraft at an average rate of 2.4 percent a year over the forecast period, with the turbine jet portion increasing at 2.8 percent a year, reaching a total of 20,815 by 2035.

The number of active piston-powered aircraft (including rotorcraft) is projected to decrease at an average annual rate of 0.5 percent from the 2014 total of 139,890 to 125,935 by 2035, with declines in both single and multi-engine fixed wing aircraft, but with the smaller category of piston-powered rotorcraft growing at 2.1 percent a year. Single-engine, fixed-wing piston aircraft, which are much more numerous within this group, are projected to decline at a rate of 0.6 percent, while multi-engine fixed wing piston aircraft are projected to decline by 0.4 percent a year.

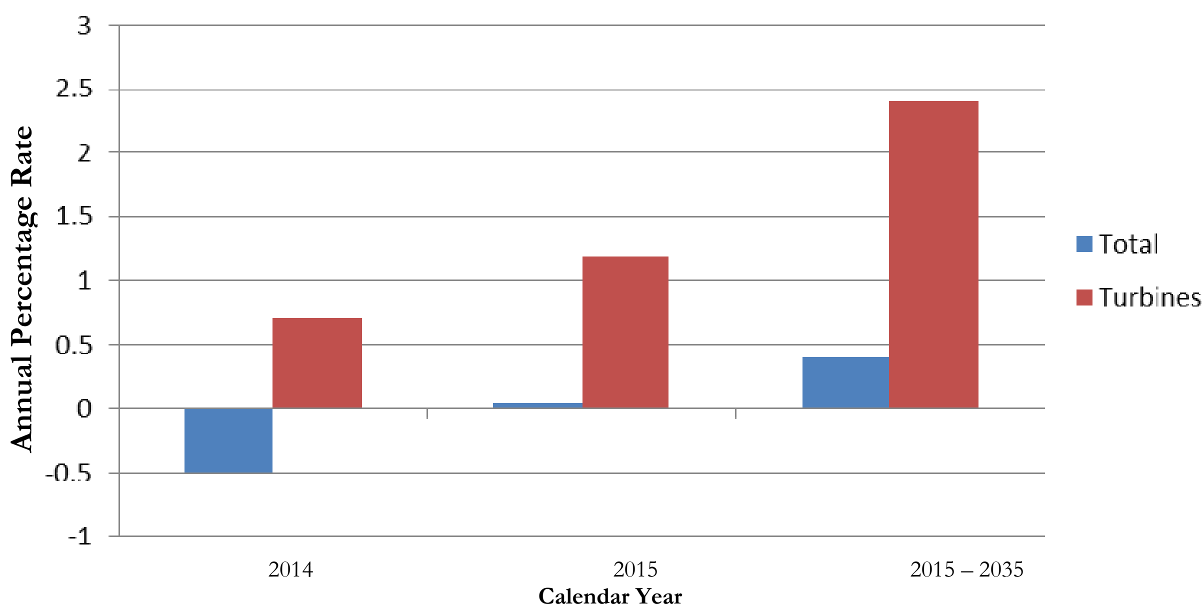
The total number of general aviation hours flown is projected to increase by 1.4 percent yearly over the forecast period. The FAA projects faster growth in hours will occur after 2023 with increases in the fixed wing turbine aircraft fleet, as well as increasing utilization of both single and multi-engine piston aircraft as the aging of this fleet starts to slow down. In the medium-term, much of the increase in hours flown reflects strong growth in the rotorcraft and turbine jet fleets. It is also expected that declining fuel prices will slow down the decrease in piston flight hours over the short to medium term.

Hours flown by turbine aircraft (including rotorcraft) are forecast to increase 2.9 percent yearly over the forecast period, compared with a decline of 0.3 percent for piston-powered aircraft. Although hours flown by piston rotorcraft are forecast to increase an average of 2.2 percent per year during the forecast period, they have a relatively small share (less than 10 percent) in this segment of hours flown by general aviation aircraft; and thus have a small impact on the overall trend. Jet aircraft are forecast to account for most of the increase, with hours flown increasing at an average annual rate of 3.6 percent over the forecast period. The large increases in jet hours result mainly from the increasing size of the business jet fleet, along with continued recovery in utilization rates from recession induced record lows. Turboprop hours are also expected to continue their increase, as indicated by the 2013 GA Survey.

Rotorcraft hours were less impacted by the economic downturn when compared to other categories and rebounded earlier. However, the 2013 GA survey recorded declines in the active rotorcraft fleet and utilization rates. It is uncertain if the decrease in utilization is permanent. The decline in oil prices has different effects on various segments of this sector.

While decreasing activity is expected in oil exploration area, and some other functions such as aerial mapping/ photography, patrol, and surveillance may see decreasing use of rotorcrafts, yet other uses, including corporate, air taxi, air medical, and air tours, may experience offsetting increases. Rotorcraft hours are projected to grow by 3.0 percent yearly over the forecast period with utilization of rotorcraft projected to increase by 0.4 percent a year. Turbine rotorcraft hours are forecast to grow at an average annual rate of 3.2 percent over the forecast period.

Lastly, the light sport aircraft category, which now includes only the special light sport (experimental light-sport aircraft is now considered as part of the experimental aircraft category), is expected to see an increase of 5.1 percent a year in hours flown, primarily driven by growth in the fleet.



Source: FAA Aerospace Forecasts 2015 - 2035

Figure 3-1 Active General Aviation Aircraft

3.2.3 Other Aviation Industry Trends

Other aviation industry trends in the U.S. include new emerging technologies and the acknowledgement of the importance aviation has on the economy. New technologies such as NextGen and unmanned aerial vehicles (UAV) continue to expand in a positive direction. Likewise, the aviation industry continues to be economically beneficial for not only the U.S. as a whole, but also for the state of Arizona; the aviation industry has been found to contribute a sizable amount of jobs and money, either by primary or induced impacts, to the State. Both new emerging technologies and studies documenting the economic impacts of aviation are anticipated to remain trends within the industry in the near future.

Next Generation Air Transportation System (NextGen) is a new era in flight that is transforming how aircraft navigate the sky and is a replacement to the World War II era technology that has until recently been the primary navigation technology. NextGen utilizes satellite technology which allows pilots to know the precise locations of other aircraft around them. This allows more planes to operate in the sky while enhancing the safety of air travel. Satellite landing procedures also allow pilots to arrive at airports more efficiently by providing more direct flight routes. **Figure 3-2** highlights the airports in the United States currently benefitting from NextGen technology.

Figure 3-2 U.S. NextGen Airports

3.3 Historical and Existing Aviation Activity and Fleet Mix

The first step in preparing aviation forecasts is to examine historical and existing activity levels and available forecasts from other sources. The aviation forecasts developed as part of the 2007 Airport Master Plan (AMP) serve as the historical basis for the updated forecasts in this chapter. Current local and regional demographic information and aviation activity at the Airport, as well as other FAA and State aviation forecasts, were also used to update the forecast.

General aviation activity includes a variety of aircraft, ranging from single-engine piston to multi-engine turbojets and rotorcraft. General aviation operations at Marana Regional Airport include personal and business transportation, flight instruction and training, air ambulance, law enforcement, and skydiving, as well as special events such as fly-ins and air shows.

Based aircraft are defined as aircraft that are stored at the airport for more than a six month period. An aircraft operation is defined as either a landing or take-off by an aircraft. The fleet mix for an airport is comprised of the various types of aircraft that are based at the airport.

Historically, according to the 2007 AMP for the Airport, there were 218 based aircraft in 2000 and 295 in 2004 (base year data for the AMP). Likewise, there were an estimated 71,300 total annual operations in 2000 and 101,400 in 2004. A decade later, the existing based aircraft and total annual operations have declined slightly, which is briefly explained later in the chapter.

According to the airport manager, there were approximately 80,000 aircraft operations in calendar year 2014. This number was derived from baseline operations data gathered by airport personnel in recent years. Furthermore, according to airport records, there were 260 based aircraft on the airfield at the end of 2014. FAA Form 5010-1, *Airport Master Record*, is the official record kept by the FAA to document airport physical conditions and other pertinent information. The record normally includes an annual estimate of aircraft activity as well as the number of based aircraft. This information is normally obtained from the airport sponsor and depending on the sponsor's record keeping system, the accuracy will vary. The current FAA Form 5010-1 for Marana Regional Airport indicates 227 based aircraft and 90,000 annual aircraft operations. Besides Form 5010-1, the FAA also relies on data found on their sponsored website for the National Based Aircraft Inventory Program (www.basedaircraft.com). Non-primary NPIAS airports are required to enter and keep up-to-date based aircraft numbers via this database so that Form 5010-1 can be accurately updated by the FAA.

3.4 Federal and State Forecasts and Projections

As previously mentioned, aviation forecasting also takes place on the national and state level. The FAA makes projections for based aircraft and annual operations using the Terminal Area Forecast (TAF), the official forecast of aviation activity for U.S. airports. The TAF is commonly used by the FAA as a planning and budgeting tool. At the State level, the Arizona Department of Transportation (ADOT) Aeronautics Group also maintains a State Aviation System Plan (SASP), in which forecasts for all airports in the state are available. Data from the January 2015 TAF and 2008 Arizona SASP (most current available) for the Airport were reviewed for this Airport Master Plan Update.

- The 2015-2035 TAF data for the Airport projects 237 based aircraft in 2015, which increases to 356 over the course of the 20-year forecast period. Likewise, the projected total annual operations occurring in 2015 is 114,032, with an ultimate projection of 165,060 over the 20-year forecast period.
- According to the medium forecast contained in the Arizona SASP, in 2012 the Airport was projected to have 338 based aircraft and 121,200 annual operations; in 2017, it was projected to have 374 based aircraft and 133,600 annual operations. Extrapolation of these figures indicates approximately 356 forecast based aircraft for the year 2015.

The actual number of based aircraft and related operations according to airport management for calendar year 2014 are reported as 260 based aircraft and approximately 80,000 annual operations; These numbers are substantially less than the Arizona SASP forecasts, which may be attributed to a variety of economic conditions that occurred in the Nation and the state after a general economic downturn beginning in 2008.

For aircraft operations, the TAF and SASP data may not be as accurate for airports that do not have an air traffic control tower; normally aircraft operations are recorded by air traffic controllers and reported to the FAA. As such, for an airport that does not have an air traffic control tower, like Marana Regional Airport, aircraft operations are more difficult to record and are often estimates made by airport management and staff. Knowing this, the FAA Statistics and Forecast Branch developed Equation #15, *Model for Estimating General Aviation Operations at Non-Towered Airports*. The model was used to estimate the number of operations at 2,789 non-towered general aviation airports included in the FAA TAF. Local factors such as the number of based aircraft, population, location, and the number of flight schools is applied to the equation resulting in an estimated number of annual operations.

A summary of the historical, existing, and forecasted based aircraft and annual operations data generated from all sources described above are shown in **Table 3-1.** The aircraft type data for the 2015 TAF was estimated by using the ratio of current aircraft types and numbers as reported by airport management for 2014.

Table 3-1 Historical, Existing, and Forecasted Aviation Activity Data

Based Aircraft						
	2000[1]	2004[1]	2014[2]	2015[3]	2015[4]	2035[4]
Single-engine	189	229	214	189	195	242
Multi-engine	25	28	35	22	28	28
Turbo-prop	0	12	--	3	3	6
Jet	3	22	4	3	4	41
Rotorcraft	1	4	2	4	2	28
Other	0	0	5	6	5	11
Total Based Aircraft	218	295	260	227	237	356
Annual Operations						
	2000[1]	2004[1]	2014[2]	2015[3]	2015[4]	2035[4]
Itinerant general aviation	17,500	27,090	28,000	30,000	36,484	55,276
Local general aviation	48,500	72,310	32,000	40,000	62,548	94,784
Total General Aviation	66,000	99,400	60,000	70,000	99,032	150,060
Air Taxi and Commuter	5,000	0	8,000	10,000	10,000	10,000
Military	300	2,000	12,000	10,000	5,000	5,000
Total Annual Operations	71,300	101,400	80,000	90,000	114,032	165,060

Source: [1]Marana Regional Airport Master Plan, 2007; [2]Marana Regional Airport management – June, 2015; [3] FAA Form 5010-1 – August, 2015; [4]FAA Terminal Area Forecast Detail Report – January, 2015

3.5 Factors Potentially Affecting Future Aviation Operations at Marana Regional Airport

Many factors have the potential to influence aviation activity at general aviation airports such as Marana Regional Airport. Based on projected national and state trends in the general aviation industry, and from discussions with Town of Marana and airport personnel, several factors have been identified which may potentially affect aviation activity at the Airport in the future.

First, the projected growth of the general aviation industry is expected to grow at a modest pace over the next 20 years. This assumption is made by projections found within the FAA's *Aerospace Forecast Fiscal Years 2015-2035* and the 2008 Arizona SASP. Specifically, according to the *Aerospace Forecast*, the active general aviation fleet is projected to increase at an average annual rate of 0.4 percent over the 20-year forecast period, growing from an estimated 198,860 in 2014 to 214,260 aircraft by 2035. In addition, the total number of general aviation hours flown is projected to increase by 1.4 percent yearly over the forecast period. Hours flown by turbine aircraft (including rotorcraft) are forecast to increase 2.9 percent annually over the forecast period, compared with a decline of 0.3 percent for piston-powered aircraft. Jet aircraft are forecast to account for most of the increase, with hours flown increasing at an average annual rate of 3.6 percent over the forecast period. Turboprop hours are also expected to continue to increase, more so than originally foreseen. An increase in the general aviation fleet and total number of general aviation hours flown could potentially mean more based aircraft and increased operations at the Airport.

The second factor is the strong historical growth occurring in the area. The Town of Marana is located in Pima County, northwest of Tucson. According to the 2010 census, the population of the town is 34,961. Marana was the fourth fastest-growing city among all cities and towns in Arizona of any size from 1990 to 2000. The Town of Marana also boasts a strong local economy where agriculture, retail trade, government, technology, and tourism are the top employers. The southern portion of Marana has grown considerably since the early 1990s with the addition of businesses and some housing, much of it due to annexation of existing unincorporated areas. In 1992, the Marana Town Council voted to annex an area of unincorporated Pima County that was located to the southeast of the town limits. These areas were mainly high density commercial businesses and shopping centers, including large retailers such as Costco Wholesale, Target, and Home Depot. The Town of Marana has also recently annexed a small portion of Pinal County northeast of where Interstate 10 enters Pima County.[4] The continued increases in population for both the Town of Marana and Pima County has the potential to include a portion of its population that uses general aviation aircraft for recreational or business purposes, and who may be inclined to either base an aircraft or fly to or from the Airport on a regular basis, thus increasing the Airport's aviation activity.

A third factor which may influence aviation activity at the Airport is the development and implementation of an Airport Business Plan. In conjunction with other economic

[4] Source: Town of Marana Web Site; www.maranaaz.gov, retrieved August 2015

development efforts by the Town of Marana, the county, and state, this effort may pave the way for attracting additional businesses and related flight activity to the area.

Specifically, the Business Plan development process will analyze the assets and resources of the Marana Regional Airport, along with outside factors and opportunities that may be leveraged to increase the effectiveness of the Airport as an economic engine and catalyst for future growth. Properly orchestrated this plan will provide a framework for attracting new businesses and services to the airport, and increase levels of aeronautic activity. The net result will be an improved revenue stream for the Airport, and new aeronautical access and services in support of future economic development opportunities in Marana.

3.6 Based Aircraft Forecast

Forecasts for based aircraft for the Marana Regional Airport were determined from data comprised of current based aircraft combined with existing forecasts from the Arizona SASP and FAA TAF, which consider growth rates for the community. In addition to the state and federal forecasts listed above, several other types of forecasting platforms were analyzed including a Per Capita forecast and a Cohort forecast. A comparative analysis of this body of data led to the development of a preferred forecast for the Marana Regional Airport.

3.6.1 Per Capita Forecast

A per capita forecast was developed that projects the number of based aircraft in direct proportion to the projected population for Pima County. As previously mentioned, Marana has experienced a significant amount of growth over the past decade, and Pima County is the second-most populous county in Arizona. According to the Arizona Department of Administration, Office of Employment and Population Statistics, the 2015 population estimate for Pima County is 1,007,162. The 2015 estimated population of Pima County and the existing based aircraft figure of 260 as reported by airport management were used to calculate the based aircraft per capita. The result of this calculation indicates approximately one based aircraft per 3,874 persons residing in Pima County. This figure was then applied to the estimated Pima County population for each year in the forecast period. The results of the per capita forecast are shown in **Table 3-2.**

Table 3-2 Per Capita Forecast

Year	Pima County Population[1]	Based Aircraft
2015	1,007,162	260[2]
2020	1,100,021	284
2025	1,172,515	303
2030	1,243,099	321
2035	1,312,101	339

Source: [1]Pima County Population Projections: 2012 to 2050, Medium Series, Arizona Department of Administration, Office of Employment and Population Statistics, 2015. [2]Total based aircraft as reported by airport management, 2015.

A review of historic based aircraft from previous years dating back to 2000 and populations for the same years produced positive and relatively constant based aircraft per capita figures over this time period with some variations. However, this data provides a fairly strong correlation between population and based aircraft that has existed in the past, and therefore, using the based aircraft per capita as a forecasting tool for the future seems reasonable.

3.6.2 Arizona State Airport System Plan Forecast

For the second forecast, the preferred based aircraft forecast from the 2008 Arizona SASP for Marana Regional Airport was used. The 2008 Arizona SASP calculated a low, medium, and high based aircraft forecast for each airport included in the SASP through the year 2030. Various factors were used to project these forecasts, such as population projections, nationwide aviation trends, and historic growth of based aircraft at Arizona's system airports. The medium forecast was selected as the preferred forecast in the SASP for the following reasons: 1) it was based on historic based aircraft growth and FAA industry forecasts, and 2) of the three forecasts (low, medium, and high), it was most likely to reflect how based aircraft will grow at Arizona airports, especially over the long-term.

The Arizona SASP medium based aircraft forecast was analyzed for use in this update because of the reasons listed above. Although the forecast years are different from the ones for this update, the results for 2012 and 2017 are an indication of how the SASP forecasts differ from the actual 2014 based aircraft data for the Airport as supplied by airport management. For example, the SASP projected 338 based aircraft in 2012 and 374 in 2017; actual based aircraft in 2014 according to airport management totaled 260. An average of the projected based aircraft in 2012 and 2017 from the ASASP results in 356. The CAGR (Compound Annual Growth Rate) used in the medium forecast in the SASP for the Airport was 2.03 percent; this percentage was applied to airport management numbers currently reflecting 260 based aircraft and forecast through the year 2035 as shown in **Table 3-3**.

Table 3-3 Arizona State Airport System Plan Forecast

Year	Based Aircraft
2015	260
2020	288
2025	318
2030	352
2035	390

Source: Extrapolations from the Arizona State Airport Systems Plan, 2008

3.6.3 Cohort Forecast

A third forecast was developed using the cohort method; this method uses the average of based aircraft from the per capita forecast and the extrapolations from the Arizona State Aviation System Plan forecast. The results of the cohort method are shown in **Table 3-4**.

Table 3-4 Cohort Forecast

Year	Based Aircraft
2015	260
2020	286
2025	311
2030	337
2035	365

Source: Armstrong Consultants Inc. (ACI), 2015

3.6.4 Based Aircraft Forecast Summary

For comparative purposes, the three forecast methods were evaluated against the FAA TAF forecast for the years 2015-2035, which estimates a total of 237 based aircraft in 2015, increasing to approximately 356 based aircraft across the 20-year planning period. Also for comparative purposes, the based aircraft forecasted in the 2007 AMP were incorporated into the review. Based on the three forecasts and their corresponding methodologies, the Per Capita forecast has been selected as the preferred forecast. The Per Capita forecast is slightly more conservative compared to the TAF, and may also reflect more accurate population growth rates. Thus, it is believed this method best represents how based aircraft may increase at the Airport in the future. **Figure 3-3** illustrates the variation in based aircraft for each type of forecasting method.

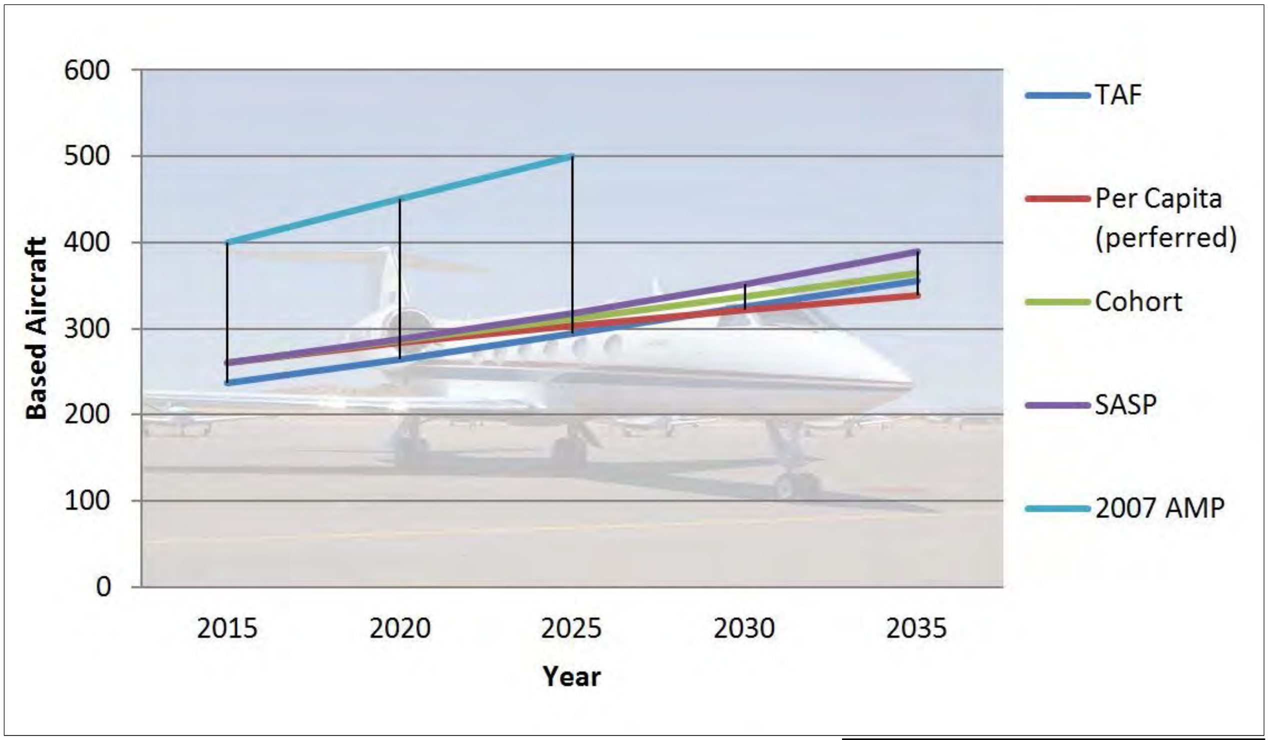


Figure 3-3 Based Aircraft Forecast Methods

3.7 Aircraft Operations Forecast

The last Marana Regional Airport Master Plan published in 2007 calculated current and forecast airport operations to climb from 101,400 total operations in the year 2004 to 277,000 total operations in the year 2025. Due to major changes in the United States economy and other factors affecting aviation, in the long term these forecasts fell short of the mark. However, it is useful to compare this data with current projections and forecasts in order to create a more functional and realistic picture of future growth based on current data.

The forecast methodology used to project general aviation operations at the Airport was calculated using the current ratio of total annual operations per based aircraft (OPBA). This is a standard forecasting methodology used by the FAA. This ratio is multiplied by the projected number of based aircraft for each year in the forecast period (from the preferred based aircraft forecast). This forecast assumes that this ratio of operations per based aircraft will remain constant over the forecast period. Based on existing data of 260 based aircraft and approximately 80,000 total annual operations, the existing OPBA at Marana Regional Airport is 307.

The existing 307 OPBA at the Airport does not imply that each based aircraft performs 307 operations; rather, the ratio represents one based aircraft to 307 operations. This OPBA ratio is consistent with the moderate amount of flight training and corporate activity that occurs at the airport, as well as steady recreational activity.

In order to develop a preferred forecast of aircraft operations at the Marana Regional Airport using the OPBA methodology, three different methods were analyzed. These methods are summarized as follows:

Method 1: Existing operations per based aircraft (OPBA 307)

Method 2: Arizona State Airports System Plan for Marana Regional Airport (OPBA 358)[5]

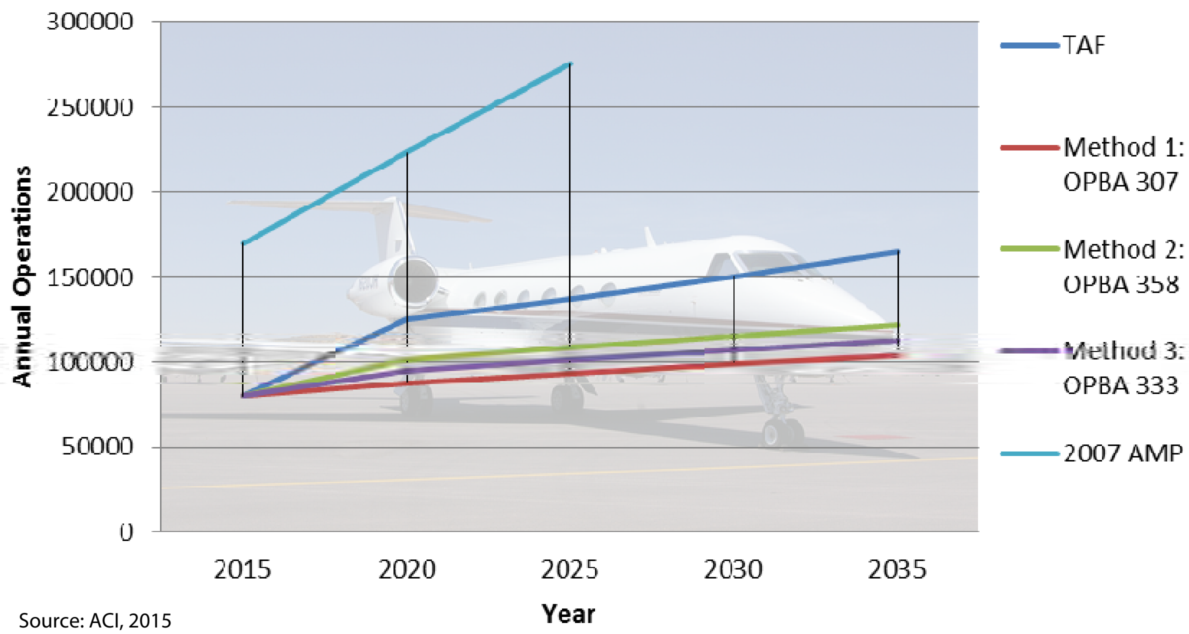
Method 3: Average between existing and Arizona State Airport System Plan (OPBA 333)

For Method 1, the OPBA of 307 was applied to the preferred based aircraft forecast over the forecast period. This ultimately results in 104,073 operations per year in 2035 (307 x 339 = 104,073). Data from the Arizona SASP indicates an OPBA in excess of 7,000; this estimate appears to be excessively high, especially when considering the current factors that exist at the Marana Regional Airport. In an effort to determine a more appropriate OPBA specific to Marana Regional Airport, the SASP OPBA was modified by extrapolating forecast based aircraft against forecast annual operations which resulted in an estimated OPBA of 358. This ultimately results in 121,362 operations per year in 2035 (358 x 339 = 121,362). Finally, Method 3 uses the average OPBA between Method 1 and Method 2, which equals an OPBA of 333. This ultimately results in 112,887 operations per year in 2035 (333 x 339 = 112,887).

3.7.1 Aircraft Operations Forecast Summary

These methods provide a likely range of projected future aircraft operations at the Airport. The results of each method are illustrated in **Figure 3-4**. The FAA TAF and 2007 AMP projections were also incorporated for comparison. Upon review, Method 3 was selected as the preferred forecast, as it assumes reasonable growth in correlation with the existing local and itinerant operations currently being conducted at the Airport, and the likelihood of aircraft operations growing at a faster rate than based aircraft in the state of Arizona as predicted by the SASP.

[5]Actual estimated OPBA for Marana Regional Airport as reported in the 2008 Arizona SASP is 7,296. However, as explained above, a modified OPBA was used to determine the total annual operations for Method 2 data.



Source: ACI, 2015

Figure 3-4 Aircraft Operations Forecast Methods

3.8 Instrument Operations Forecast

An instrument approach, as defined by FAA, is "an approach to an airport with the intent to land an aircraft in accordance with an Instrument Flight Rule (IFR) flight plan, when visibility is less than three miles and/or when the ceiling is at or below the minimum initial approach altitude." An aircraft landing at an airport must follow one of the published instrument approach procedures to qualify as an instrument approach. According to the FAA TAF, approximately 25 percent of the total aircraft operations in Arizona were instrument operations in 2014. Since virtually all commercial and business jet flights and most military aircraft flights are IFR (since they fly at or above 18,000 feet MSL), the number of instrument operations does not reflect the occurrence of instrument weather or the provision of instrument approaches at airports. Additionally, this percentage is influenced by the high traffic levels at the major commercial airports in Arizona. At most general aviation airports with an instrument approach and minimal commercial service or military activity, instrument operations will comprise approximately 2.5 percent of total operations. As shown in **Table 3-5**, the estimated historical IFR activity was derived from the FAA TAF's for years 2010 through 2015. Future IFR activity for years 2020 through the end of the forecast period in 2035 was estimated based on 2.5% of the annual operations for each year based on the preferred operational forecast.

Table 3-5 Estimated IFR Activity at Marana Regional Airport

Year	Annual Operations	Estimated Annual IFR Operations
2010	112,000	2,800
2011	112,000	2,800
2012	112,000	2,800
2013	110,000	2,750
2014	111,995	2,780
2015	90,000	2,250
2020	94,572	2,364
2025	100,899	2,522
2030	106,893	2,672
2035	112,877	2,821

Source: Years 2010 – 2015, FAA TAF 2015; Years 2020 – 2035 Armstrong Preferred Aircraft Operations Forecast @ 2.5%

3.9 Airport Seasonal Use Determination

Seasonal fluctuations in aircraft operations are not unusual at any airport. Such fluctuation is most apparent in regions with severe winter weather patterns at non-towered general aviation airports. It is less pronounced at major airports, with a high percentage of commercial and scheduled airline activity where the operational numbers that tend to smooth out the seasonal fluctuations.

Non-towered general aviation airports generally experience a substantially higher number of operations in summer months than off-season months. In Arizona the opposite is true, when the best weather often times occurs in the winter. A review of the Marana Regional Airport's total fuel sales from 2014 provided a reasonable depiction of the airport's seasonal use trends. Fuel sales data was not available by type, i.e., Jet A and AvGas. Therefore the use trend reflects total fuel sales (for only the months that data was available) at the airport. **Figure 3-5** depicts these seasonal use trends and reveals that the greatest quantity of fuel was sold in the month of March.

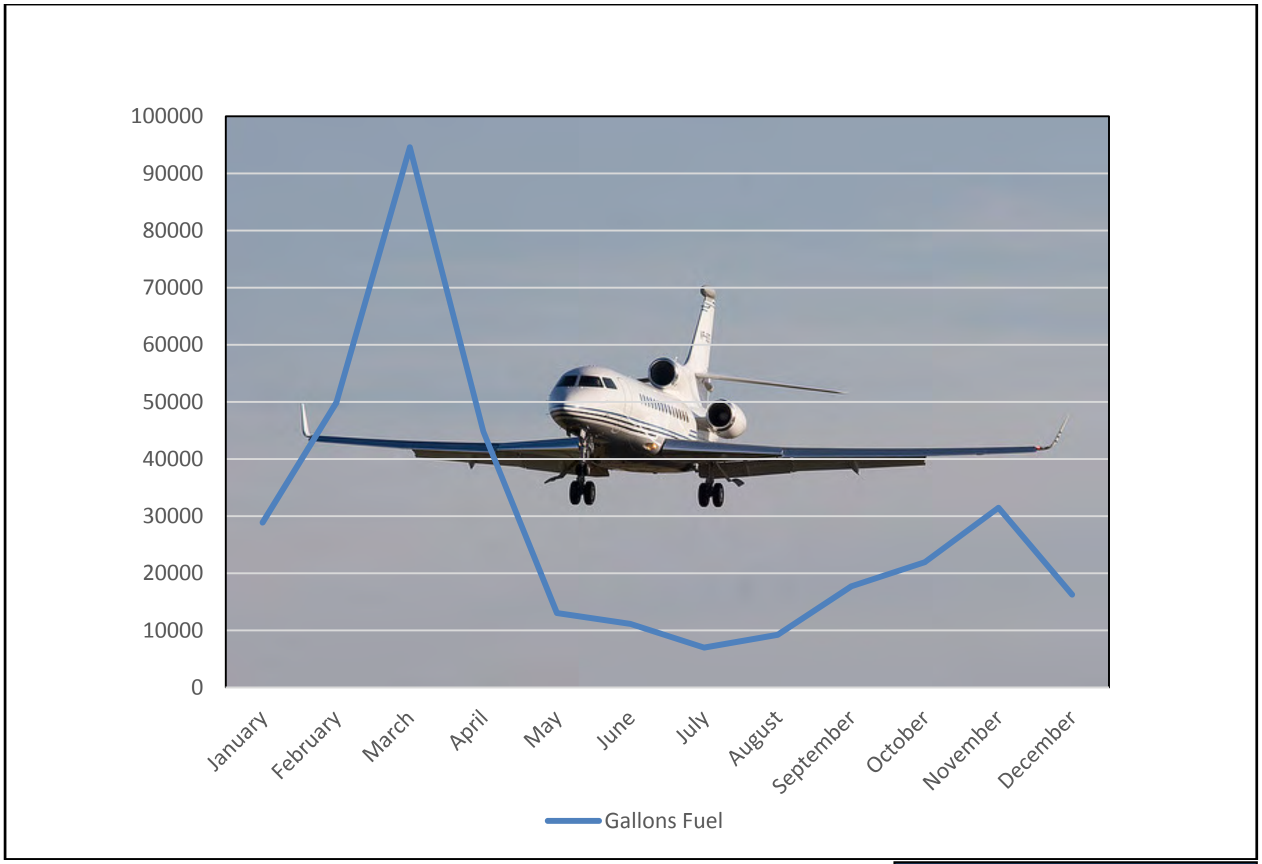


Figure 3-5 Total Fuel Sales (2014)

3.10 Hourly Demand and Peaking Tendencies

A common method used in aviation forecasting to determine reasonable estimates of demand at an airport is accomplished by calculating the levels of activity during peak periods. The periods normally used to determine peaking characteristics are defined below:

Peak Month: The calendar month when peak enplanements or operations occur.

Design Day: The average day in the peak month derived by dividing the peak month enplanements or operations by the number of days in the month.

Busy Day: The Busy Day of a typical week in the peak month. In this case, the Busy Day is equal to the Design Day.

Design Hour: The peak hour within the Design Day. This descriptor is used in airfield demand/capacity analysis, as well as in determining terminal building, parking apron, and access road requirements.

Busy Hour: The peak hour within the Busy Day. In this case, the Busy Hour is equal to the Design Hour.

A formula is used to calculate the average daily operations in a given month, based on the percentage of the total annual operations for the month. In this instance, fuel sales data was used to estimate the approximate number of operations for a given month. The self-serve and full service fuel sales data for calendar year 2014 was used to determine the percent use calculation. The results of all calculations are shown in **Table 3-6**. As is evident in Table 3-6, the Design Day and Design Hour peak demand in the planning period occurs under VFR weather conditions in the month of March (highlighted in bold), with an average of 1,015 daily operations and approximately 114 operations per hour in 2035.

Table 3-6 Estimate of Monthly/Daily/Hourly Demand at Non-Towered General Aviation Airport

Planning Year: 2020					Planning Year: 2025				
Operations:	94,572				Operations:	100,899			
Month	% Use	Operations			Month	% Use	Operations		
		Monthly	Daily	Hourly			Monthly	Daily	Hourly
January	8.35%	7,897	259.6	29.2	January	8.35%	8,425	277	31.2
February	14.40%	13,618	447.8	50.4	February	14.40%	14,529	477.7	53.8
March	**27.34%**	**25,856**	**850.2**	**95.7**	**March**	**27.34%**	**27,585**	**907.1**	**102.1**
April	12.96%	12,257	403	45.3	April	12.96%	13,077	430	48.4
May	3.77%	3,565	117.2	13.2	May	3.77%	3,803	125	14
June	3.22%	3,045	100.1	11.2	June	3.22%	3,249	106.8	12
July	2.02%	1,910	62.8	7	July	2.02%	2,038	67	7.5
August	2.67%	2,525	83	9.3	August	2.67%	2,694	88.5	9.9
September	5.12%	4,842	159.2	17.9	September	5.12%	5,166	169.8	19.1
October	6.34%	5,996	197.1	22.2	October	6.34%	6,397	210.3	23.6
November	9.10%	8,606	283	31.8	November	9.10%	9,182	301.9	34
December	4.70%	4,445	146.1	16.4	December	4.70%	4,742	155.9	17.5
Planning Year: 2030					Planning Year: 2035				
Operations:	106,893				Operations:	112,877			
Month	% Use	Operations			Month	% Use	Operations		
		Monthly	Daily	Hourly			Monthly	Daily	Hourly
January	8.35%	8,926	293.5	33.0	January	8.35%	9,425	309.9	34.9
February	14.40%	15,393	506.1	57	February	14.40%	16,254	534.5	60.1
March	**27.34%**	**29,225**	**961**	**108.2**	**March**	**27.34%**	**30,861**	**1,014.8**	**114.2**
April	12.96%	13,853	455.5	51.3	April	12.96%	14,629	481	54.1
May	3.77%	4,030	132.5	14.9	May	3.77%	4,255	139.9	15.7
June	3.22%	3,442	113.1	12.7	June	3.22%	3,635	119.5	13.4
July	2.02%	2,159	71	8	July	2.02%	2,280	74.9	8.4
August	2.67%	2,854	93.8	10.5	August	2.67%	3,014	99.1	11.1
September	5.12%	5,473	179.9	20.2	September	5.12%	5,779	190	21.4
October	6.34%	6,777	222.8	25.1	October	6.34%	7,156	235.3	26.5
November	9.10%	9,727	319.8	36	November	9.10%	10,272	337.7	38
December	4.70%	5,024	165.2	18.6	December	4.70%	5,305	174.4	19.6

Note. Fuel sales data for calendar year 2014 was provided by airport management and used to determine the approximate monthly operations and percent use.
Source: ACI, 2015

3.11 Preferred Forecast Summary

The preferred based aircraft and annual operations forecasts for Marana Regional Airport are summarized in **Table 3-7**. These preferred forecasts estimate aviation activity levels at the Airport over the 20-year planning period using existing data as reported by airport management. Activity estimates for itinerant operations are 46% of total annual operations, and local operations are 54% of total annual operations. Given the difficulty in determining the actual operations at non-towered general aviation airports, the proposed forecasts are considered reasonable as they represent moderate growth in operations and based aircraft and take into consideration the potential economic growth in the region.

Table 3-7 Summary of Preferred Forecasts for Marana Regional Airport (2015-2035)

Year	Itinerant Operations	Local Operations	Military and Commercial Operations	Total Annual Operations	Total Based Aircraft
2015	28,000	32,000	20,000	80,000	260
2020	36,604	42,968	15,000	94,572	284
2025	39,514	46,385	15,000	100,899	303
2030	42,270	49,623	15,000	106,893	321
2035	45,023	52,854	15,000	112,877	339

Source: ACI, 2015

OUR BUSINESS IS AVIATION. OUR PRIORITY IS YOU.

Corporate Office
861 Rood Avenue
Grand Junction, Colorado 81501
970.242.0101

Denver Office
6855 South Havana Street, Suite 400
Centennial, Colorado 80112
303.296.4949

Albuquerque Office
2305 Renard Place SE, Suite 210
Albuquerque, New Mexico 87106
505.508.2192

Phoenix Office
2345 S. Alma School Road, Suite 208
Mesa, Arizona 85210
602.803.7079

www.armstrongconsultants.com