MARANA REGIONAL AIRPORT

AIRPORT MASTER PLAN

Working Paper No. 2

MARANA REGIONAL AIRPORT

MARANA, ARIZONA | JANUARY 2016

ARMSTRONG

Marana Regional Airport

Airport Master Plan

Draft Working Paper No. 2

Prepared for
Town of Marana, Arizona

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January 2016

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.

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Chapter 4 – Facility Requirements

4.1 Introduction

This chapter identifies the requirements for airfield and landside facilities to accommodate the forecast demand levels at the Marana Regional Airport. In order to meet the demand levels, an assessment of the existing airport facilities to meet current and future demand was conducted. The facility requirements were based on information derived from capacity and demand calculations, information from FAA advisory circulars and design standards, the sponsor's vision for the future of the airport, the condition and functionality of existing facilities, and other pertinent information.

Facility requirements have been developed for the various airport functional areas listed below:

- General aviation requirements;
- Support facilities;
- Ground access, circulation, and parking requirements;
- Infrastructure and utilities; and
- Land use compatibility and control

The time frame for addressing development needs usually involves short-term (up to five years), medium-term (six to ten years), and long-term (eleven to twenty years) planning periods. Long-term planning primarily focuses on the ultimate role of the airport and is related to development. Medium-term planning focuses on a more detailed assessment of needs, while the short-term analysis focuses on immediate action items. Most important to consider is that a good plan is one that is based on actual demand at an airport rather than time-based predictions. Actual activity at the Airport will vary over time and may be higher or lower than what the demand forecast predicts. Using the three planning milestones (short-term, medium-term, and long-term) the airport sponsor can make an informed decision regarding the timing of development based on the actual demand. This approach will result in a financially responsible and demand-based development of the Airport.

4.2 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, while at the same time remaining mindful that designing for large aircraft that may never serve the Airport is not economical.

As discussed previously in Chapter 2, Sections 2.14.1 and 2.14.2, the design aircraft(s) and Runway Design Code (RDC) are key components of the FAA's design standards. The design aircraft (or family of design aircraft), along with the RDC, provide the information needed to determine which FAA design standards apply to the airfield, and in turn can be used to determine some of the necessary facility requirements. As mentioned, the existing RDC for Runway 12 is C/II/5000 and Runway 30 is C/II/VIS; the RDC for Runways 3 and 21 are B/I/5000. The existing design aircraft for Runway 12-30 is a Canadair Challenger CL-600, and the existing design aircraft for Runway 3-21 is a Beechcraft King Air 100. Examples of the various types of aircraft that frequent the Airport on a regular basis and their specifications are illustrated in **Table 4-1**.

Table 4-1 Design Specifications of Aircraft Using Marana Regional Airport on a Frequent Basis

AIRCRAFT	AAC/ADG[1]	APPROACH SPEED (KTS)	WINGSPAN (FT)	TAIL HEIGHT (FT)	MAX. TAKE OFF WEIGHT (LBS)
Beech Bonanza V35B	A-I	70	33.5	6.6	3,400
Cessna 172	A-I	60	36.0	9.8	2,200
Eclipse 500 Jet	A-I	90	37.9	13.5	5,920
Piper Archer II	A-I	86	35.0	7.4	2,500
Pilatus PC-12	A-II	85	52.3	14.0	9,920
Beech King Air B100[2]	**B-I**	**111**	**45.9**	**15.3**	**11,799**
Cessna 182	B-I	64	36.0	9.2	2,950
Mitsubishi MU-2	B-I	119	39.1	13.8	10,800
Swearingen Merlin	B-I	105	46.3	16.7	12,500
Beech Super King Air B200	B-II	103	54.5	14.1	12,500
Cessna 441	B-II	100	49.3	13.1	9,925
Cessna Citation 525A	B-II	118	49.8	14.0	12,500
Cessna Citation 560XL	B-II	107	55.8	17.2	16,830
Cessna Citation 650	B-II	126	53.6	16.8	23,000
Dassault Falcon 50	B-II	113	61.9	22.9	37,480
Dassault Falcon 2000	B-II	114	63.3	23.2	35,888
Grumman Gulfstream I	B-II	113	78.5	23.0	35,100
Hawker 125-400A	C-I	124	47.0	16.5	23,300
Learjet 25	C-I	137	35.6	12.6	15,000
Learjet 55	C-I	128	43.7	14.7	21,500
Bombardier CL-604	C-II	132	64.3	20.3	47,600
Canadair CL-600[3]	**C-II**	**125**	**61.8**	**20.7**	**41,250**
Cessna Citation 750 X	C-II	131	63.6	18.9	36,100
Dassault Falcon 900 EX	C-II	126	63.5	24.2	48,300
Gulfstream IV	C-II	128	77.1	24.1	73,200
Gulfstream 450	D-II	149	77.1	24.1	74,600

Note. [1] The RDC is made up of the Aircraft Approach Category (AAC), the Airplane Design Group (ADG), and the runway visibility minimums expressed as the runway visual range (RVR); the RVR component has been removed since the visibility minimums of the runway do not apply when comparing aircraft types. [2] Existing design aircraft for Runway 3-21. [3] Existing design aircraft for Runway 12-30 (primary runway).
Source: FAA AC 150/5300-13A, *Airport Design*, 2015; GCR AirportIQ Data Center, 2010-2014; ACI, 2016

Based on existing and forecasted demand levels, these aircraft represent the most likely types of aircraft to use the facility in the planning period, and it is reasonable to maintain the existing RDCs over the course of the planning period and apply them to the existing and ultimate development plans for the Airport. This applies with the exception of Runway 30; a recommendation to create a RNAV/GPS instrument approach is discussed later in the chapter, in which case the future RDC for Runway 30 would change to C/II/5000.

4.3 AIRFIELD CAPACITY

The airfield capacity analysis is determined by using an airport's annual service volume (ASV). An airport's ASV has been defined by the FAA as "a reasonable estimate of an airport's annual capacity. It accounts for differences in runway use, aircraft mix, weather conditions, etc., that would be encountered over a year's time." ASV is a function of the hourly capacity of the airfield and the annual, daily, and hourly demands placed upon it. According to FAA Advisory Circular (AC) 150/5060-5, *Airport Capacity and Delay*, the ASV for an airfield configuration similar to Marana Regional Airport (a single primary runway with a crosswind runway configuration) is approximately 230,000 operations.

Based on the 80,000 existing aircraft operations (landings and takeoffs) and the 230,000 ASV per AC 150/5060-5, Marana Regional Airport's current airfield capacity is 35 percent. By 2035, the capacity is estimated at approximately 49 percent using the forecasted annual operations for 2035 and the same 230,000 ASV (per the Airport's airfield configuration). For most airports, once this ratio reaches around 75 percent, a need to start planning for additional airfield components (such as runways) becomes apparent. It is evident that airfield capacity will not be a constraining factor to growth of the Airport. No additional runways are needed (from a capacity perspective) to accommodate the existing or forecasted activity. **Table 4-2** summarizes the ASV and airfield capacity relationship developed in this section.

Table 4-2 Airfield Capacity Analysis Summary

Year	Annual Operations	Annual Service Volume[1]	Annual Capacity Ratio
2015	80,000	230,000	35%
2020	94,572	230,000	41%
2025	100,899	230,000	44%
2030	106893	230,000	46%
2035	112,877	230,000	49%

Note. [1]FAA AC 150/5060-5, *Airport Capacity and Delay* data
Source: ACI, 2016

4.4 AIRSIDE FACILITY REQUIREMENTS

All airports are comprised of both airside and landside facilities as presented in Chapter 2. Airside facilities consist of those facilities that are related to aircraft arrival, departure, and ground movement, along with all associated navigational aids, airfield lighting, pavement markings, and signage.

4.4.1 RUNWAY LENGTH

There are many factors that may determine the runway length for an airport. FAA AC 150/5325-4B, *Runway Length Requirements for Airport Design*, provides guidance for determining runway length requirements. The information required to determine the recommended runway length(s) includes airfield elevation, mean maximum temperature of the hottest month, and the effective gradient for the runway. Also, the performance characteristics and operating weight of an aircraft impacts the amount of runway length needed. The following information for the Airport was used for the analysis:

- Field elevation: 2,031 feet mean sea level (MSL)
- Mean maximum temperature of hottest month (July): 101° F
- Maximum difference in runway centerline elevation (Runway 12-30): 21 feet
- Maximum difference in runway centerline elevation: (Runway 3-21) 6 feet
- Performance characteristics and operating weight of aircraft

The process to determine recommended runway lengths for a selected list of critical design aircraft begins with determining the weights of the critical aircraft that are expected to use the airport on a regular basis. For aircraft weighing 60,000 pounds or less, the runway length is determined by family groupings of aircraft having similar performance characteristics. The first family grouping is identified as small aircraft, which is defined by the FAA as airplanes weighing 12,500 pounds or less at maximum takeoff weight (MTOW). The second family grouping is identified as large aircraft, which is defined by the FAA as aircraft exceeding 12,500 pounds but weighing less than 60,000 pounds. For aircraft weighing more than 60,000 pounds, the required runway length is determined by aircraft-specific length requirements. **Table 4-3** depicts the aircraft weight categorization as recommended by the FAA.

Table 4-3 Airplane Weight Categorization for Runway Length Requirements

AIRPLANE WEIGHT CATEGORY MTOW			AIRCRAFT GROUPING
≤ 12,500 Pounds	Approach Speed < 30 knots		Family groupings of small airplanes
	Approach Speed ≥ 30 knots, but < 50 knots		Family groupings of small airplanes
	Approach Speed ≥ 50 knots	With < 10 Passengers	Family groupings of small airplanes
		With ≥ 10 Passengers	Family grouping of small airplanes
Over 12,500 pounds, but < 60,000 pounds			Family groupings of large airplanes
≥ 60,000 pounds or more, or Regional Jets[1]			Individual large airplane

Note. [1] All regional jets, regardless of their MTOW, are assigned to the 60,000 pounds or more weight category.
Source: FAA AC 150/5325-4B, *Runway Length Requirements for Airport Design*, 2005

Recommended runway lengths are determined using charts in AC 150/5325-4B based on the seating capacity and the mean daily maximum temperature of the hottest month of the year at the airport. The small airplanes with an approach speed of greater than or equal to 50 knots with less than 10 passengers seats and a MTOW less than 12,500 pounds recommends a runway length of 4,020 feet in order to accommodate 95 percent of the fleet; the 95 percent of fleet category applies to airports that are primarily intended to serve medium size population communities with a diversity of usage and greater potential for increased aviation activities. Also included in this category are those airports that are primarily intended to serve low-activity locations, small population communities, and remote recreational areas. The approach speed of greater than or equal to 50 knots with less than 10 passenger seats and a MTOW less than 12,500 pounds recommends a runway length of 4,660 feet in order to accommodate 100 percent of the aircraft fleet. The 100 percent of fleet category is a type of airport that is primarily intended to serve communities located on the fringe of a metropolitan area or a relatively large population remote from a metropolitan area. With an existing runway length of 6,901 feet, Runway 12-30 can accommodate 100 percent of the small airplanes.

Recommended runway lengths to serve large aircraft weighing over 12,500 pounds, but less than 60,000 pounds, are determined using a certain percentage of the useful load. The term useful load, as defined by the FAA, is the difference between the maximum allowable structural gross weight and the operating empty weight. A typical operating empty weight includes the airplane's empty weight, crew, baggage, other crew supplies, removable passenger service equipment, removable emergency equipment, engine oil and unusable fuel. According to the above referenced Advisory Circular, 75 percent of fleet at 60 and 90 percent useful load requires runway lengths of 5,500 and 8,020 feet respectively. Similarly, the Advisory Circular indicates that 100 percent of fleet at 60 and 90 percent useful load requires runway lengths of 7,070 and 10,780 feet respectively. Again, for aircraft weighing more than 60,000 pounds, which do on occasion utilize the airport, the required runway length is determined by aircraft-specific length requirements. Still, FAA calculations for this category of aircraft determined an approximate required runway length of 5,730 feet. With an existing runway length of 6,901 feet, Runway 12-30 can accommodate the majority of the aircraft that fall within the large aircraft category (over 12,500 pounds, but < 60,000 pounds), and also aircraft that weigh more than 60,000 pounds according to FAA calculations. However, some aircraft may be somewhat constrained if they desire to take off at a higher percentage of useful load, e.g. aircraft that may wish to carry the maximum amount of passengers over a great distance with full fuel tanks during the hotter summer months.

Based on the analysis, Runway 12-30 seems adequate for the existing conditions and those likely to continue in the planning period. Thus, no additional runway length is likely to occur over the course of the 20-year planning period. However, if the types and frequencies of operations change significantly at the airport, the need to revisit the runway length analysis may be warranted. The recommended runway length information for Runway 12-30 as discussed above is summarized in **Table 4-4**.

Table 4-4 Runway 12-30 Length Analysis

Existing Runway 12-30 Length (ft)	**6,901**
Aircraft Grouping:	**Recommended Runway Length (ft)**
Small Aircraft (<12,500 lbs.,< 10 passenger)	
95 percent of these small airplanes	4,020
100 percent of these small airplanes	**4,660**
Large Aircraft (<60,000 lbs.)	
75 percent of these planes at 60 percent useful load	**5,500**
75 percent of these planes at 90 percent useful load	8,020
100 percent of these planes at 60 percent useful load	7,070
100 percent of these planes at 90 percent useful load	10,780
Aircraft more than 60,000 lbs.	**5,730 (approx.)**

Source: FAA AC 150/5325-4B, *Runway Length Requirements for Airport Design*, 2005

The AC 150/5325-4B recommends the same guidelines be followed to determine the recommended runway length for crosswind runways. Small aircraft weighing less than 12,500 pounds primarily have less crosswind performance capabilities. As such, it is usually recommended that a crosswind runway accommodate 100 percent of small aircraft. The existing length of crosswind Runway 3-21 (3,892 feet) can accommodate approximately 84 percent of small aircraft weighing less than 12,500 pounds. According to AC 150/5325-4B, to accommodate 100 percent of small aircraft weighing less than 12,500 pounds, Runway 3-21 would need to be a lengthened to 4,660 feet.

Furthermore, the runway length requirement for Runway 3-21 based on AC 150/5325-4B reveals that if the runway displacement of 494 feet was removed, the runway length of 3,892 feet is adequate based on existing and forecasted aircraft operations. However, based on conversations with the airport management, occasional operations by larger aircraft (<60,000 lbs.) is increasing. To accommodate larger aircraft on Runway 3-21 in the future, and to enhance the overall reliability of the Airport, an extension to Runway 3-21 should be considered. As such, to accommodate 75 percent of larger aircraft Runway 3-21 would need to be extended 1,608 feet. An extension of this length would also assume the removal of the current displacement. The recommended runway length information for Runway 3-21 as discussed above is summarized in **Table 4-5**.

Table 4-5 Runway 3-21 Length Analysis

Existing Runway 3-21 Length (ft)	**3,892[1]**
Aircraft Grouping:	**Recommended Runway Length (ft)**
Small Aircraft (<12,500 lbs.,< 10 passenger)	
5 percent of these small airplanes	3,340
95 percent of these small airplanes	4,020
100 percent of these small airplanes	**4,660**
Large Aircraft (<60,000 lbs.)	
75 percent of these planes at 60 percent useful load	**5,500**
75 percent of these planes at 90 percent useful load	7,870
Aircraft more than 60,000 lbs.	5,730 (approx.)

Note. [1] Existing runway length of 3,892 feet represents actual runway length without displacement of 494 feet.
Source: FAA AC 150/5325-4B, *Runway Length Requirements for Airport Design*, 2005

4.4.2 RUNWAY ORIENTATION

The FAA AC 150/5300-13A, *Airport Design*, recommends that a runway's orientation provide at least 95 percent crosswind coverage. Based on the wind data presented in Table 2-12 in Chapter 2, Runway 12-30 provides 94.61 percent wind coverage for A-I and B-I aircraft (10.5 knots), 96.93 percent wind coverage for A-II and B-II aircraft (13 knots), and 98.88 percent wind coverage for A-III, B-III, and C-I through D-III aircraft (16 knots).

With the addition of the existing crosswind Runway 3-21, the combined wind coverage is 99.24 percent, 99.83 percent, and 99.97 percent for 10.5 knots, 13 knots, and 16 knots respectively. The existing airfield configuration exceeds the FAA's recommended crosswind coverage of 95 percent; additional runways are not needed over the course of the planning period based on the Airport's existing configuration.

4.4.3 RUNWAY WIDTH

The required runway width is a function of airplane approach category, airplane design group, and the approach minimums for the design aircraft expected to use the runway on a regular basis. The existing runway pavement width of 100 feet for Runway 12-30 meets the existing and future FAA design standards and should be maintained over the planning period. Runway 3-21 is 75 feet wide and exceeds the standard of 60 feet. Maintaining the existing runway width is allowable, although when the runway requires reconstruction, the additional pavement width may be problematic from a funding eligibility perspective.

4.4.4 Runway Pavement Strength and Condition

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. As previously mentioned in Chapter 2, pavement design strength is not the maximum allowable weight; limited operations by heavier aircraft other than the critical aircraft may be permissible. However, it is important to note that frequent operations by heavier aircraft will shorten the lifespan of the pavement.

The existing runway pavement strengths are reported (FAA Airport Master Record – August 2015) to be:

- Runway 12-30: 75,000 pounds gross weight single-wheel landing gear, 100,000 pounds gross weight dual-wheel landing gear, and 300,000 pounds dual-tandem wheel landing gear configuration.
- Runway 3-21: 75,000 pounds gross weight single-wheel landing gear, 100,000 pounds gross weight dual-wheel landing gear, and 150,000 pounds dual-tandem wheel landing gear configuration.

Based on the existing and planned RDCs for each runway and the aircraft most likely to use the airport on a regular basis (illustrated in **Table 4-1**), the pavement strength ratings for both Runways 12-30 and 3-21 are adequate. Many A-I and B-I aircraft likely to use Runway 3-21 have a maximum takeoff weight of 12,500 pounds or less. Likewise, the majority of C-I and C-II, and even some D-II type aircraft likely to use Runway 12-30 have a maximum takeoff weight far below the 160,000 pounds dual-wheel landing gear rating for the runway. For planning purposes, the existing pavement strengths for both runways should be maintained over the planning period.

Although the pavement strength ratings for Runways 12-30 and 3-21 are classified correctly for the types of aircraft serving the airport, it does not indicate that either runway is currently in excellent condition. As shown in **Table 2-16,** *Summary of Pavement Condition Index Data*, found in Chapter 2, Runway 12-30's PCI index is listed as 56, which falls within the pavement preservation portion of the PCI index repair scale, but is at the very bottom of this scale. Furthermore, as shown on **Table 2-17,** *Summary of Pavement Condition Number Results*, the existing pavement structure of Runway 12-30 is not adequate for many of the regular aircraft operations which occur at the Airport; therefore, major rehabilitation should be considered to strengthen the runway pavement in the short-term. Additionally, **Table 2-16** shows Runway 3-21's PCI index as 54; this falls within the major rehabilitation portion of the PCI index repair scale. The results of the PCN classification for Runway 3-21 as shown in **Table 2-17** indicate that none of the analyzed traffic for this runway had aircraft classification numbers (ACNs) exceeding the recommended PCN; i.e. the types of aircraft utilizing this runway are not causing the runway any structural damage based on their weight, the runway itself is just in need of rehabilitation due to age and other factors which occur over the life-cycle of airfield pavement. Again, major rehabilitation of Runway 3-21 may be needed in the short term to improve the overall condition of the pavement. The ability of the airfield pavement to handle the existing and projected pavement loads is a critical component to prudent planning.

4.4.5 Taxiway and Taxilane Requirements

By definition, a taxiway is a defined path established for the taxiing of aircraft from one part of an airport to another. A taxilane is a taxiway designated for low speed and precise taxiing. Taxilanes are usually, but not always, located outside the movement area, providing access from taxiways to aircraft parking positions, hangars, and terminal areas.

FAA AC 150/5300-13A, *Airport Design*, provide planners with guidance on recommended taxiway and taxilane layouts to avoid runway incursions and to enhance the overall safety at the airport. According to the FAA, a runway incursion is "any occurrence at an airport involving the incorrect presence of an aircraft, vehicle, or person on the protected area of a surface designated for the landing and takeoff of aircraft." In addition, according to *Airport Design*, "good airport design practices keep taxiway intersections simple by reducing the number of taxiways intersecting at a single location and allows for proper placement of airfield markings, signage, and lighting." Existing taxiway geometry should be improved whenever feasible with emphasis on "hot spots," and to the extent practical, the removal of existing pavement to correct confusing layouts is advisable.

Based on the Airport's existing taxiway configuration, there are two taxiway connectors that provide direct access from an apron to a runway. These have been identified as taxiway connectors A-2 and B-2. Per AC 150/5300-13A, taxiways that lead directly from an apron to a runway without requiring a turn can lead to confusion and are a safety hazard. The AC recommends that any taxiway which meets this condition be relocated to a new location which then would require a turn from the taxiing aircraft, eliminating the direct access to the runway. It is therefore suggested that airport management plan to relocate and reconstruct taxiway connectors A2 and B2 in the immediate future in order to comply with FAA design standards.

As discussed previously in Chapter 2, Section 2.14.3, to arrive at the TDG, the undercarriage dimensions of the aircraft are used. 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. On the other hand, the Airplane Design Group (ADG) is based on the wingspan and tail height and determines the safety area, object free area, and separation standards for a taxiway.

The existing design aircraft for both Runways 12-30 and 3-21 fall within the TDG 1A and 1B design standards. As illustrated in Table 2-10, *Existing Dimensional Standards – Taxiways/Taxilanes*, found in Chapter 2, it is evident that all taxiways, taxiway connectors, and several taxilanes have been built to meet TDG 2 and 3 design standards (except Taxiway

C, which does not conform to either group as its dimensions fall between those of the TDG 2 and TDG 3).

For now, the Airport should continue to maintain the taxiways as is; however, when it comes time to reconstruct any taxiways/lanes in the future, it should be noted that the FAA may require that they be reconstructed to a width that accommodates the existing design aircraft and its corresponding TDG, which in this case would be TDG 1A and 1B.

In addition, the PCN Report dated October 2014 also indicated that Taxiways B, C, and E are not structurally adequate to handle regular operations of the analyzed traffic at the Airport (see **Table 2-17**). It is recommended that further review and verification of the pavement strength be undertaken in the near future. In order for the airport to accommodate heavier aircraft on a regular basis in the future, the pavement strength of the taxiways may need to be increased.

4.4.6 Aircraft Apron

An aircraft apron is typically located in the non-movement area of an airport near or adjacent to the terminal area. The function of an apron is to accommodate aircraft during loading and unloading of passengers and/or cargo. Activities such as fueling, maintenance, and short to long-term parking take place on an apron. The layout and size of an apron depends on aircraft and ground vehicle circulation needs and specific aircraft clearance requirements. There are several types of aircraft aprons:

Terminal/itinerant aircraft apron – These aprons are adjacent to the terminal where passengers board and deplane from the aircraft. The apron also accommodates multiple activities such as fueling, maintenance, limited aircraft service, etc. Itinerant aprons handle itinerant aircraft activities which are usually only on the airport for a few days. At general aviation airports, this type of apron can also provide some tie-down locations for both itinerant and based aircraft.

Tie-down apron – An apron area for both short-term and long-term aircraft parking (based and itinerant aircraft).

Other services apron – Apron areas that will accommodate aircraft servicing, fueling, and the loading/unloading of cargo.

Hangar aprons – This is an area on which aircraft move into and out of a storage hangar.

FAA AC 150/5300-13A, *Airport Design*, provides design criteria to assist in apron layout and capacity. For the purpose of calculating the aircraft apron size, the following planning criterions were used:

- 800 square yards of apron per aircraft for single-engine and multi-engine aircraft
- 1,500 square yards per aircraft for turbo-props and business jets
- 30% of single-engine (forecasted) based aircraft will require apron parking
- 10% of multi-engine (forecasted) based aircraft will require apron parking

- 10% of turbojet (forecasted) based aircraft will require apron parking
- Itinerant aircraft apron requirements are based on the design hour operations

Based on the above criterion, additional aircraft apron is not required for the planning period. The Airport and the Town of Marana should monitor the utilization of the apron and based on the above criterion, make adjustments in the apron size as needed. It is recommended that reconstruction and pavement maintenance projects take place on the existing apron as needed. **Table 4-6** depicts the aircraft apron requirements for the Airport. The best course of action regarding excess aircraft apron pavement will be included in the Development Alternatives chapter.

Table 4-6 Aircraft Apron Requirements

Aircraft Apron Requirements (Based on Forecasts)	Available in 2015	Year			
		2020	2025	2030	2035
Existing Apron Parking Positions	140	-	-	-	-
Designated Parking Positions for SE/ME Aircraft	140	74	78	82	87
Designated Parking Positions for Turboprops and Business Jets	0	1	1	1	1
Based Aircraft Apron Area (approx. sy)[1]	165,000	61,000	64,000	67,000	71,000
Itinerant Aircraft Apron Area (approx. sy)[2]	150,000	92,000	98,000	104,000	110,000
Total Aircraft Apron Area (approx. sy)	315,000	153,000	162,000	171,000	181,000

Note. Apron development will depend on actual demand.
[1]Calculations are based on 800 square yards per forecasted SE/ME aircraft, plus a constant 1,500 square feet for turbojet aircraft; calculations have been rounded and are approximate. [2] Calculations are based on the forecasted design hour operations multiplied by an average apron requirement of 1,150 square feet per aircraft; calculations have been rounded and are approximate.
Source: ACI, 2016

Besides the apron space requirements, it is evident based on the 2014 PCN Report for the Airport that several of the Airport's aprons are not structurally adequate to handle regular operations of the aircraft using these apron areas. These aprons include (referred to by their common names by airport users/personnel) the Terminal/FBO and Itinerant Parking Apron, the East Hangar Apron, and the East Apron. As mentioned in the previous section, further review and verification of the pavement strength should be undertaken in the near future. In order for the airport to accommodate heavier aircraft on a regular basis in the future, the pavement strength of the aforementioned aprons may also need to be increased.

4.4.7 Instrument Aids to Navigation

The airport has non-precision, GPS and NDB instrument approach procedures to Runway 12 and 3-21. These approaches provide for visibility minimums as low as one mile and cloud ceiling down to 500 feet. These approaches should be maintained in the future as they provide all-weather capabilities for the airport.

Non-precision Global Positioning System (GPS) approaches do not require ground-based facilities on or near the airport for navigation. The GPS receiver uses satellites for navigation, and it involves little or no cost for the airport sponsor. GPS was developed by the United States Department of Defense for military use and is now available for civilian use. GPS approaches are rapidly being commissioned at airports across the United States with typical approach minimums of 350-foot ceilings and one mile visibility. An instrument approach increases the utility of the airport by providing for the capability to operate in inclement weather conditions. This is especially important for air ambulance, physician transport, and business flights. It is also useful for conducting training and maintaining instrument currency.

Development of an Area Navigation (RNAV) approach with one mile visibility minimums to Runway 30 is recommended, as it would provide enhanced safety and utility during hours of darkness and adverse weather conditions. Visibility minimums of lower than one mile are not necessary based on the weather conditions which typically occur in southern Arizona. Further investigation as to whether or not a non-precision instrument approach can in fact be created for Runway 30 will be determined by the FAA Flight Procedures Office.

4.4.8 Airfield Lighting, Signage, Markings, and Visual Aids to Navigation

Based on findings from the airport inventory as discussed in Chapter 2, several recommendations for improvements to the airfield lighting, signage, markings, and visual aids to navigation are recommended for the Airport.

These recommendations include the following:

Airfield Lighting

During the inventory process, it was noted that all of the MIRL and MITL on the airfield use incandescent light fixtures. There has been much advancement in light emitting diode (LED) fixtures on airports over the last several years. LED fixtures are much more energy efficient and have a longer life span than traditional incandescent fixtures. The Airport may want to consider replacing the existing incandescent MIRL and MITL in the medium- to long-term planning period. Should any new MIRL/MITL be needed as part of a runway or taxiway reconstruction project, it is recommended that the LED version of MIRL/MITL be installed.

Taxiway C currently does not have any MITL or retro-reflectors installed. It is recommended that one of these options be installed along Taxiway C in the short-term planning period to enhance safety for pilots using this part of the airfield at night or during inclement weather.

Airfield Signage

As previously mentioned in the Inventory Chapter, the lighted airfield destination signs are in the process of being replaced; the new signs will be internally lit with LED fixtures. No further recommendation for the airfield signage is necessary at this time.

Pavement Markings

The majority of airfield pavement markings, especially those on the runways and the taxiways (except for Taxiway A), are heavily faded. Runway and taxiway pavement markings are intended to safely guide pilots as they take-off, land, and taxi around the airfield. Clear, clean, highly visible airfield markings are imperative in preventing runway and other airfield incursions.

It was noted at the time of the inventory that Runway 12-30's pavement markings are faded. Runway 3-21's markings are also faded; however, in addition to the existing markings faded condition, it was also observed that the runway is incorrectly marked. Currently basic pavement markings are found on the pavement, which indicates the runway is used for Visual Flight Rules (VFR). However, considering that there are two published non-precision GPS approaches to both Runway 3 and 21, the correct pavement markings should be that of non-precision. It is recommended that Runway 3-21 be correctly marked in the short-term planning period in order to comply with current FAA design standards. Runway 12-30's pavement markings should also be repainted in the short-term planning period.

All of the taxiways (except for Taxiway A) have varying degrees of faded pavement markings. The taxiway system is quite expansive and covers a great deal of ground on the airfield; airport management should consider repainting the taxiway pavement markings at some point over the course of the planning period, or at least portions of them, in a manner that is most feasible and economical to them.

Although pavement markings on the aprons were noted as good to fair during the inventory, airport management should most likely plan to repaint these markings at some point over the course of the planning period as well.

Visual Aids to Navigation

The PAPIs and REILs mentioned in Chapter 2 are currently in good working condition. They should be maintained until they have reached the end of their useful life-cycle. It is anticipated that some or all of the components of these systems may need to be replaced in the medium- to long-term planning period. The wind cones and segmented circle are also in relatively good condition. The Airport should maintain and replace/paint as needed over the course of the planning period. Finally, the airport rotating beacon is also in adequate condition, although it was noted that the fixture and tower are outdated. Possible replacement in the medium-term planning period may be warranted.

4.4.9 WEATHER AIDS

The existing Airport AWOS meets the existing and projected needs of the Airport and is in good overall condition as stated in the Inventory Chapter. Replacement of the AWOS equipment may be necessary during the planning period due to technological improvements.

4.5 LANDSIDE FACILITY REQUIREMENTS

Landside facilities are another important aspect of any airport as they handle aircraft and passengers while on the ground at the airport. Landside facilities serve as the processing interface between two modes of transportation – air and ground. Likewise, landside facilities also offer travelers the first impression of the airport and the local community.

The capacity, condition, and functionality of the various facilities were examined in relation to the anticipated aviation demand presented in Chapter 3 to identify future facility needs.

4.5.1 Terminal Building

The terminal building at general aviation airports typically offers various amenities to passengers, local and transient pilots, and airport management. Terminal buildings (often called pilot lounges at general aviation airports) most often house public restrooms, public telephones, a pilot lounge area, and information regarding airport services. The existing terminal building at the Marana Regional Airport also serves as the Airport's FBO (Tucson Aeroservice Center) and is used by transient and local aircraft operators. It is recommended that an airport's terminal building be able to satisfy the forecasted peak-hour general aviation pilot and passenger demand.

The accepted methodology used to project terminal building facility needs for general aviation airports is based on the number of airport users anticipated to use the facility during the design hour. The design hour is typically defined as the peak hour of an average day of the peak month. The design hour measures the number of passengers departing or arriving on aircraft in an elapsed hour of a typical busy (design) day. Estimating design hour passengers is typically a three-step process involves the following:

- Determine the peak month,
- Determine the design day to be used, and
- Estimate the amount of daily activity that occurs in the design hour.

The number of peak hour passengers and pilots was derived by assuming 3.4 passengers and pilots per design hour. The terminal function size is based on providing 75 square feet per peak design hour. This process is applied to both the existing (base year) conditions, as well as activity in future years. **Table 4-7** depicts the terminal building requirements.

Table 4-7 General Aviation Terminal Building Requirements

Year	Design Hour Operations	Peak Hour Pilots and Passengers	Terminal Function Size (approx. sf)
2015	67.5	232	17,000
2020	79.8	274	21,000
2025	85.1	293	22,000
2030	90.2	310	23,000
2035	95.2	328	25,000

Note. Calculations for the terminal function size have been rounded to the nearest whole number.
Source: ACI, 2016

According to the calculations above, the existing 9,500 square-foot terminal building does not meet the space requirements through the planning period. Overall the building appears to be in good condition, although it may be somewhat dated (originally built in 1982). It is likely that typical energy and water efficiency improvements may be needed such as: mechanical, electrical, and plumbing upgrades. Energy efficient exterior lighting which meets the Town's light pollution code should be installed to enhance safety and reduce energy costs. The Development Alternatives chapter will consider various terminal concepts and will present additional recommendations.

Access from the vehicle parking area and from the aircraft apron to the terminal is adequate. The concrete sidewalk from the landside allows the public easy access to the terminal building. Native/drought tolerant landscaping is already in place around the terminal building and should be maintained in the future.

The Airport should consider implementing a recycling program if it does not already exist to reduce the solid waste that will be generated. The program should also be suggested as a requirement for each tenant. The Airport should also make sure that the dumpsters for the terminal building are adequately sized and coordinated with tenant activities to keep the overall number of dumpsters to a minimum, thereby reducing the waste haulers maneuvers and emissions on airport property.

4.5.2 Hangar Facilities

As previously mentioned in Chapter 2, the Airport has six conventional hangars, 19 T-hangars, and one shade structure located on the airport. The six conventional hangars are occupied by long-standing tenants of the Airport, and therefore no other conventional hangars are available on the airfield at this time. The existing T-hangars and shade structure seem to be adequate at meeting the current demand for hangars at this time. The estimated hangar needs of the Airport are discussed further below.

Prefabricated conventional and T-hangar units are available from a variety of manufacturers throughout the nation. Storage space for based aircraft was determined using guidelines suggested in manufacturer's literature. Typical aircraft sizes were also reviewed in light of the evolution of business aircraft sizes.

Conventional hangar standards:

- 1,200 square feet for single-engine aircraft
- 1,400 square feet for multi-engine aircraft
- 1,800 square feet for turboprop or turbojet aircraft

T-hangar standards:

- 1,400 square feet for single- and multi-engine aircraft

The assumptions that were made regarding the type of storage needed for each type of aircraft at Marana Regional Airport is illustrated in **Table 4-8**.

Table 4-8 Breakdown of Aircraft Storage Types

Percent of Aircraft Type	Type of Storage
100% of turbojet	Conventional hangar
55% of multi-engine	Conventional hangar
35% of multi-engine	T-hangar
10% of multi-engine	Parking apron
10% of single-engine	Conventional hangar
60% of single-engine	T-hangar
30% of single-engine	Parking apron

Source: ACI, 2016

Using the above criterion and the based aircraft forecasts, combined with consideration of the potential fleet mix, **Table 4-9** depicts the demand requirements for hangar space at the Airport. It can be inferred from the table that the existing number of T-hangars currently and is predicted to meet the space requirements over the planning period. Conventional hangars on the other hand, do not. It is evident from the table, as from discussions with airport management, that the existing number of conventional hangars does not meet the space requirements at present nor over the course of the planning period. It is recommended that conventional hangars be planned at the Airport over the course of the 20-year planning period. The exact size and amount of hangars will ultimately be determined by demand; however, the Development Alternatives chapter will consider and propose various hangar configurations and locations for airport management and the Town to consider. It should be noted that these requirements are not rigid, meaning that shifting of the space requirements between conventional and T-hangars is something that the Town will need to consider as operations fluctuate and the need to satisfy user's specific requirements are identified.

Table 4-9 Aircraft Hangar Requirements

	Year				
	2015	2020	2025	2030	2035
Based Aircraft	260	284	303	321	339
Total Aircraft to be Hangared (approx. 70%)	185	199	212	225	237
T-hangared Aircraft (approximation)	140	152	162	170	180
Conventional Hangared Aircraft (approximation)	45	47	50	55	57
Hangar Size Requirements					
T-hangar 4 to 8 bays (sf)[1]	-	0	0	0	10,000
Conventional Hangar (sf)[1]	-	80,000	80,000	90,000	100,000
Total Hangar Storage (sf)	-	80,000	80,000	90,000	110,000

Note. Hangar development will depend on actual demand.
A minimum hangar size of approximately 10,000 square feet is recommended.
Source: ACI, 2016

4.5.3 Aviation Fuel Facilities

As discussed in Chapter 2, there are currently two fuel storage tanks on the Airport that are owned and operated by the FBO (Tucson Aeroservice Center). Each fuel tank has a capacity of 12,500 gallons; 100LL AvGas and Jet A are available. A self-service system with a credit card reader is available for 100LL (AvGas) fuel only. The FBO also owns and operates a total of three fuel trucks; two are designated for AvGas and holds 1,200 gallons of fuel each, and the third is designated for Jet A and holds 5,000 gallons of fuel.

Additional fuel storage capacity should be planned when the airport is unable to maintain an adequate supply and reserve. For general aviation airports such as Marana Regional Airport, typically a 14 day supply is common. If the need for additional fuel storage becomes necessary, additional tanks should be added in 10,000 or 12,500 gallon increments. These increments will be the most economical to install.

4.5.4 Airport Access and Vehicle Parking

The Marana Regional Airport is accessed from Avra Valley Road, which if taken east for approximately five miles will intersect with Interstate 10 (I-10). Traffic approaching the airport on Avra Valley Road is directed off the roadway and on to the airport entrance road. The two lane entrance leads to a paved vehicle parking area adjacent to the FBO/airport terminal building and Sky Rider Coffee Shop. Also adjacent to the main entrance on the east side is a dirt and gravel lot that is on occasion used for additional parking; this is usually when a large meeting or special event is being held at the airport. Although not officially an entrance road, another paved, two-lane roadway is located approximately one mile east of the main entrance. This roadway was built in 2008. Some private airport businesses have access to their facilities via ancillary access roads, which also are accessed from Avra Valley Road. The existing entrance road is expected to be adequate to accommodate current and future activity for the planning period.

The existing vehicle parking area can accommodate approximately 40 vehicles. Normally, an airport's vehicle parking area should be able to satisfy the forecasted peak-hour (design-hour) general aviation pilot and passenger demand. Using planning methods commonly accepted for calculating parking space requirements, **Table 4-10** depicts the vehicle parking space requirements for the 20-year planning period.

Table 4-10 Vehicle Parking Requirements

Year	Parking Space Requirements	Parking Lot Requirements[1] (sy)
2015	154	5,500
2020	183	6,500
2025	195	7,000
2030	207	7,500
2035	219	8,000

Note. Parking space requirements = 2/3 of the design hour for pilot and passenger flow. Parking lot requirements have been rounded and are approximate.
[1]Each parking space = 35.5 square yards
Source: ACI, 2016

Based on the vehicle parking requirements, the existing parking area is inadequate to handle passenger and pilot flow at a peak busy hour of the day. It is recommended that the Airport add additional vehicle parking spaces over the 20-year planning period. The Development Alternatives chapter will provide more information on potential locations for the additional parking spaces.

4.5.5 FENCING

According to FAA AC 150/5300-13A, *Airport Design*, the primary purpose of airport fencing is to restrict inadvertent entry to the airport by unauthorized people and wildlife. There are several types of airport fencing that are eligible for FAA funding as part of the AIP program depending on the airport's classification (commercial service, GA, etc.) and fencing needs. The different types include wire fencing (with wooden or steel posts), chain-link fencing with steel posts, and wildlife deterrent fencing. Wildlife deterrent fencing usually consists of installing chain-link fence fabric along an existing chain-link fence, and constructing concrete pads at existing fence gates.

The Airport has six-foot high, chain-link fence with three strands of barbed wire around the entire perimeter of the airfiled. Additionally, ornamental security fencing is also in place near the terminal/FBO area. Several gates with access control systems are located at various locations around the perimeter as well. The existing perimeter fencing is currently adequate for the needs of the Airport. If wildlife in the area becomes an issue, wildlife deterrent fencing may also be an option. The specific location, extent, type, and height of wildlife deterrent fencing shall be designed for the purpose intended based on and in general conformance with accepted guidelines and recommendations of the Arizona Game and Fish Department or other recognized public wildlife specialists for preventing intrusion of the specific targeted animals known to inhabit the area. It is recommended that the Airport maintain the existing chain-link and ornamental security fencing and access control gates.

4.5.6 SECURITY

There are several programs designed to increase general aviation airport security. For example, the Aircraft Owners and Pilots Association (AOPA) Airport Watch program created an around the clock telephone hotline answered by federal authorities for pilots and other airport users to report suspicious activity at GA airports. Also, the Transportation Security Administration's (TSA) *Security Guidelines for General Aviation Airports* provides a set of federally-endorsed recommendations to enhance security for municipalities, owners, operators, sponsors, and other entities charged with oversight of general aviation airports. The TSA's guidance provides nationwide consistency with regard to security at general aviation facilities, as well as a rational method for determining when and where these enhancements may be appropriate based upon the operational profile of differing airports. The guidelines offer an extensive list of options, ideas, suggestions, and proven best practices for the airport operator, sponsor, tenant and/or user to choose from when considering security enhancements. The TSA's guidelines are updated and modified as new security enhancements are developed and as input from the general aviation community is received. It is recommended that Town review the latest version of the TSA's *Security*

Guidelines for General Aviation Airports in order to assess the suggested security enhancements, if any, at the Airport.

4.5.7 Aircraft Rescue and Fire Fighting (ARFF) Equipment

According to FAA guidance, operators of Part 139 certificated airports must provide Aircraft Recue and Fire Fighting (ARFF) services. Marana Regional Airport is not a Part 139 certificated airport, therefore ARFF equipment is not required. Local municipal or volunteer fire departments typically provide fire protection to general aviation airports in their district. Mutual aid agreements may also be provided and developed with nearby fire departments to assist in emergency situations. In any case, procedures should be in place to ensure emergency response in case of an accident or emergency at the airport. Although statistically very safe, the most likely emergency situations at general aviation airports are an aircraft accident, fuel or aircraft fire, or a hazardous material (fuel) spill. The level of protection recommended in FAA AC 150/5210-6D, *Aircraft Fire and Rescue Facilities and Extinguisher Agents*, for small general aviation airports is 190 gallons of aqueous film forming foam (AFFF) supplemented with 300 pounds of dry chemical. Proximity suits should be utilized for fire fighter protection. Aviation rated fire extinguishers should be immediately available in the vicinity of the aircraft apron and fueling facilities.

Some members of the PAC and TAC encouraged the Airport to consider providing on-site ARFF capabilities. Although not an FAA requirement, enhancing the Airport's ability to respond to emergencies is reasonable given the existing and projected corporate aircraft activity.

4.5.8 Airport Support and Maintenance Building

As mentioned in the Inventory chapter, the Airport does not have a dedicated support and maintenance building. It is recommended that the Airport construct such a building in the short-term planning period in order to have a secure, functional, and organized location for the airfield's maintenance equipment. It is recommended that the building be approximately 10,000 – 20,000 square feet, although this is flexible. The location will be discussed more in the Development Alternatives chapter. The maintenance equipment mentioned in the Inventory chapter, along with any other pertinent equipment the Town finds essential to the upkeep and maintenance of the airfield and airport property, should be evaluated to determine if it has reached the end of its useful lifecycle. After evaluation, any piece of equipment that has reached the end of its lifecycle should be replaced in a timely fashion.

4.6 Infrastructure Needs

The existing electric, water, and telecommunication utilities are considered adequate for the existing facility. Upgrades and improvements to the existing utilities are recommended, as needed, in order to accommodate recommended development. The need for additional utilities, or modifications to existing utilities, will be evaluated in more detail in the Development Alternatives chapter, if applicable.

4.7 Land Use Compatibility and Control

As previously discussed in Chapter 2, Section 2.15, 14 CFR Part 77 establishes several imaginary surfaces that are used as a guide to provide a safe and unobstructed operating environment for aviation. In addition to ensuring that penetrations to these imaginary surfaces are avoided or appropriately marked and lighted, the FAA recommends that the airport sponsor make reasonable efforts to prevent incompatible land uses, such as residential encroachment, from developing in the immediate area of the airport. Many times this can be achieved by the municipality creating an airport overlay zone. It is recommended that the Town consider creating an airport overlay zone to preserve compatible land uses around the airport.

Private development proposals should also be reviewed to ensure compatibility in the vicinity of the airport. Land use compatibility considerations include safety, height hazards, and noise exposure. Although extremely rare, most aircraft accidents occur within 5,000 feet of a runway. Therefore, the ability of the pilot to bring the aircraft down in a manner that minimizes the severity of an accident is dependent upon the type of land uses within the vicinity of the Airport.

The RPZ is a trapezoidal area extending beyond the ends of the runway and is typically included within the airport property boundary. Residential and other uses that result in congregations of people are restricted from the RPZ. As previously mentioned in Chapter 2, Section 2.14.7, guidance from the FAA on what constitutes a compatible land use and how to evaluate proposed land uses that would reside in a RPZ is contained within a memorandum dated September 2012.

In addition, according to FAA Advisory Circular 150/5200-33B, *Hazardous Wildlife Attractants On or Near Airports,* landfills and/or transfer stations are incompatible land uses with airports. According to the FAA, these types of facilities should be located at least 5,000 feet from any point on a runway that serves piston type aircraft and 10,000 feet from any point on a runway that serves turbine powered aircraft. Furthermore, the FAA recommends that any facility which may attract wildlife (especially birds), such as sewage treatment ponds and wastewater treatment plants, should also be located this same distance from any point on the runway. It is known that two settlement ponds are located just northeast of the airport. Pending the outcome of the Wildlife Hazard Assessment that is near completion for the Airport, the settlement ponds will need to be revisited and referenced in this document to determine if they pose a hazard or not. Overall, the Town should remain diligent to ensure future land use remains compatible with airport facilities.

4.7.1 Airport Property

The existing airport property encompasses approximately 630. From a review the of airport property map, it appears that the existing Runway Protection Zone (RPZ) on Runway 12 is owned in fee simple. The existing RPZs for Runway ends 30, 3, and 21 each extend off airport property. FAA recommends that airports control the land within the RPZ. This was also discussed in Chapter 2, Inventory, Section 2.14.7, Runway Protection Zone (RPZ).

Additional land and/or avigation easements required to accommodate existing or future design surfaces, such as RPZs and all other proposed development will be discussed in more detail in the Development Alternatives chapter.

4.7.2 AIRPORT ZONING

Airport zoning ordinances should include height restrictions and land use compatibility regulations. Development around airports can pose certain hazards to air navigation if appropriate steps are not taken to ensure that existing, as well as future, buildings and other types of structures do not penetrate 14 CFR Part 77 imaginary surfaces.

The FAA recommends that airport sponsors implement height restrictions in the vicinity of the airport to protect all 14 CFR Part 77 imaginary surfaces. The airport is zoned accordingly for airport use and is considered to be adequate for the planning period. There are currently no incompatible land uses in the vicinity of the airport. The surrounding land uses and zoning are compatible with airport operations.

4.8 SUMMARY OF FACILITY REQUIREMENTS

The facility requirements for the Airport are summarized in **Table 4-11**. The recommendations are based on the types and volume of aircraft currently using, and expected to use, the airport in the short- and long-term time frames. In the next chapter, Development Alternatives, various airside and landside improvements will be presented and evaluated, which will in turn lead to the recommended airside and landside development for the Airport. The recommended facilities will enable the Airport to continue to serve its current and future users in a safe and efficient manner.

Table 4-11 Facility Requirements Summary

ITEM	BASE YEAR (2015)	SHORT-TERM	MEDIUM-TERM	LONG-TERM
RUNWAYS				
12-30				
Runway Design Code (RDC)	Rwy 12: C-II/5000; Rwy 30: C-II/VIS	Same as existing C-II/5000		 Maintain
Length (ft)	6,901	Same as existing		
Width (ft)	100	Same as existing		
Pavement Strength (lbs)	75,000 S, 100,000 D, 300,000 DT	Verify per PCN report; strengthen where needed[1]		Maintain
Lighting	MIRL	Same as existing	Replace with LED	Maintain
Markings	Non-precision	Repaint	Maintain	
3-21				
Runway Design Code (RDC)	B-I/5000	Same as existing		
Length (ft)	3,892	Same as existing		
Width (ft)	75	Same a existing		
Pavement Strength (lbs)	75,000 S, 100,000 D 150,000 DT	Same as existing; maintain		
Lighting	MIRL	Same as existing	Replace with LED	Maintain
Markings	Basic	Repaint; Non-precision	Maintain	
TAXIWAYS				
Taxiway A, E, & H				
Taxiway Design Group (TDG)	TDG 3[2]	Maintain existing[2]		
Width (ft)	50	Maintain existing		
Lighting	MITL	Same as existing	Replace with LED	Maintain
Markings	Existing	Repaint	Maintain	
Taxiway B				
Taxiway Design Group (TDG)	TDG 2[2]	Maintain existing[2]		
Width (ft)	Varies (35'-50')	Maintain existing		
Lighting	MITL	Same as existing	Replace with LED	Maintain
Markings	Existing	Repaint	Maintain	
Taxiway C				
Taxiway Design Group (TDG)	N/A	Reconstruct to TDG-1[2]		Maintain
Width (ft)	40	Reconstruct to 25		Maintain
Lighting	None	Install MITL	Maintain	
Markings	Existing	Repaint	Maintain	
Connector Taxiways A-2 & B-2				
	Non-standard; provide direct access from apron to runway	Relocate/ Reconstruct	Maintain	

Table 4-11 Facility Requirements Summary Continued

ITEM	BASE YEAR (2015)	SHORT-TERM	MEDIUM-TERM	LONG-TERM
NAVIGATIONAL AND WEATHER AIDS				
AWOS-3	Yes	Maintain existing		
Rotating Beacon	Yes	Maintain	Replace	
NDB	Yes	Maintain existing		
Approaches	Rwy 3-21: GPS Rwy 12: GPS & NDB	Add RNAV/GPS Runway 30	Maintain	
VISUAL AIDS				
REIL	12-30: Yes 3-21: No	Install on Runway 3-21	Maintain	Replace
PAPI	12-30: 4-light 3-21: 2-light	Maintain		Replace
Wind cone/segmented circle	Yes	Maintain	Replace	
TERMINAL				
General Aviation (sf)	9,500	17,000	21,000	25,000
HANGARS (sf)[3]				
Conventional (approx. sf)	52,000	80,000	90,000	100,000
T-hangars/shade (approx. sf)	317,000	Maintain existing		10,000
APRONS[3]				
Tie-down/transient (approx. sy)	150,000	Maintain existing		
VEHICLE PARKING				
Total (spaces/appox. sy)	40/2,500	183-195/ 6,500-7,000	207/7,500	219/8,000
FUEL FACILITY				
Jet A (gal)	12,500	Same as existing		
AvGAS (100LL) (gal)	12,500	Same as existing		
Total (gal)	25,000	Same as existing		
Self-fueling/Credit card reader	Yes; AvGas Only	Maintain existing		
FENCING				
Perimeter	Yes	Maintain existing		
Access Controls	Yes	Maintain existing		Replace

Abbreviations: S = Single-wheel landing gear, D = Dual-wheel landing gear, DT = Dual-tandem landing gear, NDB = Non-directional beacon
Note. [1] This also applies to certain taxiways and aprons mentioned in this Chapter; the Airport should also verify and strengthen where needed. [2]According to the existing design aircraft for the Airport, the taxiways should conform to the standards of TDG 1; the Airport is advised to maintain the existing pavement as is, however it should be noted that the FAA may require that any future reconstruction of taxiways should be designed and built to TDG 1 (or whichever TDG corresponds to the existing design aircraft). [3]Hangar and apron development will depend on actual demand.
Source: ACI, 2016

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