Rolle Field Airport

Airport Master Plan
Final Report - May 2015

Prepared by
Morrison-Maierle, Inc.

In association with
Genesis Consulting Group, LLC
Core Engineering Group, PLLC

This page intentionally left blank.

AIRPORT MASTER PLAN
FINAL REPORT

Rolle Field Airport
San Luis, Arizona

Prepared For
The Yuma County Airport Authority

May 2015

ADOT Grant Number: E3S3N

Prepared by
Morrison-Maierle, Inc.

In association with
Genesis Consulting Group, LLC
Core Engineering Group, PLLC

"The contents of this plan do not necessarily reflect the official views or policy of the ADOT Multimodal Planning Division (MPD). Acceptance of this document by the ADOT MPD does not in any way constitute a commitment on the part of the State of Arizona to participate in any development depicted herein nor does it indicate that the proposed development is environmentally acceptable in accordance with applicable public laws."

This page intentionally left blank.

TABLE OF CONTENTS – *Final Report May 2015*

TABLE OF CONTENTS (continued)

TABLE OF CONTENTS (continued)

LIST OF FIGURES

TABLE OF CONTENTS (continued)

LIST OF TABLES

TABLE OF CONTENTS (continued)

This page intentionally left blank.

Inventory

This page intentionally left blank.

CHAPTER ONE:
INVENTORY

1.1 Introduction: Goals, Objectives and Assumptions

The purpose of this Airport Master Plan Update is to present guidelines for development of Rolle Field that considers all of these factors in order to meet the needs of Yuma County, the City of San Luis, as well as the array of interrelated government, military and civilian operators that are active in the region over the next 20 year period.

Rolle Field (44A) is a general aviation airport located approximately 12 miles southwest of the City of Yuma, Arizona. The airfield supports general aviation users in Yuma County and the customers of Yuma International Airport's aerospace industrial base, which supports government, civilian and military operations.

Rolle Field is managed by the Yuma County Airport Authority (YCAA). Rolle provides a safe facility for general aviation pilots to practice their skills outside the operating environment of Yuma International Airport, with its mixture of military training activity, commercial jet and business jet operations. In addition, due to its proximity to a variety of special use military airspace, Rolle is routinely utilized for military aviation-related training exercises.

Recently, several factors have developed that position Rolle Field to play an increasingly important role in the region's future.

In November 2010, the Department of Homeland Security opened a new commercial Land Port of Entry (LPOE) in the City of San Luis. The border crossing point is located approximately two miles directly south of Rolle Field. Identified as San Luis II, the port was developed to expand the capacity of the original port. Because expansion of the existing port was limited by existing city infrastructure, San Luis II was developed to provide a separate port of entry for commercial traffic. The new port consists of an 80-acre site and includes three incoming lanes from Mexico and two outgoing lanes into Mexico. There is an Arizona Department of Transportation facility next to the new port where state officials will conduct safety inspections, collect fees and issue permits. The facility is expected to handle approximately 40,000 trucks per year. New State Highway 195 opened in 2009 to provide a direct link from the new Port of Entry to Interstate 8. Known as the Robert A. Vaughan Expressway, the four lane highway is designed to expedite the flow of commercial traffic between the United States and Mexico by channeling large tractor-trailers through the new port. It also provides a more direct route for motorists traveling between the border and east Yuma and the Foothills.

The City of San Luis designated the area a high priority growth area. A large commercial industrial park is planned for the area adjacent to San Luis II. Rolle Field is recognized by the City of San Luis as a key component of this important commercial / industrial growth area.

Additionally, The YCAA launched the Defense Contractor Complex (DCC) in January, 2009 on 120 acres at Yuma International Airport. The mission and purpose of the DCC is to provide Government Agencies and Defense Contractors with a secure center for completing Defense Testing and Technological based activities in Southwest Arizona. Because many of these customers want to operate in areas less congested than Yuma International Airport, the YCAA initiated the rehabilitation and development of Rolle Field.

Finally, the State of Arizona was competing to be considered as a national test range identified by Federal Aviation Administration (FAA) as one of six (6) test ranges for civilian use of UAS. This effort was a part of the Congressional mandate to the FAA to integrate unmanned aircraft systems (UAS) into the National Airspace System (NAS) through the National Defense Act for fiscal year 2012. As part of the proposal, Rolle Field had been included as a promising site for testing and other operations. While Arizona was not selected as a part of this process, for purposes of this study, it is still important to note the many development opportunities for UAS at Rolle Field and within Yuma County.

1.1.1 Vision, Goals and Objectives

The Master Plan provides a vision for the airport covering the next 20 years and beyond. With this vision, the YCAA will have advance notice of potential future airport funding needs so that appropriate steps can be taken to ensure that adequate funds are budgeted and planned.

Rolle Field Vision –
Rolle Field serves a unique function, in that it provides a safe site at which pilots can practice their flying skills away from the varied and diverse aviation activity of Yuma International Airport. The development of Rolle Field will contribute to the economic development of the City of San Luis as it grows with the expansion of the new Port of Entry at San Luis II. Rolle Field is also uniquely positioned to participate in the testing and development of unmanned aircraft as an extension of the Yuma International Airport DCC.

Master Plan Goal –
The goal of the Master Plan is to provide the community, public officials, and the YCAA with proper guidance for future development to satisfy regional general aviation demands and be wholly compatible with the environment. In addition, the airport needs to understand the aviation impact of UAS operations with respect to pavement, ground space and the NAS. To accomplish that goal, considerable effort will be required to understand and incorporate the mixed UAS / NAS perspective.

Specific objectives of this Master Plan are:

- Develop a plan that preserves public and private investments
- Develop a plan that is reflective of community goals and objectives
- Develop a plan that takes advantage of the current trends in the aviation industry toward UAS
- Develop a plan that maintains safety
- Develop a plan that preserves the environment
- Develop a plan that strengthens the economy

1.1.2 Assumptions

A study such as this typically requires some baseline assumptions to be used throughout the planning process. The baseline assumptions for the Rolle Field Master Plan are as follows:

- Rolle Field will continue to operate as a general aviation airport serving the city of Yuma, San Luis and the surrounding area.
- Rolle Field intends to seek general aviation and commercial business aviation based tenants and transient operations.
- The aviation industry on the national level will grow as forecast by the FAA in its annual Aerospace Forecasts.
- The socioeconomic characteristics of the region will remain as forecast (see Chapter Two).
- Both a federal and a state program will be in place through the planning period to assist in funding future capital development needs.
- Activities related to UAS will continue to grow in the commercial and defense sectors.

1.1.3 Master Plan Study Coordination

The Rolle Filed Airport Master Plan is of interest to many citizens, businesses and government organizations in the Yuma County area. This includes local citizens in Yuma, Somerton and San Luis, community organizations, airport users, airport tenants, area-wide and local planning agencies, aviation organizations and government agencies including the Marine Corps Air Station Yuma, Yuma Proving Grounds, U.S. Border Patrol, and the U.S. Bureau of Reclamation.

The Master Plan is of importance to both state and federal agencies responsible for overseeing air transportation in the Yuma Area as Rolle Field will be a participant in the development of UAS and also serve as a general aviation airport providing more convenient access to the City of San Luis and the new commercial Land Port of Entry to America.

To assist in the development of the master plan, the YCAA identified a group of community members and aviation interest groups to act in an advisory role in the development of the master plan. Members of the Planning Advisory Committee (PAC) reviewed phase reports and provided comments throughout the study to help ensure that a realistic, viable plan was developed. The complete list of committee members is included Appendix I Acknowledgements.

Draft chapters and working papers were prepared at various milestones in the planning process for review by the PAC and general public. This process allowed for timely input and review during each step within the master plan to ensure that all master plan issues were fully addressed as the recommended program developed.

A series of PAC meetings and public information workshops were held as part of the plan coordination. All the PAC meetings were open to the public. The workshops were designed to allow any and all interested persons to become informed and provide input concerning the master plan. Notices of meeting times and locations were advertised through the media as well as being posted online at the YCAA and Master Plan websites. The draft chapters and working papers were also made available to the PAC and public online at http://rollemasterplan.com/.

1.2 Airport Management

Rolle Field is operated by the YCAA, which also manages civilian operations at Yuma International Airport/MCAS Yuma. Under Arizona Statutes, the "Airport Authority" is an independent public agency and a non-profit organization. The YCAA was incorporated as a non-profit entity in the State of Arizona on December 30, 1965. Responsibilities of the YCAA include planning, development, administration, and maintenance of the Airfield. Because the Airfield is unattended (no permanent on-site employees), the YCAA staff at Yuma International Airport perform the administrative functions, operations, and maintenance of the facilities located at or relating to Rolle Field. The YCAA currently manages, on behalf of the County of Yuma, a contract and license agreement with the Bureau of Reclamation (BOR) to operate and maintain the 640 acre Rolle Field. The current 25-year contract was renewed in October 2009 through October 22, 2034 (Attachment 2, BOR License). Yuma International Airport and Rolle Field are managed by the Airport Director with the guidance of an 11 member Board of Directors.

1.2.1 Defense Contractor Complex

Yuma International Airport created the Defense Contractor Complex (DCC) in January 2009 in an effort to attract space and aviation related companies to the region for economic development.

Yuma International Airport's Defense Contractor Complex provides clients with a secure center for completing aviation based activities in Southwest Arizona, with benefits including flexible tenancy agreements tailored according to individual needs, maintenance hangars, ample ramp parking, specialist aviation support, high tech aviation compatible office space, high speed broadband, security, CCTV and secure parking, reception services, site access 24 hours a day all year round, marketing support, tenant networking opportunities and workshops, and a city center location just five minutes away the facilities.

Yuma International Airport, in conjunction with community agencies, markets the region’s clean desert air, low humidity, no rain to speak of (about 3" annually), an average of 350 sunny days every year, 4 runways available, one being 13,300', and that Yuma County has home-grown talent who offer an excellent range of aviation expertise including engineering, servicing, research & development - all on the cutting edge of defense technology.

The concept of the Defense Contractor Complex has been successful at Yuma International Airport. Therefore the airport’s Board of Directors approved using the concept at Rolle Field in an effort to attract aviation industry and activity to Rolle Field, again, in an effort to promote economic development in Yuma County.

1.3 Airport History

Rolle Field has been serving general aviation in Yuma County for over 60 years. Originally designated as Auxiliary Field No. 4 (AUX 4), the 640 acre site was acquired by the War Department in 1942 (according to a 1991 Army Corps of Engineers report) to build one of 7 satellite airfields for Yuma AAF, which conducted primary flight training & training of bomber aircrews. From 1942-1943, the military built 2 runways, a taxiway, a parking apron, and an operations building. The runways were constructed with a 2-3” layer of oiled sand over native sand. Rolle Field was declared surplus in 1945, and relinquished to the Department of Interior in 1947. On March 17, 1952, the BOR provided Yuma County a license to operate, maintain and manage Rolle Field.

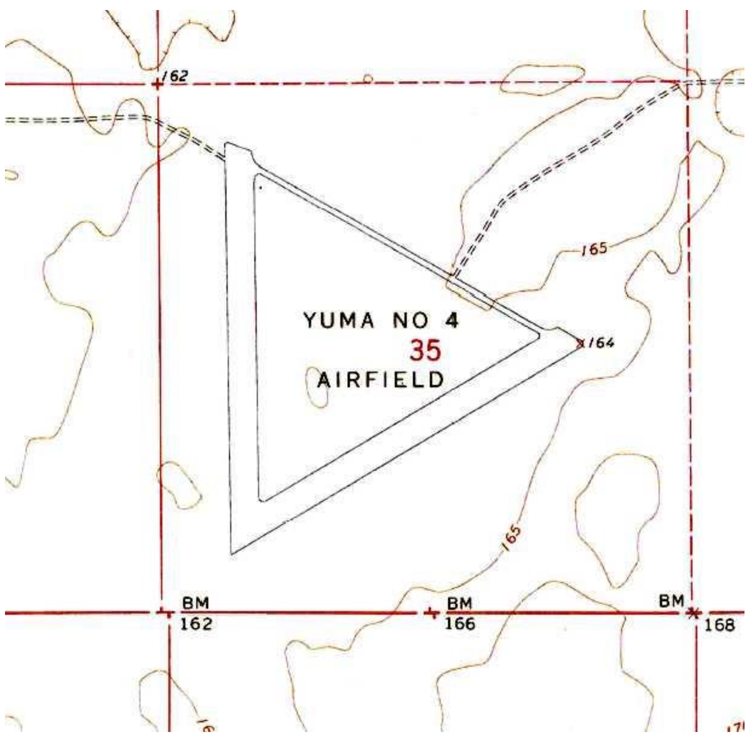
In 1966, the Yuma County Farm Bureau assumed responsibility for the Airfield since the primary beneficiaries in the area would be farmers and growers, and the related crop dusting operations. The YCAA, which was established in 1966 to administer Yuma International Airport, took responsibility of Rolle Field on February 24, 1972. The intent was to provide a site for civilian pilot training in the region and to reduce air traffic conflicts at Yuma International Airport / MCAS Yuma.

The original agreement between the BOR and Yuma County was amended on September 17, 1973, to allow for an additional term of license and to access available State funds for capital improvements. Simultaneously, the Rolle Field airport license was officially delegated to the YCAA by the Yuma County Board of Supervisors.

Improvements to Runway 17-35 took place in early 1976, and consisted of leveling a 50 foot by 2,500 foot area with prepared aggregate base course followed by a 2 inch asphaltic overlay and an emulsion seal coat. State grant funds covered approximately half of the fifty thousand dollar project cost and the YCAA provided the funding for the remaining cost.

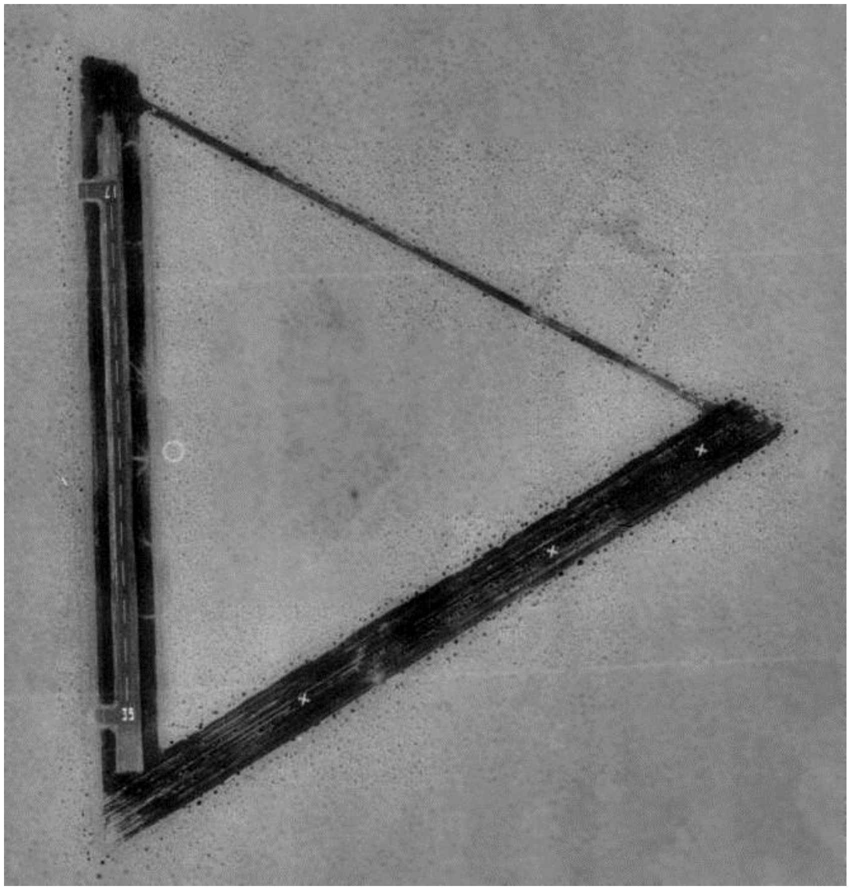
The runway improvement sparked an increased use of the Airfield as a reliever for student pilot training as air traffic in and around Yuma International Airport / MCAS Yuma increased.

In 1986, Yuma County signed a new agreement with the BOR extending the term of license an additional 25 years.



The 1965 USGS topo map depicted "Yuma #4 Airfield" as having 2 paved runways connected by a paved taxiway.[i]

An Airport Layout Plan (ALP) was completed in December 1992. The purpose of the ALP was to provide a record drawing of the existing Airfield conditions, which included facility improvements that were completed in January 1992. The improvements to the facilities were runway reconstruction, installation of a segmented circle and wind cone, removal of vegetation obstructions, and the construction of a 4-strand barbed wire security fence.



USGS aerial photo 1992.[ii]

A Master Plan was completed for Rolle Field in 2001. At that time, a major use of the airfield was civilian pilot training. A majority of the local student pilots were using Rolle Field, accounting for over 200 operations a month. Additional uses of the airfield included aircraft testing, test parachute drops, and military training exercises.

Since the 2001 Master Plan, the airport has received several State grants to maintain and upgrade Rolle Field. Recent grants from the Arizona Department of Transportation (ADOT) and the Arizona Commerce Authority (ACA) funded a variety of significant improvements including the following: reconstruction of the main runway, construction of new taxiway and aircraft parking apron, re-graded 500’ stopways (run-outs) with asphalt millings on each runway end, construction of new parking lot and sidewalk to access the first aircraft hangar (50’ x 50’), cleared and striped the access road to the airfield, installation of a new electrical generator, septic system (one 1,250 gallon tank), water well, installation of a new seven foot chain-link perimeter fence with a three strand barbed wire, pedestrian gate door, and a 25’ rolling controlled access vehicle gate. The improvements were completed in September 2011. In addition, the YCAA has added an operating bathroom and cabinets inside the hangar, two card readers at the vehicle access gate, electrical gate motor, and a gate outdoor LED light, all powered by solar panels. **Table 1-1** shows the variety of capital projects undertaken at Rolle Field since 1997.

In 2009 the YCAA's license with the BOR was renewed for a period of 25 years.

Table 1-1: Grants for Rolle Field

ADOT Grants

Year	Grant No.	Description	Grant Funds	Local Funds	Total
1997	N751	Resurface Runway; Drainage; Emergency Communication	$56,430	$2,970	$59,400
1999	9040	Master Plan	$38,000	$2,000	$40,000
2003	3S87B	Crack Seal and Slurry Seal RW 17/35	$32,420	$3,602	$36,022
2005	5S27	Relocate Segmented Circle & Lighted Wind Indicator; Install Tiedowns	$10,688	$563	$11,251
2012	2S74	Rehabilitation of RW 17/35	$225,000	$72,092	$297,092
2013	3S3N	Master Plan Update	$178,735	$19,859	$198,594
		Total ADOT Projects	**$541,273**	**$101,086**	**$642,359**

ACA Grants

Year	Description	Grant Funds	Local Funds	Total
2011	Taxiway and Apron Construction, Roadway, Hangar, Water Well, Aircraft Hangar, Perimeter Security Fence, Controlled Access Vehicle Gate	$280,680	$34,512	$315,192

1.4 Airport Ownership

As discussed in Section 1.3 Airport History, Rolle Field is located on 640 acres of land that is owned by the BOR. The YCAA manages the airport under a "Contract and License for Airport Purposes" (License) agreement with the BOR. Agreements with the BOR to use "Section 35, Township 10 South, Range 24 West, Gila and Salt River Meridian, Arizona" for airport purposes extend back to 1952. In 1972, the YCAA became the Yuma County Agent responsible for the operation and maintenance for Rolle Field.

The current agreement, originally executed by the BOR and Yuma County on February 18, 1986, was amended on October 23, 2009 by the BOR and the YCAA acting on behalf of Yuma County to cover the twenty-five year period from 2009 to October 22, 2034. Article 7 of the 1986 agreement was amended to provide that the new term of the agreement was 25 years from October 23, 2009.

The 1986 Contract was made in pursuant of the Reclamation Act of Congress of June 17, 1902 (Ch.1093, 32 Stat. 388), and acts amendatory thereof or supplementary thereto, particularly the Reclamation Project Act of August 4, 1939 (CH. 418, 53 Stat. 1187) which provide broad authority for the BOR to enter into agreements for construction, operation and maintenance of reclamation projects including acquisition of lands for relocation of highways, roadways, utilities, etc. Yuma County and YCAA do not pay the BOR for the use of the airport property. Article 4 of the agreement refers to a "Memorandum of Understanding Relating to Reciprocal Use of

Rights-of Way Between Yuma County Highway Department and the United States Bureau of Reclamation" No. 5-07034-L0544, which provides for mutual use of the other's rights-of-way without reimbursement for administrative costs or fair market value.

Article 2 of the Contract gives Yuma County (YCAA) the right to operate and maintain an airport on land of the United States "…primarily for the purpose of operating, maintaining and managing an airport including, but not limited to, use by farmers, and growers in the Yuma area in connection with crop spraying or dusting operation…"

Article 9 prohibits the use of Section 35 for any purpose other than airport purposes. It provides however that Yuma County/YCAA may "…construct and erect structures and facilities needed for operating, maintaining and managing the airport and for the storage of crop dusting materials."

Other provisions in the contract are generally consistent with the requirements of the FAA and ADOT for Rolle Field to be eligible for future airport development grants. A review of **FAA Advisory Circular AC 150/5100-17** Change 6 *Land Acquisition and Relocation Assistance for Airport Improvement Program (AIP) Assisted Projects* and **Arizona Revised Statutes ARS 28-8202D and ADOT State Grant Assurances** provide guidelines for Sponsor (YCAA) Certification of Title.

The 1986 Contract and License for Airport Purposes as Amended in 2009 generally meets the FAA and ADOT Title Requirements for airport lease agreements under FAA Order 5100.38C, AC 150/5100-17 Change 6 and ARS 28-8202 as follows:

- Lessor (BOR) is a public body
- Sponsor (YCAA) manages a 25 year Contract (license) with the BOR expiring in October 2034. YCAA is in the process of working with the BOR to extend the license in order to be able to accept future ADOT and FAA grants. In any event, future grants will not be offered after October 2014 unless the term is extended due to the twenty (20) year requirement by both Arizona law and FAA Grant Assurances.
- The Contract and License Agreement contains no provision that prevents the Sponsor (YCAA) from assuming any of the obligations in FAA or ADOT Grant Agreements.
- The reversionary clause meets the 20 year term for grant improvements

The current Contract and License Agreement does not require the payment of annual fees.

1.5 Airport Setting

Figure 1-1 depicts the location of the airport in its regional setting. As shown, Rolle Field is located in the southwestern portion of Yuma County, Arizona within the City of San Luis, Arizona. The airfield was annexed into the City of San Luis in June 1999. It lies approximately four (4) nautical miles northeast of the center of the City of San Luis, Arizona and five (5) nautical miles south of the City of Somerton, Arizona. U.S. Highway 95 connects both of these communities to the City of Yuma, which is located along Interstate 8, some 12 miles north of Somerton, and to San Luis Rio Colorado, Mexico, which is situated approximately six (6) miles southwest of Rolle Field, across the border from San Luis, Arizona. The Airport is situated on 640 acres with relatively level terrain at an elevation of 163 feet above mean sea level (MSL).

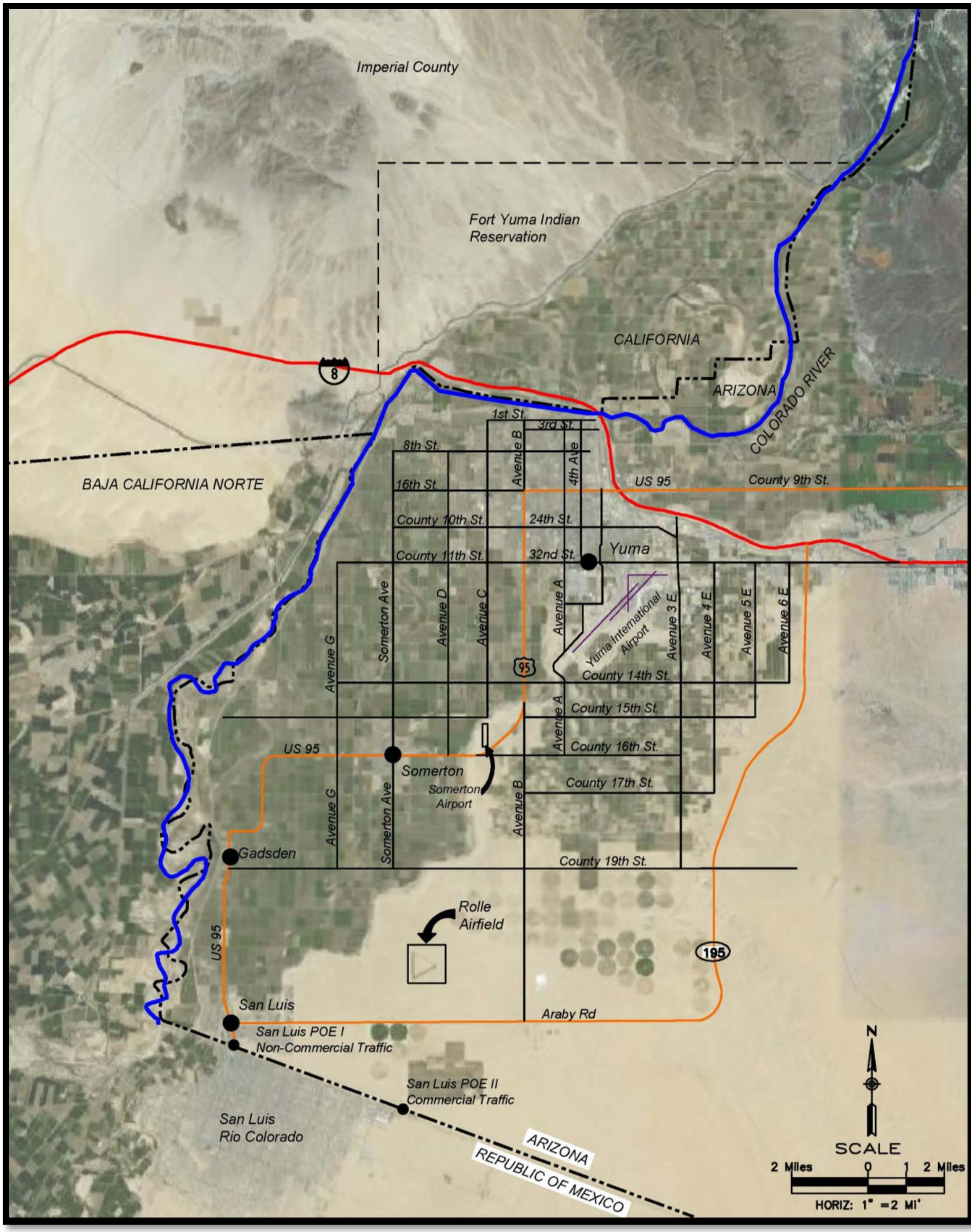


Figure 1-1 Location Map

1.6 Climate

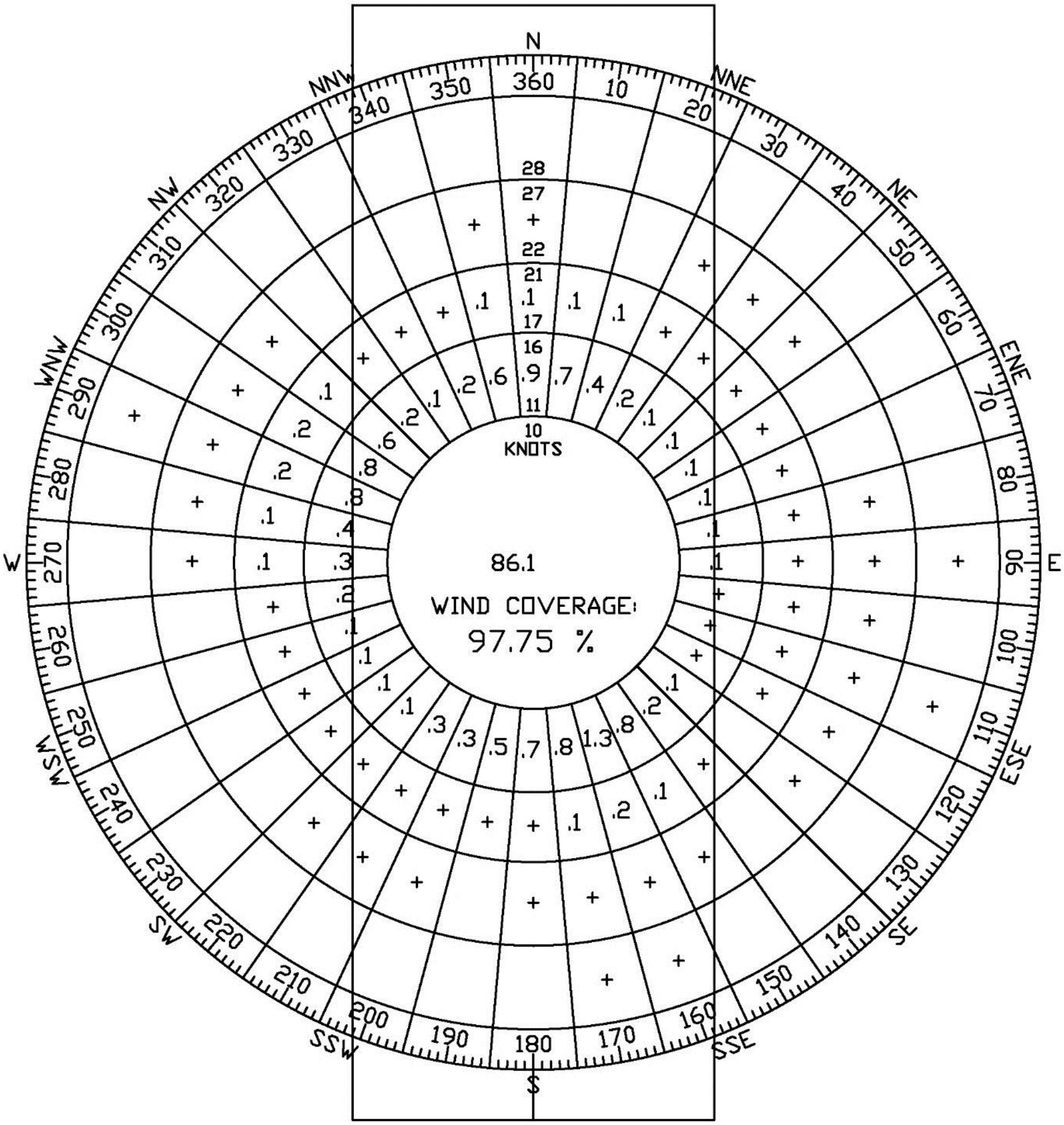
Local weather conditions affect the daily operations of an airport and must be considered in planning future facilities. Most importantly, temperature and wind patterns must be considered in determining runway length and orientation requirements.

Yuma's climate is that of an arid desert, characterized by mild winters, hot summers and low precipitation. The normal daily minimum temperature ranges from 44.2 degrees in January to 80.7 degrees in July. The normal daily maximum temperature ranges from 68.5 degrees in December to 107.0 degrees in July. The region averages approximately 3.2 inches of precipitation annually. On average, Yuma experiences sunshine 90 percent of the year. A summary of climactic data for Yuma is presented in **Table 1-2**.

Table 1-2: Yuma, AZ Climate Data[iii]

	Jan.	Feb.	Mar	Apr	May	Jun	Jul	Aug.	Sep.	Oct.	Nov.	Dec.
High Temp Avg. (F)	68.7	74.4	78.9	86.3	94.2	103	107	105	100	90.3	77.4	68.5
Low Temp Avg. (F)	44.2	46.9	50.8	56.5	63.8	72.0	80.7	80.1	73.2	62.2	50.9	44.3
Precip. Avg. (in.)	0.3	0.2	0.2	0.1	0.0	0.0	0.3	0.6	0.3	0.3	0.2	0.5
Wind Speed (mph)	7.3	7.4	7.9	8.3	8.3	8.5	9.5	8.9	7.3	6.6	6.9	7.2
Sunshine (%)	84.0	87.0	90.0	94.0	95.0	97.0	91.0	91.0	93.0	92.0	87.0	82.0

The All Weather Wind Rose, shown in **Figure 1-2** illustrates wind conditions in relation to the existing runway orientation at Rolle Field. The Wind Rose was constructed using historical data collected at Yuma International Airport between 2008 and 2012.



	10.5 Knots Crosswind	13 Knots Crosswind
Runway 17-35	95.99%	97.75%

Figure 1-2 Windrose[iv]

1.7 Airport System Planning Role

Airport system planning is an integrated process that occurs at a number of levels, local, regional, state and national. Local level airport planning is accomplished through the airport master plan process. Local planning data and recommendations are incorporated into regional and state planning. Rolle Field is included in the Arizona State Aviation System Plan (SASP), last updated in 2008. The purpose of the SASP is "to provide a framework for the integrated planning, operation, and development of Arizona's aviation assets." Since all airports do not serve the same needs, airports in the system were classified into roles. Rolle is classified in the SASP as a Public Use, "General Aviation Rural" airport. "General Aviation Rural" airports are defined in the SASP as "airports that serve a supplemental role in local economies, primarily serving smaller business, recreational, and personal flying".

The National Plan of Integrated Airport Systems (NPIAS) is a federal planning document which defines the service level, role of all airports in the federal airport system, and is updated every other year by the FAA. The State system plans are used to develop NPIAS recommendations. The FAA draws money for eligible airport development projects from the Airport Improvement Program (AIP). AIP funding is derived from the Aviation Trust Fund, and the source for this trust fund is a dedicated stream that is derived from taxes on the aviation fuel and commercial airline tickets. An airport must be included in the NPIAS for its projects to be eligible for AIP funding. While there are a variety of criteria that are considered for an airport to be included in the NPIAS, generally speaking, to be in the NPIAS, an airport must:

- Serve a community more than 30 miles from the closest NPIAS airport
- Have at least 10 based aircraft
- Have a willing public sponsor

Rolle Field is not currently included in the NPIAS because it does not meet the criteria of having at least 10 based aircraft or of serving a community more than 30 miles from the closest NPIAS airport. Airports that do not meet any of the entry criteria may be considered for inclusion in the NPIAS on the basis of a special justification. This justification must show that there is a significant national interest in the airport. Such special justifications include:

- Airports with a National Defense Role
- Reliever Airports
- A determination that the benefits of the airport will exceed its development costs
- Written documentation describing isolation
- Airports serving the needs of Native American communities
- Airports needed to support recreation areas
- Airports needed to develop or protect important national resources

Although the Rolle Field does not currently meet the based aircraft criteria for inclusion, the SASP concluded that activity at and conditions near Rolle Field should be monitored for the airport's possible inclusion in the NPIAS in the future.

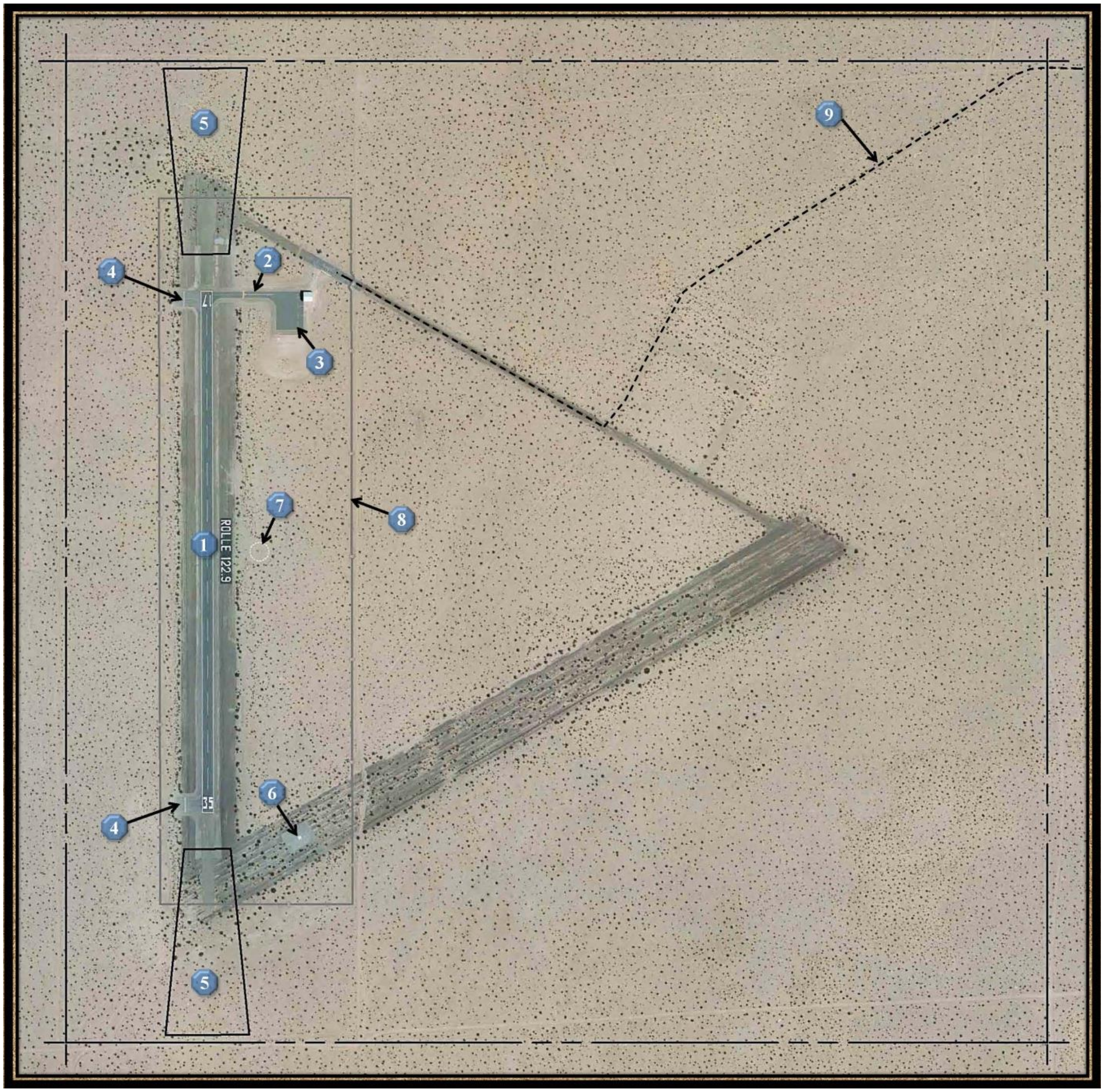
The SASP states the following: "Yuma International Airport is the only other airport with a NPIAS designation in the region. Yuma is projected to experience large demographic growth through 2030. In addition, Yuma International was operating at 66 percent of capacity in 2007 and is projected to reach 91 percent by 2030. The Marine Corps Air Station (MCAS), located at Yuma International, has also noted plans to expand in its five-year plan. Yuma International Airport has recognized that an improved general aviation airport nearby, namely Rolle, could help relieve future congestion. Monitoring of the conditions in this area is warranted to determine if Rolle could be considered by the FAA for NPIAS inclusion."

The Master Plan for Yuma International Airport was updated in 2009. The plan, in contrast to the SASP, indicated that the overall airfield capacity of Yuma International Airport is adequate through the 20 year planning period and that airfield capacity improvements, such as additional runways and taxiways, are not needed at Yuma International through the planning period on the basis of capacity alone. Based on anticipated operations and growth in GA activity, the Yuma International Airport Master Plan identifies needs for additional t-hangars, box hangars and community hangars, as well as T-shades. The selected development alternative for GA development calls for meeting hangar demand for smaller, recreational GA aircraft operators at Rolle Field. The plan recommended improvements at Rolle such as runway extension, parallel taxiway construction, and the addition of aircraft storage hangars and apron and vehicle parking area, stating, "moving the smaller recreational GA aircraft traffic to Rolle Field would separate the mix of small GA aircraft and large, fast military aircraft, as well as from higher performance commercial and corporate civil aircraft."[v]

On December 9, 2010, the Department of Navy published a Record of Decision for the U.S. Marine Corps West Coast Basing for the F-35B Aircraft at MCAS-Yuma. A total of five operational squadrons (80 aircraft) of F-35B Joint Strike Fighters will be based at Yuma, along with a one F-35B Operational Test and Evaluation Squadron (eight aircraft). These 88 aircraft will replace 56 Harriers (AV-88) and result in an 15% increase in total civilian and military operations at Yuma International. The AV-88 EIS baseline operations were approximately 21,000 operations. The F-35B operations are estimated to be about 38,000 operations, about an 80% increase. The EIS did not program any runway improvements. Most of the MCAS-Yuma airfield construction will be new aprons and hangars.[vi]

1.8 Airport Facilities

An essential element of the master planning process is identifying existing aviation facilities, noting the location of these facilities, and analyzing the ability of these facilities to meet the airport's needs. The inventory of existing facilities at Rolle Field was accomplished through physical inspection of the airport, discussion with airport staff, and review of existing airport layout drawings and related studies. An overview of the Airport layout is provided on **Figure 1-3**.



	Existing Facilities - Airside
1	Runway 17-35: 2800' X 60' (Asphalt)
2	Taxiway D: 35' Wide
3	Aircraft Parking Apron (4 Tie Downs)
4	Aircraft Turnout / Holding Area
5	Existing Runway Protection Zone (250' X 1000' X 450')
6	Helipad (20' X 20')
7	Segmented Circle / Windcone (Not Lighted)
8	Chain Link Security Fence – 8'
9	Unimproved Access Road

Figure 1-3: Airport Layout

1.8.1 Airside Facilities

Existing airside facilities consist of runways, taxiways and apron areas along with associated markings. Rolle Field is unlighted and does not have any instrumentation. The airport reference point, which defines the midpoint of the airfield is located at latitude 32˚30’ 59.576” N and longitude 114˚41’52.101” W. The airport elevation, the highest point on the airfield pavement is 164’ above Mean Sea Level (MSL).

<u>Runways</u>

The original oiled dirt runway/taxiway configuration of Rolle Field from its active military days is still visible today. Rolle Field has the World War II standard triangular arrangement used by the military for auxiliary airports consisting of two runways at opposing angles (for maximum wind coverage) connected by a single southeast-northwest taxiway alignment. The northeast-southwest oriented runway and the previously discussed connecting taxiway are closed.

The existing runway configuration consists of one active runway, Runway 17-35. The runway is 2,800 by 60 feet with an asphalt surface. Runway 17-35 is designed to accommodate A-I aircraft. The runway elevation slopes down from 165.0 feet above MSL at the Runway 17 end to 164.6 feet above MSL at the Runway 35 end (a 0.01% slope) with a peak in the middle. Runway 17-35 is not equipped with runway lights or threshold lighting and is marked as a basic runway.

Runway 17-35 was rehabilitated in September of 2011. The existing asphalt paving was pulverized. A portion of the pulverized asphalt was mixed with the existing aggregate base course, and compacted, providing an additional half inch of ABC. New 2" asphalt concrete paving (Type C ¾", under Yuma County Specification 321) was placed on the reconditioned ABC. The remaining pulverized asphalt material was utilized for the construction of stabilized 10' shoulders the full length of the runway and 500' stabilized runway overruns at each runway end. The load bearing capacity of the runway is estimated to be 8,000 pounds gross weight on single gear.

In addition, there is an approximately 300-foot wide (centered on runway), heavily rutted, oil treated area which extends approximately 600 feet beyond the Runway 17 and 35 thresholds. This is another remnant of the Rolle Field's World War II military legacy

Table 1-3: Runway Characteristics

Runway Data	17-35	
Length (feet)	2,800	
Width (feet)	60	
Pavement Type	Asphalt	
Pavement Strength (lbs.) **Single Wheel**	8,000	
Marking	Basic	
	RW 7	RW 35
Lighting **Runway** **Runway end/approach** **Centerline** **Touchdown Zone**	 None None None None	 None None None None
Approach Aids **Visual** **Electronic**	 None None	 None None
Approach Visibility Minimums	>1 Mi.	>1 Mi.
FAR Part 77 Category	Visual	Visual
Approach Slope	20:1	20:1

Taxiways

As shown on **Figure 1-3,** Rolle Field does not currently have a parallel taxiway system. A 35 foot wide connecting taxiway links the aircraft parking apron to the Runway 17 end of Runway 17-35. There are paved turnouts / holding aprons at each runway end which allow aircraft to turn around while utilizing the runway for taxiing purposes. These turnouts were not reconstructed in the 2011 rehabilitation project and are currently in a poor condition with asphalt cracking/shoving and vegetation intrusion.

Apron Areas

Rolle Field has one apron area for public use. The apron is approximately 3,400 square yards and has four (4) aircraft tie-downs. Currently, there is no apron lighting.

Helipad

A 20’ by 20’ concrete helipad is located southeast of Runway 35 (see **Figure 1-3**). The Final Approach and Takeoff Zones (FATOs) for this helipad run north and south. The helipad is identified with non-standard markings.

Pavement Conditions

The project completed in September of 2011 was the full rehabilitation of Runway 17-35, and new construction of an aircraft apron and connecting taxiway. All new pavement areas are in excellent condition. The runway rehabilitation did not include the two turnout aprons at each runway end. These turnout aprons are in poor condition with asphalt cracking/shoving and vegetation intrusion.

Navigational Aids, Radio Communication, Weather Aids

Rolle Field aircraft operations are limited to VFR daytime conditions only. Navigation to and from Rolle are supported by a number of airport and terminal area navigational aids including Very-High-Frequency Omni range Equipment (VOR) with Tactical Air Navigation (TACAN), commonly called a VORTAC. This ground based, electronic navigation system, provides both azimuth (directional) and distance information usable by both civilian and military aircraft. The Bard VORTAC and the Mexicali VOR/DME are located approximately 15.7 miles northeast and 27.3 miles west of west of Rolle Field respectively and serves as a regional fix for pilots approaching or departing the airport. Aircraft flying to or from Rolle Field can utilize the Golden Eagle NDB facility located approximately 24 miles northeast of the airfield.

The airport provides an unlighted wind cone and segmented circle onsite.

The airport does not currently provide visual navigational aids such as runway/taxiway lighting (e.g. MIRLs/MITLs), lighted airfield signage, visual approach lighting (VASIs / PAPIs), or runway end identifier lights (REIL).

Instrument Approach Procedures

Instrument approach procedures are a series of predetermined maneuvers established by the FAA using electronic navigational aids that assist pilots in locating an airport during low visibility and cloud ceiling conditions. Currently, Rolle Field has no instrument approach procedures, which means the airport is essentially closed to operations when weather conditions deteriorate to a point where visual flight is no longer feasible.

1.8.2 Landside Facilities

Rolle Field Aircraft Apron, Hangar and Auto Parking

Landside facilities at the airport include all areas not considered part of the previously discussed airfield system. Existing landside facilities include one aircraft hangar, automobile parking and vehicular access. The aircraft apron is considered an airside facility.

It should be noted that the Hangar and Auto Parking are within the secured area and have access to the Air Operations Area (AOA). At some point in the development of Rolle, it will be necessary to relocate the security fencing or reconfigure the parking layout so that Public parking is outside the security fence.

The GA ramp area and associated parking facilities are shown on **Figure 1-4**. Services associated with the GA ramp area include automobile parking and aircraft storage.

<u>Airport Terminal / Administration Building</u>

An Administration Building has not been constructed at Rolle Field, but a proposed location has been selected as shown on Figure 1-6 Terminal Area. This area has been fitted with a water line and a sewer line stub outs for the future use.

Existing Facilities - Landside	
1	Aircraft Hangar (50' X 50')
2	Aircraft Parking Apron (4 Tie Downs)
3	Automobile Parking (18 spaces)
4	Chain Link Security Fence – 8'
5	Controlled Access Gate
6	Water Well
7	Diesel Generator

Figure 1-4: Terminal Area

Fixed Base Operators and Specialty Shops (Airframe and Engine Repair, Radio, etc.)

There are no Fixed Base Operator (FBO) or specialty shop tenants at this time.

Hangars

There is currently one hangar building on the airport, which was built concurrently with the 2011 runway reconstruction, apron and taxiway project. The 50' X 50' hangar is of metal construction with a wide metal bi-fold hangar door. A restroom and small storage cabinets are located in the hangar. The hangar is in excellent condition.

Automobile Parking

A small automobile parking area is located north of the apron area and hangar. Eighteen (18) vehicle spaces are marked with two designated as handicap parking spaces.

1.8.3 Support Facilities

Maintenance

There are currently no maintenance facilities on site. Maintenance is regularly provided by YCAA staff.

Utilities

Water

Potable water is supplied to the hangar area by an on-site well. There is currently no fire suppression water system, but one will be installed by YCAA during future construction projects as authorized by the City of San Luis. The existing hangar does have a Certificate of Occupancy.

Sanitary Sewer

The airport is not served by a sanitary sewer service. The Hangar is on a septic tank and leach field.

Electricity
Electrical power is supplied to the Airport by a diesel generator located adjacent to the auto parking area

Telephone / Data
There is currently limited internet access through the Verizon 4G network. There is no land line telecommunications, but cellular reception is available.

Gas
There is no natural gas service at the Airport; however, the Southwest Gas Corporation has a 6" steel main line parallel and along County 20th street which is a mile north of Rolle Field.

Fueling Facilities

There is no aircraft fueling facility at Rolle Field.

Airport Security

An eight foot chain-link perimeter fence with a three strand barbed wire which serves as a perimeter security fence was installed around the Runway 17-35 air operations area in 2011. Additionally, a four-strand barbed wire is in place to deter off-road vehicles. Access to the airfield is through an access controlled gate that operates from the Yuma International Airport badging system.

The City of San Luis Police Department provides police protection on the airport. Due to limited police resources that are committed to the entire region, a minimum weekly routine surveillance/check-up is conducted by YCAA personnel.

Aircraft Wash Racks
None

Access / Roadways
Rolle Field can be accessed by traveling on about 2.5 miles of dirt road west from Avenue B on the County 21st Street alignment. Another way to access the site is going a mile north of Juan Sanchez Blvd along Avenue F alignment, then over a mile east along County 22nd Street alignment, followed by ¾ of a mile on airport property. All are dirt roads. Contiguous county right-of-way of between 33 feet and 66 feet exists along the referenced county roadway alignments to the airport boundary.

YCAA currently uses a dirt road, which is along the outer perimeter of the airport, for routine inspections/check-ups and access to Rolle Field.

1.9 Air Traffic Activity

Rolle Field has no based aircraft at the present time, and there are no formal procedures for gathering detailed operations information. The operations estimates for the Airfield summarized in **Table 1-4** were obtained from historic FAA 5010 forms (Airport Master Record) and the 2008 Arizona State Airports System Plan, and reflect only those years available. Operations statistics from other sources will be presented for comparison in Chapter Two, *Aviation Demand Forecasts*.

Table 1-4: Historic Operations[vii]

Year	General Aviation	Military	Total
1988	5,400	600	6,000
1989	2,600	1,000	3,600
1990	2,600	1,000	3,600
1992	2,600	2,000	4,600
1995	2,900	2,000	4,900
1996	2,900	2,000	4,900
1998	2,900	2,000	4,900
2007	3,000	100	3,100
2008	2900	2000	4,900

1.10 Airspace and Air Traffic Control

Airspace

Airspace structure in the vicinity of Rolle Field has remained unchanged since the previous master plan was prepared in 2001. The following section is an excerpt from the 2001 master plan:

> Airspace in the United States is classified as controlled, uncontrolled, or special use. Controlled airspace encompasses those areas where there are specific certification, communication and navigation equipment requirements that pilots and aircraft must meet to operate in that airspace. Airspace is classified as Class A, B, C, D, E, G or special use airspace. **Figure 1-5** graphically defines the airspace classifications.
>
> Class A airspace is controlled airspace and includes all airspace from 18,000 feet Mean Sea Level (MSL) to Flight Level 600 (approximately 60,000 feet MSL). Class B airspace is controlled airspace surrounding high activity commercial service airports (i.e. Phoenix Sky Harbor International Airport). Class C airspace is controlled airspace surrounding lower activity commercial service airports (i.e. Tucson International Airport) and some military airports (i.e. Davis Monthan Air Force Base). Class D airspace is controlled airspace surrounding airports with an air traffic control tower (i.e. Yuma International Airport). All aircraft operating within Class A, B, C and D airspace must be in contact with the air traffic control facility responsible for the particular airspace. Class E Airspace is controlled airspace that encompasses all instrument approach procedures and low altitude federal airways. Only aircraft conducting instrument flights are required to be in contact with air traffic control when operating in Class E airspace. While aircraft conducting visual flights in Class E airspace are not required to be in radio communication with air traffic control facilities, visual flight can only be conducted if minimum visibility and cloud ceilings exist. Class G is uncontrolled airspace that is not Class A, B, C, D or E controlled airspace. In general, within the United States, Class G Airspace extends up to 14,500 feet above mean sea level (MSL). At and above this altitude, all airspace is within Class E Airspace, excluding the airspace less than 1,500 feet above the terrain and certain special use airspace areas.
>
> The airspace surrounding Rolle Field is highly complex and heavily influenced by military aviation activity in the region. As the pattern altitude (see Local Operating Procedures section) for Rolle Field is 1,200 feet MSL, the Airfield is located within both Class G uncontrolled airspace (up to 700 feet AGL – above ground level) and Class E controlled airspace. **Figure 1-6** depicts Rolle Field and its relationship with the regional airspace.

Special Use (Military) Airspace

Rolle Field is located under an area of special use airspace known as a Military Operations Area (MOA). This area, known as the Dome MOA, begins south of the City of Yuma and extends both west and south to the US-Mexico border, and east to where it abuts a restricted airspace area designated as R-2301W. Civilian operations within a MOA are not prohibited though civilian aircraft are cautioned to remain alert for military aircraft while operating in the MOA. Military operations in the Dome MOA are intermittent and these schedules may be obtained by NOTAM (Notice to Airmen). Military operations within the Dome MOA are conducted at altitudes above 6,000 feet Mean Sea Level.

Restricted Area R-2301 W borders the Dome MOA and begins approximately nine (9) miles east of the airport and covers the entire area from Interstate Highway 8 near Yuma on south to the U.S. – Mexico border. Operations within R-2301 are continuous and at altitudes from the surface up to Flight Level 800 (80,000 feet).

Other restricted areas located within the vicinity of and northeast of the Airfield are Restricted areas R-2306A, B, C, D, E; R-2307; R-2308 A, B; R-2309 and R2311. Military operations within all these areas are continuous and at varying altitudes. Restricted areas R-2306C extends from the surface to 80,000 feet. R-2306D extends from the surface to 17,000 feet. R-2306D extends from the surface to 17,000 feet. R-2306D extends from the surface to FL 230 (23,000 feet). Military aircraft have no altitude restrictions within R-2307. R-2308A extends from 1,500 feet above the surface to 80,000 feet while R-2308C extends from 1,500 feet above the surface to FL 230 (23,000 ft.) R-2309 extends from the surface to 15,000 feet to protect an unmarked, tethered balloon. R-2311 extends from the surface to 3,500 feet MSL.

Northwest of the airport, across the Arizona-California border, is the Abel East MOA which operates intermittently at altitudes between 5,000 feet MSL up to, but not including 13,000 feet MSL

Other Airspace

Additionally, the Imperial National and Cibola Wildlife Refuges, as well as the Muggins and Trigo Mountains Wildlife Areas are all located within 40 miles of the Airfield. While aircraft operations are not restricted over these areas, aircraft are requested to maintain a minimum altitude of 2,000 feet above ground level.

As a further note, Victor Airways V-66 and V-135 used by aircraft enroute to or departing the Yuma metropolitan area are located northeast of Rolle Field. Victor Airways are a system of federal airways established by the FAA, which utilize VOR navigational facilities. These airways are corridors of airspace eight miles wide that extrude upward from 1,200 feet MSL to 18,000 feet MSL and extend between VOR navigational facilities. All Victor Airways in the Yuma area emanate from the Bard VORTAC and are identified on **Figure 1-6.**

Air Traffic Control

Rolle Field lies within both Class G, uncontrolled airspace and Class E, controlled airspace. Operations within Class G airspace do not require contacting an air traffic control facility. Flight operations conducted outside of Class G airspace, yet still within the Dome MOA, are coordinated through the airport traffic control tower (ACTC) at Yuma International Airport for Class D airspace surrounding Yuma International Airport (5 mile radius), and Yuma Approach Control for Dome MOA airspace other than Class D or Class G. Both of these facilities are located at Yuma International Airport / MCAS (Yuma Marine Corps Air Station), and are operated by MCAS personnel. The tower normally operates Monday through Friday from 7:00 a.m. to 11:00 p.m. and is closed on weekends. The tower schedule is subject to change, depending upon military operational requirements, with the MCAS issuing NOTAMS (Notices to Airmen) detailing any schedule changes as they occur. Aircraft enroute to or from the Dome MOA are controlled by the Los Angeles Air Route Traffic Control Center (ARTCC). The Los Angeles ARTCC controls aircraft in a large, multi-state area.

Local Operating Procedures

Rolle Field, as noted earlier in this chapter, is authorized for VFR general aviation aircraft operations during daylight hours only. Military, agriculture, and law enforcement aircraft conducting night operations at the airport do so at their own risk. Furthermore, requests for military training at the Airfield requires 48 hours advance notice so as to allow time for publishing NOTAMS in order to inform general aviation of military activity at Rolle Field. The local operating procedures governing aviation activity at the airfield are as follows:

Arrival Procedures

Rolle Field uses the standard left-hand traffic pattern. Arriving aircraft must use the standard traffic pattern entry procedures for an uncontrolled airport. This requires aircraft to utilize a forty-five (45) degree angle to enter a left downwind leg for both Runway 35 and Runway 17, all the while announcing (CTAF 122.0) their position on downwind leg, base leg and final approach. Traffic pattern altitude for fixed wing aircraft is 1,200 feet MSL, penetrating Class E Airspace approximately 310 feet. Use of extreme caution is encouraged when approaching the Airfield. A missed approach at the Airfield requires a 180-degree left turn to maintain flight within U.S. Airspace. The YCAA encourages that pilots using Rolle Field be extra vigilant, and use proper radio and flight procedures in order to keep traffic pattern conflicts at the Airfield minimal. Pilots are further discouraged from stopping on the runway when other aircraft are in the traffic pattern.

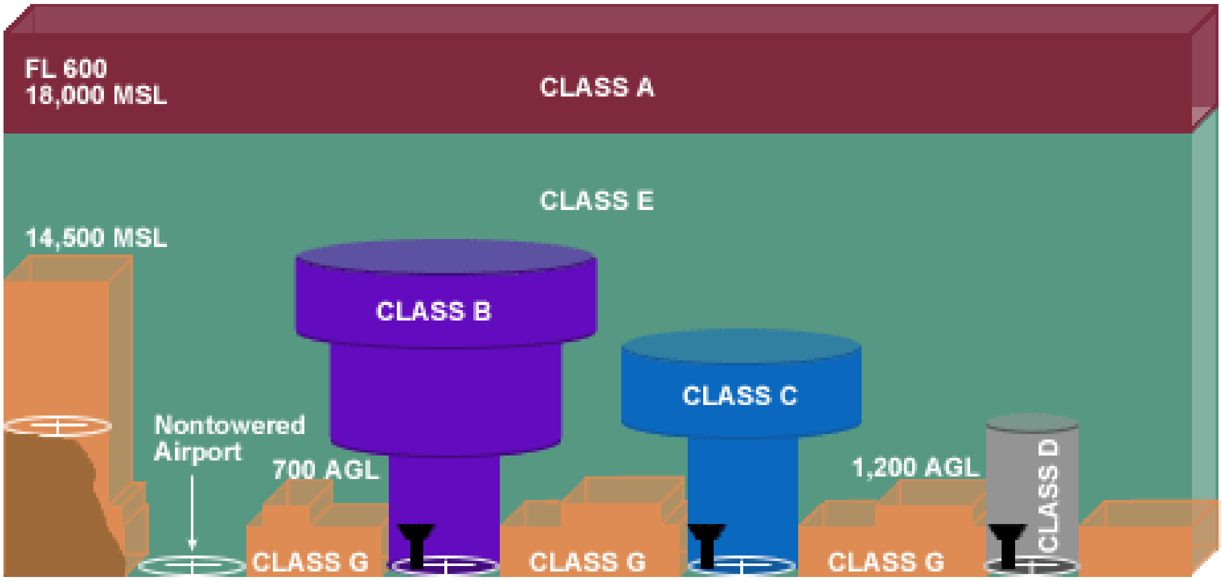
Departure Procedures

Departures are allowed in any direction that does not conflict with the traffic pattern in use when the pilot's intentions are announced.

Helicopter Operations

Helicopter operators, per Federal Aviation Regulation (F.A.R) 91.129, must avoid the fixed-wing traffic pattern when approaching the helipad located southeast of Runway 35.

The traffic pattern altitude for helicopters is 800 feet MSL. Additionally, skid equipped helicopters are prohibited from making touch-and-go or full stop landings on Runway 17-35 or the turn out areas. High desert temperatures leave the asphalt surfaces highly susceptible to helicopter skid damage. Wheeled helicopters using the runway are required to stay over the runway, and not land or hover adjacent to the active landing area. Hovering or landing next to the runway creates a FOD (Foreign Object Damage) hazard for aircraft using the runway.



Airspace Features	Class A	Class B	Class C	Class D	Class E	Class G
ATC Facility	ARTCC	TRACON	TRACON or ATCT	ATCT	ARTCC	None
Operations Permitted	IFR	IFR & VFR	IFR & VFR	IFR & VFR	IFR & VFR	IFR & VFR
Entry Requirements	ATC Clearance	ATC Clearance	ATC Clearance for IFR. All require radio contact	ATC Clearance for IFR. All require radio contact	ATC Clearance for IFR. All require radio contact	None
VFR Minimum Distance from Clouds	N/A	Clear of clouds	500' below, 1,000' above, and 2000' horizontal	500' below, 1,000' above, and 2000' horizontal	500' below, 1,000' above, and 2000' horizontal	Clear of clouds
Aircraft Separation	All	All	IFR, SVFR, and runway operations	IFR, SVFR, and runway operations	IFR and SVFR	None

Courtesy of FAA

Figure 1-5 Airspace Classification

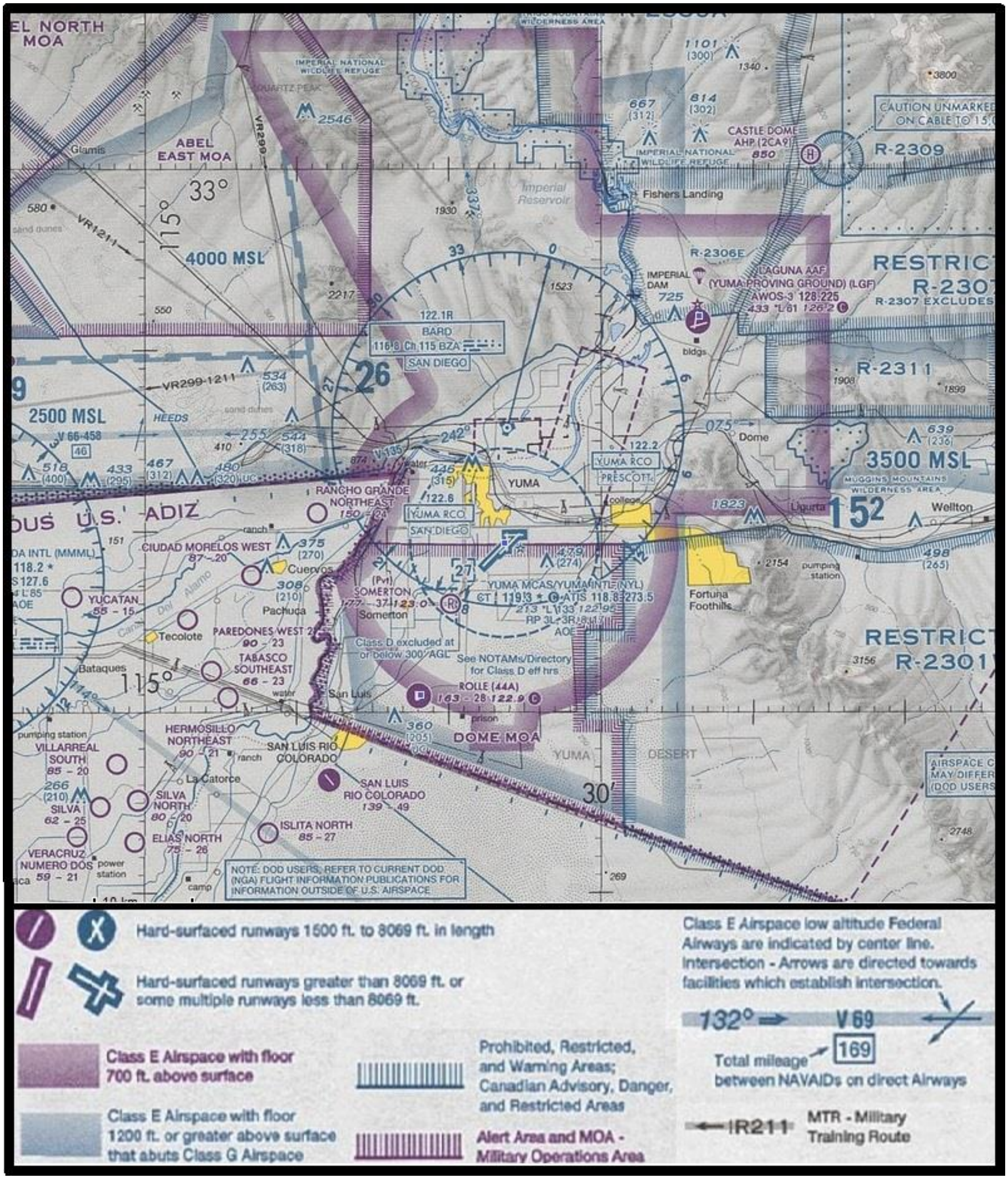


Figure 1-6 Sectional Chart

UAS Procedures

The term UAS refers to aerial vehicles and equipment that do not carry human operators, but fly autonomously or are remotely piloted. Such vehicles are considered part of a system due to their operations with a remote human operator, control and communications systems, and a payload.

Developing market growth forecasts of UAS and related technologies have recently increased the level of national interest regarding the utilization of UAS vehicles for military, civilian and commercial purposes. Commercial UAS activities have increased nationally and internationally as organizations such as local law enforcement and security agencies find lower operating cost, and increase work efficiency while reducing the risk to human life.

The FAA's current goal is to integrate UAS vehicles into the existing airspace system. Ultimately, the airspace for UAS will not differ greatly from the current National Airspace System (NAS). Until then, in an effort to accommodate the growing need to regulate current UAS operations; the FAA has imposed strict limitations on UAS operations in the NAS until that time when standards and regulations are fully developed. However, the FAA continues to develop policy through certifications and Special Federal Aviation Regulations (SFARs) to manage operation of small, low-flying UAS vehicles within visual line-of-sight that are used for commercial purposes. This guidance enables small UAS users to initiate or continue operations that do not present a safety threat to the public or to other aircraft prior to the finalization of complete certification regulations.[viii] The FAA published the final rule in late 2012.

Since the UAS operations will not differ from current manned aircraft operations, the UAS will fall under the same criteria with regard to airspace requirements. However, there is no widely accepted common classification system for unmanned aerial vehicles or systems due to the wide variety of capabilities, size and operating characteristics of UAS, with the exception of the Department of Defense (DoD). Most are described in terms of weight, speed, purpose of use, and altitude of operations. Additional groups described by the DoD have been included in **Table 1-5** to include the UAS categories, uses and UAVs that apply.

Photo from UAV Roadmap Report 2005-2030

Table 1-5: UAS Group/Class Description[ix]

UAS Class	Group	Maximum Weight (lbs)	Normal Operating Altitude (ft)	Speed (kts)	Representative UAS
Small*	Group 1A	0-5	<400 AGL	<50	Wasp, Raven (RQ-11)
	Group 1	5-20	<1,200 AGL	<100	Puma
	Group 2	21-55	<3,500 AGL	<250	Scan Eagle
Medium	Group 3	<1,320	< FL 180		Shadow (RQ-7B)
Large	Group 4	>1,320		Any Airspeed	Fire Scout (M/RQ-88), Predator (MQ-1B), Grey Eagle (MQ-1C), Hummingbird (A-160T)
	Group 5		> FL 180		Reaper (MQ-9A), Global Hawk (RQ-4), BAMS (RQ-4N)

* The FAA has used additional groups of light weight (<55lbs) aircraft to capture small/very small UAS aircraft that remain in visual contact, remain below 400'AGL and for the most part are frangible (consult current FAA guidance as required).

Due to continued growth of UAS operations for government and tremendous potential evolving in the commercial sector, several FAA initiatives are in process in an effort to provide UAS integration to NAS; Certifications and Safety Federal Aviation Regulations (SFARs).

1. UAS certification granted under a Certification of Authorization (COA) or Waiver for public operation mostly US government organizations
2. Special Airworthiness Certifications (SAW-EC), experimental category for civilian/private industry operations.[x] The two types of special airworthiness certificates are special flight permits and experimental certificates. Special flight permits are used for production testing of new aircraft. Experimental certificates are used for research, crew training, and market survey activities.

Special Note: The FAA faces issues with the commercial application of the UAS market. Currently, there are no means to obtain authorization for commercial UAS operations in the NAS today. In the commercial market, manufacturers can only apply for an experimental certificate for the purpose of R&D, market survey and crew training.[xi] The absence of standards, regulations and procedures to govern the safety integration of civil use (non-military) UAS into civilian airspace have been challenging.[xii]

One of the objectives for future Rolle Field development is to offer a support base for those UAS operators and developers currently engaged in UAS/UAV research and development.

Certifications provide the necessary regulations to control UAS operators and manufacturers to conduct research and development at any airport. There are several key evaluations factors that influence the airspace and ultimate approval of a COA. The airspace considerations include, but not limited to the information provided in **Table 1-6.**

Table 1-6: UAS Airspace Considerations[xiii]

Sense and Avoid as a Mitigation	Development of see-and-avoid technology that provide elevation variation within the range with overall excellent visibility from the ground Issue: Since the pilot is not collocated with the aircraft, there is a lack of an onboard capability to see and avoid other aircraft
Low Population Density Surrounding Airfields	Location to be in areas with limited development with accessible roadways and utilities Issue: Capability to accommodate emergency landings with no danger or threat to persons, structures and urban environments
Vulnerabilities of Command and Control Link	Capability for infrastructure upgrades for wireless communications Issue: The command and control link between the pilot-in-command and the aircraft flight control surfaces now includes a connection that has wireless communications that introduce vulnerability with connection
Connectivity	Capability to access other UAV designated airspace and controlled airspace Issue: Contiguous Access
Air Traffic Management (ATM) Integration	Upgradeable technology Issue: Due to some unique operational characteristics, flight performance differences, response latencies and other complexities of autonomous flight, there will be potential modifications to procedures and technology

Table 1-7: UAS Operators with COA and SAW-EC in 2011[xiv]

Service Aircraft with Certificates of Authorization	Civil Aircraft with Special Airworthiness Certificates
Department of Agriculture	Raytheon
Department of Commerce	AAI Corporation
Department of Defense	General Atomics
Department of Energy	Boeing – Insitu
Department of Homeland Security	Thompson – Wimmer, Inc.
Department of Interior	AeroVironment
Department of Justice	Aurora Flight Sciences
NASA	Honeywell
State Universities	Cyber Aerospace
State and Local Law Enforcement	Northrop Grumman
	Lockheed
	Textron/AAI
	Telford Aviation

TEST SITE LOCATION EXAMPLE: One of the first test sites, approved in July 2011, is located at Las Cruces International Airport. Through a partnership with 46th Test Group at Holloman Air Force Base and New Mexico State University (NMSU)[xv], a general FAA Certificate of Authorization (COA) was granted.

Rolle Field Airspace Consideration for Potential UAS Operational and Testing Site.

With promising growth and strong economic impact potential, in March 2013 Arizona positioned the State for consideration as a national test range under programs put forth by the US congress through the FAA to identify as many as six (6) test ranges for civilian use of UAS. While this effort was ultimately unsuccessful, and Arizona was not chosen as one of the test sites, the strong demand for UAS/UAV opportunities in the State of Arizona continues. As part of the state's proposal, Rolle Field has been included as a promising site for testing and other operations.

In October 2010, the Unmanned Aircraft Program Office (UAPO) and the Air Traffic Organization (ATO) UAS office published a Civil/Public UAS roadmap for certification and operation of UAS in the NAS. The roadmap forecasts the routine civil UAS access to the NAS by 2020.[xvi]

The economic impact for the US according to several market studies such as the 2011 Teal Group study project is anticipated at over $94 Billion in the next decade, reaching over $11 Billion annually by 2021. The economic impact anticipated for Arizona will be over $94 million by 2015 and $410 million by 2025.[xvii]

As a response to the growing need to support UAS operations, the FAA and DoD are in the process of establishing integration of the airspace to accommodate UAS flight operations to the National Airspace System (NAS). Policies and procedures are currently being drafted to establish acceptable operational requirements and airspace definitions.


Photo from UAV Roadmap 2005-2030

Even though Arizona was not selected as an FAA test site, airports, economic development organizations and educational institutions are actively competing for UAS manufacturers to locate test sites at their airport or to participate in research activities at their institution and location. The Arizona Aerospace and Defense Commission is Arizona's sole coordinator of all aerospace and defense related commercial partnerships. The Commission is tasked with providing technical support, developing goals and objectives, recommending legislation and providing direction regarding Arizona's aerospace and defense related commerce.

Arizona's proposal to the FAA identified three prime locations for a UAS test range, including two non-exclusionary or unrestricted airspace sites. The sites included:

- Benson Airport identified as San Pedro North, with airspace stretching northeast to the eastern slopes of the Santa Catalina Mountains.
    - The Benson Airport already has been approved by the FAA to operate one type of UAS, the Army's Shadow 200, under an experimental airworthiness certificate.[xviii]

- Seligman airport, about 60 miles west of Flagstaff.

- Exclusionary airspace at the edge of the U.S. Army's Yuma Proving Ground which may include Rolle Field. The Yuma site has served as a test site for UAS technology developed by Tucson-based Raytheon Missile Systems, including its bat-winged "Killer Bee."
    - As an extension of the Yuma International Airport DCC, Rolle Field would allow local UAS developers, including Raytheon and BAE Systems, to keep test costs down for testing and market research.

Rolle Airspace

As discussed in previous sections, Rolle Field is located under an area of special use airspace known as the Dome MOA, located south of the City of Yuma and extends both west and south to the US-Mexico border, and east to where it abuts a restricted airspace area designated as R-2301W. Civilian operations within a MOA are not prohibited though civilian aircraft are cautioned to remain alert for military aircraft while operating in the MOA. Military operations in the Dome MOA are intermittent and these schedules may be obtained by NOTAM (Notice to Airmen). Military operations within the Dome MOA are conducted at altitudes above 6,000 feet Mean Sea Level.

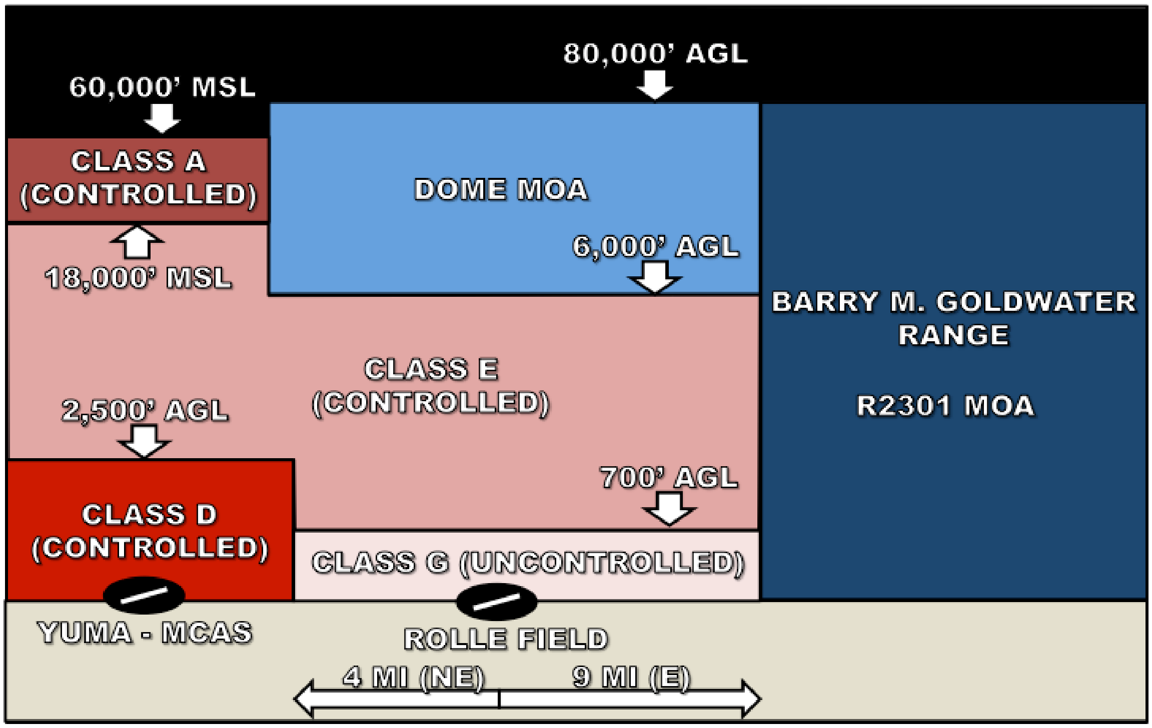


Figure 1- 7: Rolle Field Airspace Profile

Accordingly, Classes B, C, and D relate to airspace surrounding airports where increased mid-air collision potential exists; Classes A, E, and G primarily relate to altitude, and the nature of flight operations that commonly occur at those altitudes. ATC provides separation services to all flights in Classes A, B, and C. They provide it to some flights in Class E, and do not provide service in Class G. Regardless of the class of airspace, or whether ATC provides separation services, pilots are required to "S&A other aircraft" whenever weather permits. Ultimately, the FAA is moving toward a two-class structure for the NAS, "terminal" and "enroute." Terminal will subsume Class B, C, and D airspace, and Enroute will include Class A, E, and G airspace.[xix]

The location of the Rolle Field airport is well positioned to support the growing UAS market. The following is a preliminary assessment of the current airport's capability to provide UAS operations and attain some type of certification.

Table 1- 8: Rolle Field UAS Capability Assessment

Sense and Avoid as a Mitigation Development of See-and-avoid technology that provide elevation variation within the range with overall excellent visibility from the ground	Rolle Field, located approximately 12 miles southwest of the City of Yuma. The airfield is flat and has no current obstructions. Line of Sight issues would be very minimal. In addition, the Arizona weather is excellent would allow for larger number of clear days and provide excellent visibility from the ground.
Low Population Density surrounding Airfields Location to be in area with limited development with accessible roadways and utilities Capability to accommodate emergency landings with no danger or threat to anyone or anything	The airport is located amidst farmland and surrounded with minimal populated areas. The airport provides services not only to general aviation users in Yuma County, but also to a widening array of customers of Yuma International Airport's aerospace industrial base, which supports government, civilian and military operations. Emergency operations can be accomplished at the airport. The airport's runway has ability for emergency landing with minimal impact to population or other facilities
Vulnerabilities of Command and Control Link Capability for infrastructure upgrades for wireless communications	Electrical power is supplied to the Airport by a diesel generator located adjacent to the auto parking area Existing telephone service is currently cellular. YCAA plans to install a microwave link to Yuma International Airport's telecommunications network to provide both voice and high speed internet access.
Connectivity **Surrounding Airspace**	The airspace surrounding Rolle Field is highly complex and heavily influenced by military aviation activity in the region. As the pattern altitude (see Local Operating Procedures section) for Rolle Field is 1,200 feet MSL, the Airfield is located within both Class G uncontrolled airspace (up to 700 feet AGL – above ground level) and Class E controlled airspace. The Dome MOA begins south of the City of Yuma and extends both west and south to the US-Mexico border, and east to where it abuts a restricted airspace area designated as R-2301W. Restricted Area R-2301 W borders the Dome MOA and begins approximately nine (9) miles east of the airport and covers the entire area from Interstate Highway 8 near Yuma on south to the U.S. – Mexico border. Operations within R-2301 are continuous and at altitudes from the surface up to Flight Level 800 (80,000 feet).
Air Traffic Management (ATM) Integration Capability for upgradeable technology	As part of the Yuma International Airport DCC to provide an array of services to the aeronautical industry. The YCAA is committed to the rehabilitation and development of Rolle Field.

A major advantage of the Yuma County Airport Authority is their current relationship with the DoD and Universities. With YPG and University support, Rolle Field has the ability to be eligible for a COA or a SAW-EC for future UAS testing and operations. The City of San Luis has also indicated their willingness to grow the airport by providing support such as fire protection and roadway construction and access. The current Class E airspace can accommodate the majority of the small to medium of UAS in class E airspace. The larger UAS may be allowed with restrictions in time and number of operations.

Ultimately, Rolle Field could be an integral part to the FAA's plan regarding UAS airspace integration and be a site for the UAS operational expansion in the NAS. The FAA goal is full integration into the current airspace designations that aircraft operators use today. The FAA's September 2012, Integration of Unmanned Aircraft Systems into the National Airspace System, Concept of Operations V2.0 discusses three key goals in order to achieve the full integration of UAS to NAS:

1. **Accommodation.** The FAA currently approves limited UAS access to the NAS via special procedures and mitigation measures. These include the COA and special airworthiness certification processes and the use of restricted airspace to segregate UAS operations from manned operations. Such operations are considered on a case-by case basis to ensure that today's non-standardized UAS performance and operational features do not adversely affect NAS safety or efficiency. As UAS research, rulemaking, and policy developments enable an increase in integrated operations, the need for accommodation will decline significantly.

2. **Integration.** The establishment of UAS performance requirements provides operators a means to integrate operations in the NAS. Assisted by external industry organizations, the FAA develops policy and publishes regulations, standards, and procedures that enable routine UAS operations.

3. **Evolution.** Once UAS operations are integrated, unmanned aviation evolves alongside manned flight as policies, regulations, procedures, training, and technologies are routinely updated to meet the needs of the NAS community.

Rolle Field is well suited for future UAS operations, its location and capabilities to accommodate the needs of potential testing facilities will be discussed in the following chapters of this document.

1.11 Other Regional Airports

Table 1-9 below depicts other airports within an approximate 50 nautical mile radius of Rolle Field. Only the Laguna AAF at YPG is shown in the table as it is listed in the FAA Airport Facility Directory.

Table 1-9: Other Regional Airports

	Dist. From Rolle	RW length / width	Instrument approach procedures	Airline Service	GA services	Based aircraft / ops / enplaned passengers
Yuma / MCAS (NYL)	10 nm NE	3L-21R (13,300 x 200) 3R-21L (9,239 x 150) 8-26 (6,146 X 150) 17-35 (5,710 x 150)	ILS OR LOC RWY 21R RNAV (GPS) RWY 03L RNAV (GPS) RWY 17 RNAV (GPS) RWY 21R VOR/DME OR TACAN RWY 17 VOR RWY 17 HI-TACAN RWY 03L TACAN RWY 03L TACAN RWY 21R Radar Approach Procedures available	Yes (United / US Airways Express)	Aviation fuel, Aircraft ground handling, Aircraft parking (ramp or tiedown), GPU / Power cart, Passenger terminal and lounge, Catering, Rental cars,	202/194,366/82,420
Somerton (54AZ)	5 nm NE	4-22 (1,050 X 80 Dirt) 14-32 (2,100 x 80 Dirt) 17-35 (3700 X 100 Gravel) 14-32 (2,100 X 80 Dirt)	None	No	Fueling, Minor repairs, Transient Tie downs,	35/150/0
Checkerboard (AZ 99)	4.1 nm NE	8-26 (2600 X 60 Dirt)	None	No	No	NA (private)
Laguna AAF (Yuma Proving Ground)	26 nm NE	18-36 (6142x151) 6-24 (6043x100)	RNAV (GPS) RW 06 RNAV (GPS) RW 18 VOR RW 06	No	No	NA (Military)
Imperial County (IPL)	48 nm NW	14-32 (5309 X 100) 8-26 (4500 X 75)	VOR GPS-A	Yes (SkyWest)	Fueling, Minor Repairs, Tie downs	47/14,589/6,136
Brawley Municipal Airport (BWC)	50 nm NW	8-26 (4,402 x 60)	RNAV (GPS) RW 26 VOR / DME – A VOR / DME - B	No	Fueling, Major repairs, Tiedowns	62/5500/0
El Centro NAF Airport (NJK)	52 nm W	8-26 (9503 x 200) 12-30 (6824 x 200)	RNAV (GPS) RW 26 RNAV (GPS) RW 30 VOR / DME or TACAN RW 30 HI TACAN RW 26 TACAN RW 26	No	NA	NA (Military)

1.12 Community Profile

Rolle Field serves an area that includes the City of Yuma, the City of San Luis, and the City of Somerton. In order to provide a general look at the socioeconomic makeup of the community that utilizes the airport, the following sections will examine demographic and economic information from local, state and federal sources.

1.12.1 Population

Historic population statistics for San Luis, Somerton, Yuma County and the State of Arizona are presented for comparison in **Table 1-10**. While the City of Yuma and Yuma County closely reflect the average annual growth rate for the State as a whole, San Luis' 29.01 percent average annual growth rate since 1990 is more than eight times that of the State for the same time period. Somerton's growth rate is more than double the growth rate of the State for the same time period. Furthermore, San Luis's sister city, San Luis Rio Colorado, Mexico sits just across the border and is reported to be the fastest growing city in Mexico, with a 2012 estimated population of more than 250,000.

Table 1-10: Population Trends for the Years 1990-2012 [xx]

	1990	2000	2012	Avg Annual Growth Rate (1990-2012)
San Luis	4,210	17,038	31,080	29.01%
Somerton	5,315	7,558	14,796	8.11%
Yuma (City)	55,805	79,486	94,825	3.18%
Yuma County	108,100	164,992	205,174	4.08%
Arizona	3,680,800	5,181,925	6,498,569	3.48%

1.12.2 Employment

Table 1-11 provides recent statistics on the civilian labor force and unemployment levels in the State of Arizona, Yuma County, the City of Yuma, San Luis and Somerton. As shown, the unemployment levels increased in the City of Yuma between 2010 and 2011, but declined slightly in 2012. As shown, the unemployment levels have exhibited a similar pattern in Yuma County, San Luis and Somerton in recent years. This pattern is consistent with national unemployment rates tied to the slow recovery from the great recession.

Table 1-12 shows the employment by sector for Yuma County. The major industries in Yuma County are Agriculture, trade related to tourism, services and government. **Table 1-13** provides a listing of the major employers in Yuma County.

Table 1-11: Civilian Labor Force and Unemployment Rate[xxi]

	State of Arizona	Yuma County	City of Yuma	City of San Luis	City of Somerton
2010					
Labor Force	3,072,982	90,156	47,685	8,234	4,590
Unemployment Rate	9.9	26.3	20.7	49.6	38.2
2011					
Labor Force	3,039,308	89,500	45,016	15,173	4,479
Unemployment Rate	8.7	27.1	18.1	63.3	39.2
2012					
Labor Force	3,029,341	92,015	45,381	16,851	4,718
Unemployment Rate	7.9	27.5	17.5	63.9	39.7

Table 1-12: Employment by Sector[xxii]

	Yuma County		
	2010	**2011**	**2012**
Agriculture, Farming and Ranching	16,843	15,530	15,638
Mining and Construction	2,500	2,300	2,400
Manufacturing	1,800	1,900	1,900
Trade, Transportation and Utilities	9,500	9,500	9,600
Information	600	500	600
Financial Activities	1,400	1,300	1,400
Professional and Business Services	5,700	5,600	6,100
Educational and Health Services	6,700	6,900	7,300
Leisure and Hospitality	5,200	5,400	5,300
Other Services	1,500	1,500	1,500
Government	14,800	15,400	15,100

Table 1-13: Major Employers in Yuma County[xxiii]

Employer	2012 Total Employment
US Army	2,319
Yuma Regional Medical Center	2,080
Yuma Elementary School District	1,700
Wal-Mart Stores	1,394
Yuma City Government	1,388
Yuma County	1,350
US Marine Corps Air Station	1,350
Bose Corporation	1,300
US Border Patrol	920
ACT Advanced Call Center Tech	814

1.12.3 Income

Another important economic indicator is personal income and wages for the region. As shown in **Table 1-14**, the wages and income levels have been consistently rising in recent years in Yuma County.

Table 1-14 Personal Income and Wages, Yuma County $[xxiv]

	2007	2008	2009	2010	2011
Total personal Income ($000s)	4,679,250	4,971,127	5,036,089	5,186,601	5,441,761
Per capita personal income ($)	24,975	25,999	25,998	26,351	27,091
Total wage/salary disbursements ($000s)	2,340,562	2,413,317	2,374,218	2,368,286	2,435,557
Average earnings per job, $	41,774	42,577	44,150	45,084	47,051
Average wage/salary disbursements, $	32,211	33,784	35,160	35,221	35,903
Average nonfarm proprietors' income, $	30,679	31,331	27,942	26,261	26,837

1.13 Vicinity Land Use Controls

Existing Land Use

The land surrounding Rolle Field is undeveloped land covered by native Sonoran desert plant life. Agricultural fields are the dominant land use to the north and west, appearing approximately 1 mile away from Rolle. The nearest developed land is approximately 1.8 miles to the south. The Bureau of Reclamation and the Arizona State Land Department control a significant amount of the land in the vicinity of Rolle Field as shown on **Figure 1-8.**

Rolle Field lies within Bureau of Reclamation land commonly referred to as "5-Mile Zone Protective and Regulatory Pumping Unit (PRPU)." The 5-mile zone is a 5-mile-wide, 13-mile-long strip of land about 10 miles south of Yuma, Arizona, in the extreme southwestern part of the State. In 1944, the United States and Mexico signed a treaty (Treaty) requiring the United States to annually deliver 1.5 million acre-feet of Colorado River water to Mexico. In August 1973, to resolve salinity problems, the two countries reached a permanent solution in the form of Minute No. 242 of the International Boundary and Water Commission (IBWC Minute 242).

IBWC Minute 242 includes the provision that the United States shall deliver approximately 140,000 acre-feet of water to Mexico annually at the southern international boundary to partially satisfy its Treaty obligations and that each country shall limit groundwater pumping within 5 miles of the international boundary near San Luis, Arizona, to 160,000 acre-feet annually. In June 1974, the Congress passed the Colorado River Basin Salinity Control Act, Public Law (P.L.) 93-320, to enable the United States to comply with its obligations under IBWC Minute 242. Section 103(a) of this act authorized the United States to construct, operate, and maintain well fields within the 5-mile zone that are capable of providing sufficient water to Mexico.

In 2004 the Bureau of Reclamation conducted an Environmental Assessment of the Resource Management Plan (RMP) for the PRPU. The Finding of No Significant Impact for the preferred alternative was issued on March 18, 2004. The Natural Resources Conservation/Protection with Limited Recreation, Community, and Commercial Development (Alternative D) was selected as the preferred alternative. Under the preferred alternative, Reclamation resource management policies and practices within the study area would change. Reclamation will authorize limited use and consider limited land exchanges/transfers within the study area to accommodate limited recreation, community, and commercial activities. These uses will be limited to maintain Reclamation's capability to meet water deliveries to Mexico, in accordance with Treaty obligations, and conserve flat-tailed horned lizard habitat, pursuant to the 2003 Flat-Tailed Horned Lizard Rangewide Management Strategy. Chapter IV of the RMP/EA provides a detailed description of Alternative D.

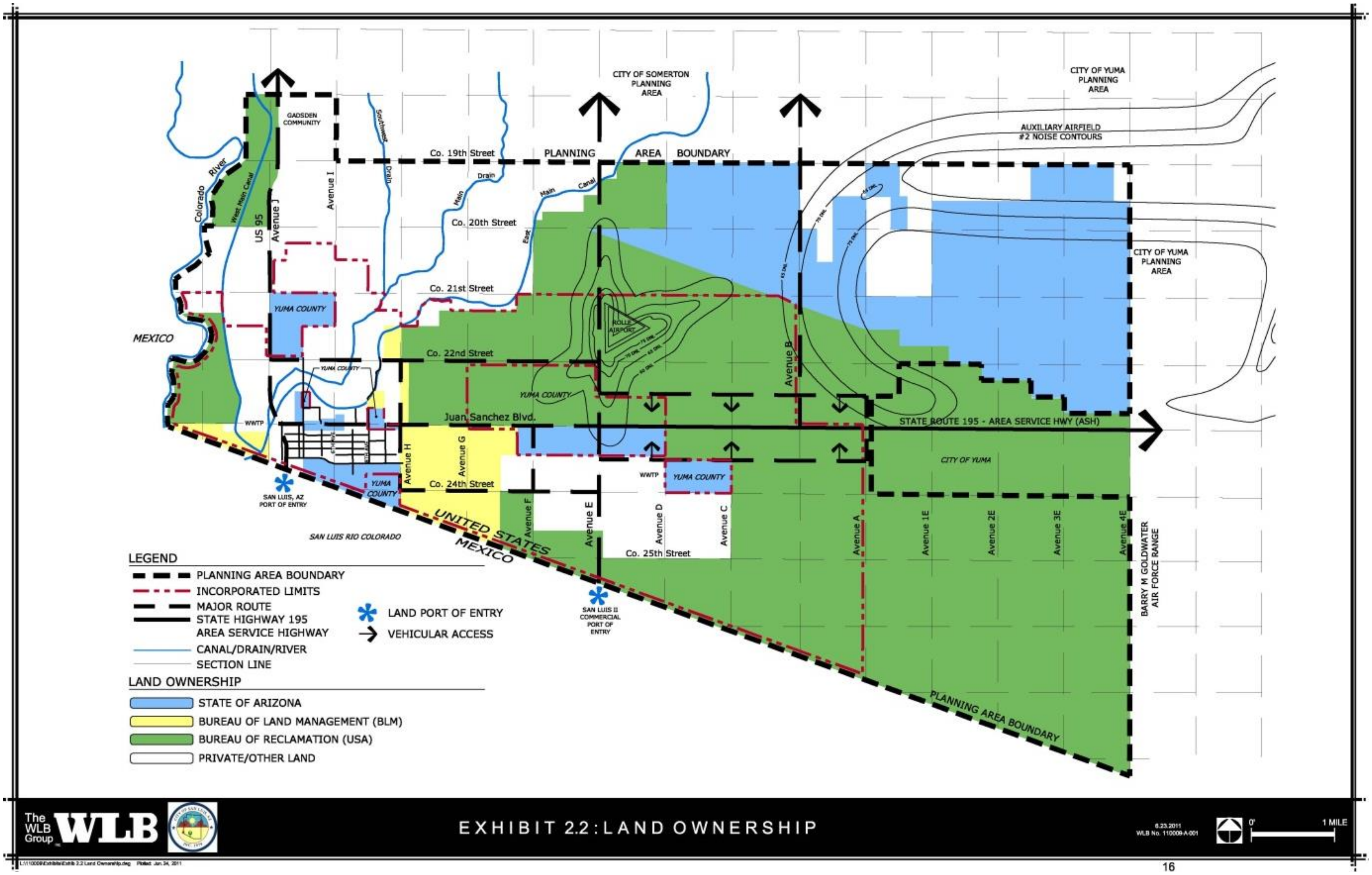


Figure 1-8 Land Ownership Map[xxv]

Existing Zoning

The airfield lies within the corporate boundaries of the City of San Luis. According to the City of San Luis Zoning Map, dated September, 2011, the land is zoned RA-10, which is a “Rural Area Residential Zoning District”.

In order to ensure the safety of aircraft arriving and departing the airport and to encourage future development which is compatible with the continued operations and planned future expansion of the airport, the City of San Luis has established an “AP” Airport Overlay Zoning District in the vicinity of Rolle Field. **Figure 1-9** depicts the current boundary of the “AP” Airport Overlay Zoning District. The general provisions of the “AP” Airport Overlay Zoning District are as follows:

> (1) Not withstanding any other provision of this overlay district, no use may be made of land or water within this overlay district in such a manner as to create electrical interference with navigational signals or radio communication between the airport and the aircraft, make it difficult for pilots using the airport, impair visibility in the vicinity of the airport, create bird strike hazards, or otherwise materially endanger or interfere with the landing, take off, or maneuvering of aircraft intending to use the airport; such as buildings with reflective glass or any type of reflective/glare producing exterior, high intensity recreation type lights (especially on high standards), smoke, antennas, landfills, garbage dumps, incinerators, or high tension transmission lines.
>
> (2) The Federal Aviation Regulations (F.A.R.) Part 77 Airspace Plan, the Airport Influence Area (AIA) map, and the 2020 Aircraft Noise Exposure map, and other information contained in the “Rolle Field Airport Master Plan”, dated March 2001 and amendments thereto as may from time to time be made shall be and the same is hereby adopted as part of the “AP” Airport Overlay Zoning District section of this Ordinance.
>
> (3) Building heights within the boundaries of the “AP” Airport Overlay Zoning District shall be as set forth in the Federal Aviation Regulations (FAR) Part 77 Airspace Plan per the “Rolle Field Airport Master Plan” dated March 2001 or as may be amended and the height limitations of the underlying zoning district; whichever is more restrictive.
>
> (4) The “AP” Airport Overlay Zoning District shall be that area as defined as the “Airport Influence Area (AIA) per the “Rolle Field Airport Master Plan” dated March 2001 or as may be amended by the YCAA.

In addition, the “AP” Airport Overlay Zoning District requires:

> 1. Public Disclosure of Potential Noise Impacts: No person shall sell, nor offer for sale, rent or lease any property unless and until the prospective buyer or renter has been provided an avigational disclosure and release form for the subject property, which the prospective buyer or renter shall sign and file with the City. The disclosure statement shall serve as notice of the fact that the property is within an Airport Overlay Area and that the property therein is subject to potential noise, vibration, and impacts from the Rolle Field.

2. Notification on Plat or Title: When a subdivision plat or parcel split is required the following notice shall be placed on the plat and/or recorded with the title: “These properties, due to their proximity to the Rolle Field, are likely to experience aircraft over flights, which could generate noise levels which may be of concern to some individuals. The City, public and airport shall be held harmless from any damages caused by noise, vibration, fumes, dust, fuel, fuel particles, or other effects that may be caused by the operation of aircraft taking off, landing, or operating on or near the airport, not including the physical impact of aircraft or parts thereof.”

3. Noise Attenuation: The construction, alteration, moving, partial demolition, repair and use of any building or structure within the Airport Overlay Area shall comply with the Sound Attenuation Standards in order to achieve an exterior to interior Noise Level Reduction (NLR) of 25 decibels. Certification of such NLR measures, by a Registered Engineer or a Registered Architect, shall be required to be submitted along with the application for a building permit.

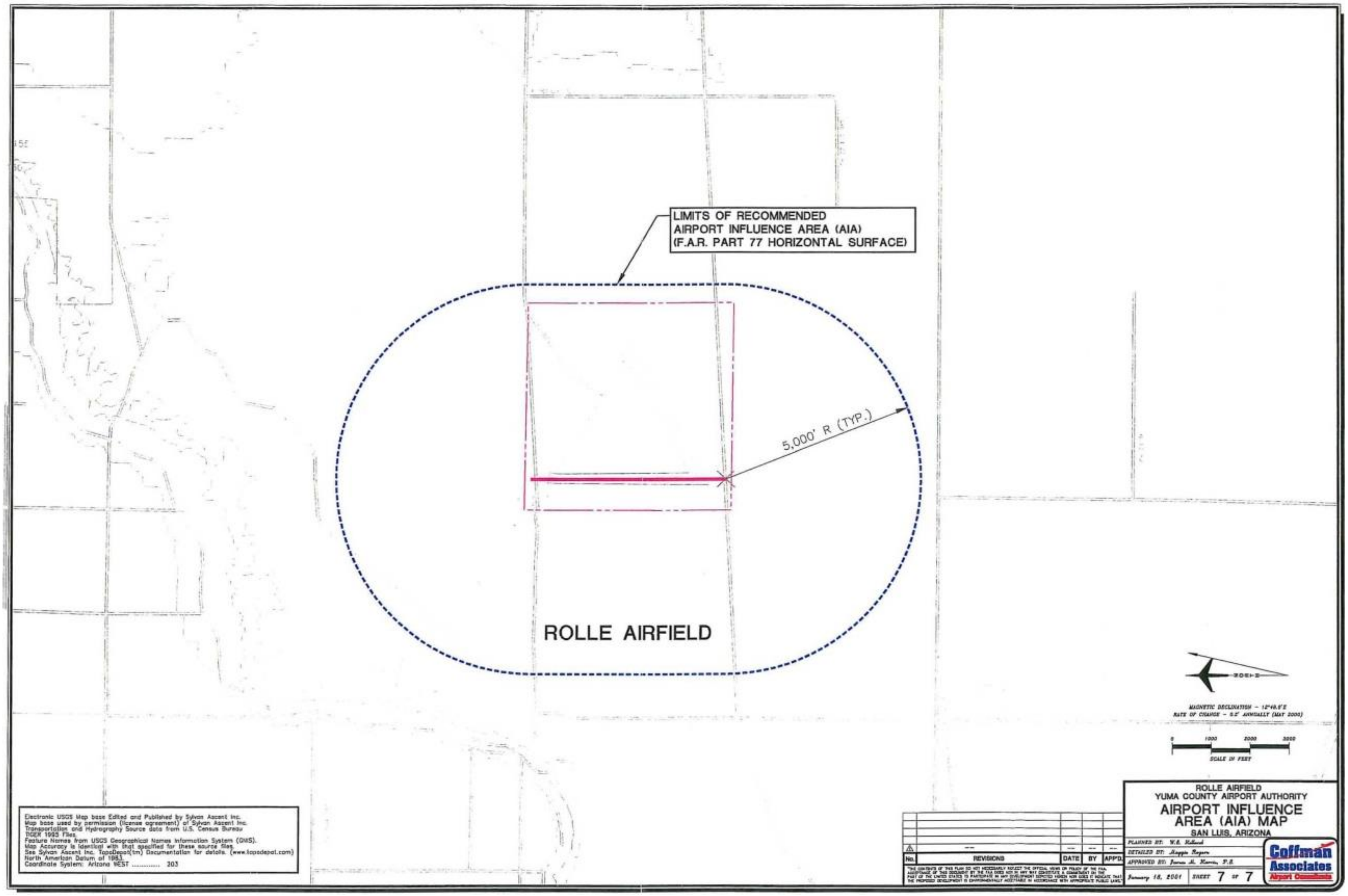


Figure 1-9: Airport Influence Area Map[xxvi]

City of San Luis General Plan 2020

The City of San Luis city council adopted its General Plan 2020 in July 2011 as an update to the 2001 plan. A general plan is not a regulatory document. Unlike zoning, the growth policy does not have immediate force and effect. Rather, it serves as a generalized, long-term guide for future revision to documents that do regulate land use such as the zoning code and subdivision regulations.

The growth and development of Rolle Field is strongly supported throughout the San Luis General Plan. The plan states:

> Rolle Field is positioned to service the expanding economies of southwestern Yuma County. The projected continuation of exploding economic and population growth for San Luis should increase demand for general aviation facilities in southwestern Yuma County. Along with the potential for increased business and corporate aviation activity, this growing population should also bring an increase in the number of personal or recreational general aviation aircraft owners and pilots.

Goal 4. of the General plan is to "Develop a regional airport at Rolle Field." In support of this goal, the following objectives are identified:

- Locate fire department and police facilities on Rolle Field for airport security purposes – this will assist in the growth of the airport facility.
- Program needed improvements and utilities to Rolle Field.
- Identify air service needs and opportunities for San Luis.

One of the specific Objectives of Goal 5 Promote Land Use Compatibility is to "provide appropriate land uses within the area influenced by Rolle Field." The future land use map shown on **Figure 1-10** depicts planned future land uses surrounding Rolle Field as industrial, business, agricultural and low density uses. These types of uses are generally the most compatible with airport operations.

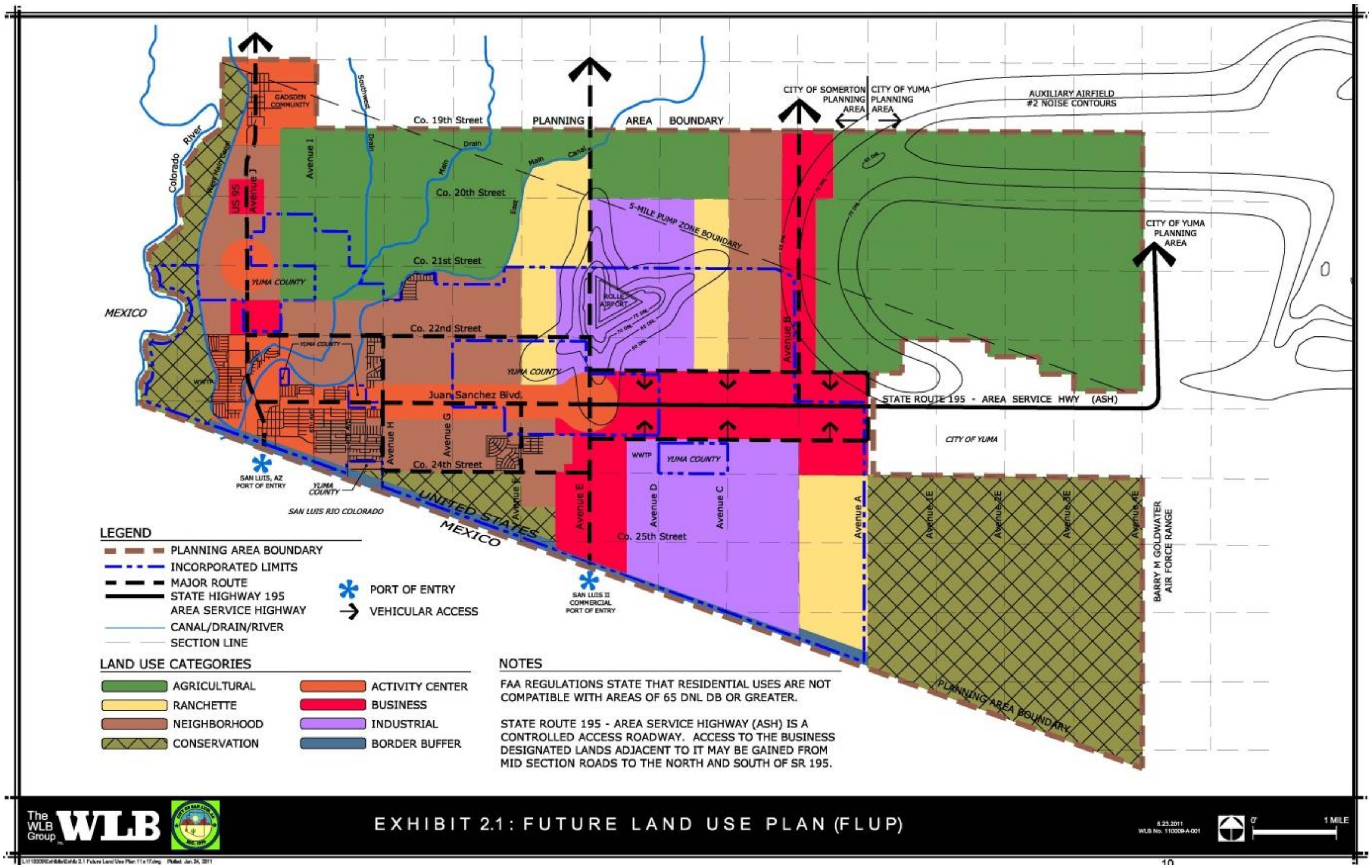


Figure 1-10: Future Land Use[xxvii]

1.13.1 Development Trends

The outlook for continued population growth and economic expansion for the Airport's service area is quite good. Two recently completed projects, the new commercial Port of Entry and prison facility, demonstrate the recent acceleration of development in the newly annexed eastern portion of the City of San Luis.

<u>San Luis Detention Facility</u>

San Luis Detention Facility was opened in 2007. The facility is owned by the San Luis Detention Facility Development Corporation, a subsidiary of the city, and is currently operated by Emerald. The facility is located on the eastern edge of the city near the Arizona State Prison Complex. It has 560 beds to hold detainees, primarily for violations of immigration laws. The facility was expanded by 368 beds in 2011. Approximately 120 full-time employees work at the facility.

<u>POE II</u>

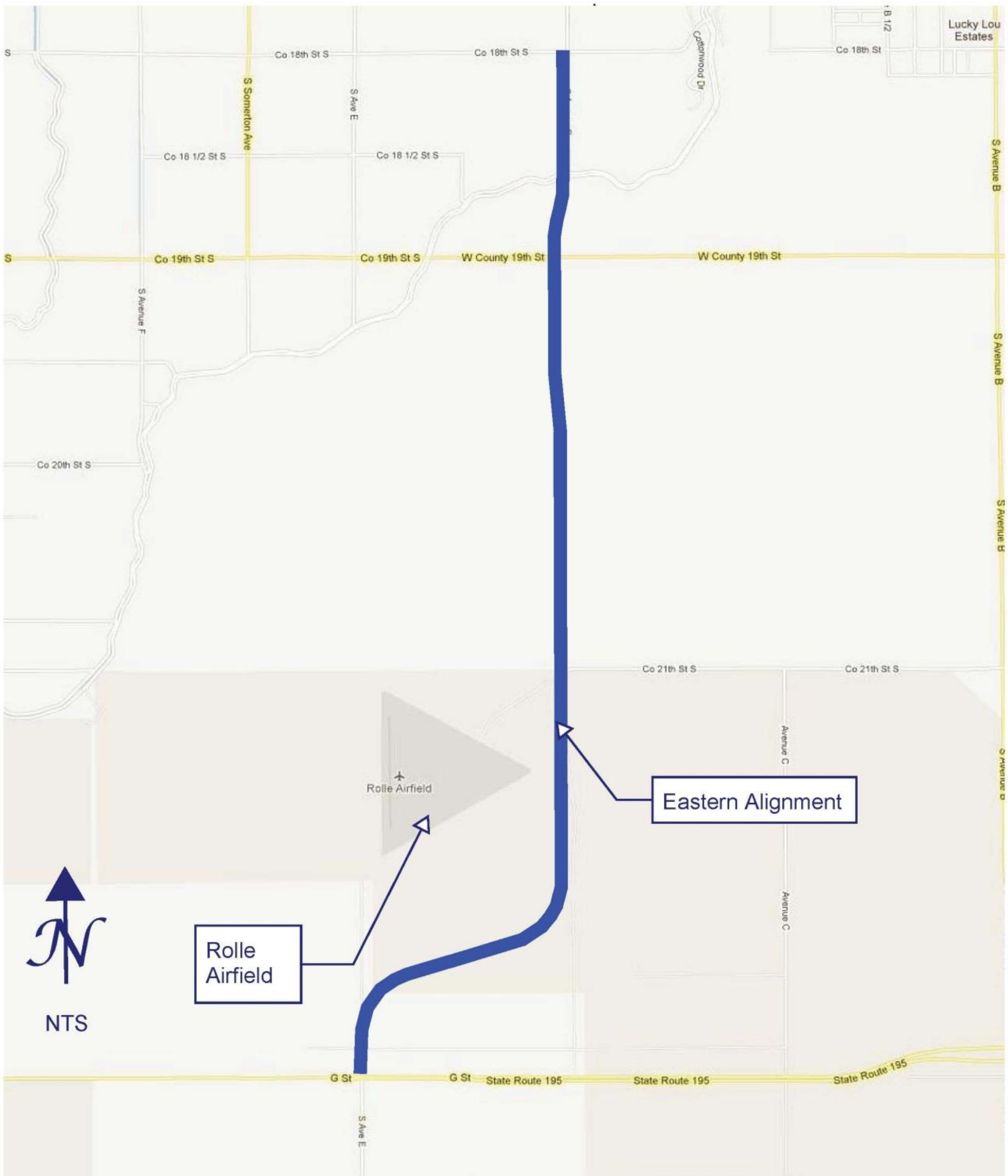
In November 2010, the Department of Homeland Security opened a new commercial Land Port of Entry (LPOE) in the City of San Luis. The border crossing point is located approximately two miles directly south of Rolle Field. Identified as San Luis II, the port was developed to expand the capacity of the original port. Because expansion of the existing port was limited by existing city infrastructure, San Luis II was developed to provide a separate port of entry for commercial traffic. The new port consists of an 80-acre site and includes three incoming lanes from Mexico and two outgoing lanes into Mexico. There is an Arizona Department of Transportation facility next to the new port where state officials conduct safety inspections, collect fees and issue permits. The facility is expected to handle approximately 40,000 trucks per year.

New State Highway 195 opened in 2009 to provide a direct link from the new Port of Entry to Interstate 8. Known as the Robert A. Vaughan Expressway, the four lane highway is designed to expedite the flow of commercial traffic between the United States and Mexico by channeling large tractor-trailers through the new port. It also provides a more direct route for motorists traveling between the border and east Yuma and the Foothills.

A large commercial industrial park is planned for the area adjacent to San Luis II. Rolle Field is recognized by the City of San Luis as a key component of this important commercial / industrial growth area.

<u>Extension of Ave E.</u>

Yuma County is in the initial stages of planning an extension of Avenue E. The preferred alignment is along the eastern boundary of Rolle Field (see **Figure 1- 11**). Construction of the roadway is expected to begin within the next ten to fifteen years. While the new roadway would improve access and visibility for Rolle Field, coordination between Yuma County and the YCAA will be vital to ensure compatibility with the airfield's future development and aircraft operations.



AVENUE E SR 195 to County 18th Street TRACS No. 0000 YU YYU SS976 03D	FIGURE 2 PROJECT LOCATION MAP	PSOMAS MARCH 2013

Figure 1- 11 Extension of Ave E., Proposed Alignment

Endnote References: Chapter I

[i] http://www.airfields-freeman.com/AZ/Airfields_AZ_Yuma.htm#yumaaux4
[ii] *Ibid.*
[iii] www.climate-zone.com
[iv] Yuma MCAS, USAF 699604, NCDS 3145, 12/1/2008 to 12/1/2012 Hourly Observations
[v] Yuma International Airport Master Plan Update, March 2009, p. V-26
[vi] Department of Navy Record of Decision for the U.S. Marine Corps West Coast Basing of the F-35B Aircraft dated December 9, 2010 and Final United States Marine Corps F-35B West Coast Basing Environmental Impact Statement (EIS) Volume I, October 2010, p.2-55
[vii] FAA Form 5010 Airport Master Record (1988-2007 Data), 2008 Arizona State Airports System Plan (2008 Data)
[viii] FAA Fact Sheet 2011
[ix] RFI for Arizona's Combined Autonomous Center for Test and Training of Unmanned Aircraft Systems (AzTTC, May 15, 2012
[x] http://www.faa.gov/aircraft/air_cert/design_approvals/uas/cert/
[xi] www.faa.gov/about/iniatives/uas/uas_faq/
[xii] "The impact of Unmanned Aerial Vehicles on the Next Generation of Air Transportation Systems: Preliminary Assessment" October 22, 2004
[xiii] Center for Advanced Aviation System Development, by Mitre Aviation: www. Mitrecaasd.org
[xiv] Federal Aviation Administration (FAA)
[xv] UAV Center of Excellence Program, Mesilla Valley Economic Development Alliance Website
[xvi] http://faa.gov/about/initiatives/uas/
[xvii] AUVSI Economic Impact Report March 2013
[xviii] AUVSI Economic Impact Report March 2013, page I-15
[xix] Unmanned Aircraft Systems Roadmap 2005-2030, appendix F, pg. F-4
[xx] Arizona Office of Employment and Population Statistics, The State Demographer's Office
[xxi] US Bureau of Labor Statistics (http://www.bls.gov/lau/tables.htm); Arizona Department of Administration Office of Employment and Population Statistics (http://www.workforce.az.gov/local-area-unemployment-statistics.aspx)
[xxii] Arizona Department of Administration Office of Employment and Population Statistics (http://www.azstats.gov/current -employment-statistics.aspx)
[xxiii] Yuma County 2012 CAFR
[xxiv] *Ibid.*
[xxv] City of San Luis General Plan 2020
[xxvi] 2001 Rolle Field Airport Master Plan
[xxvii] City of San Luis General Plan 2020

Forecasts

This page intentionally left blank.

CHAPTER TWO:
FORECASTS

2.1 Introduction

The purpose of this chapter is to prepare forecasts of aviation activity for Rolle Field. These forecasts will serve as the basis for planning the aviation facilities required to meet the needs of the airport and its users over the next twenty years.

Because Rolle Field currently has no based aircraft, forecasts of regionally based aircraft and based aircraft fleet mix, along with annual aircraft operations will serve as the basis for facility planning at the airfield.

The forecasts will be applied to several phases of the Airport Master Plan. Initially, the phases will be used to identify individual segments of future activity as well as the evaluation of airfield capacity, and the facility requirements of the airfield and the terminal area. From these evaluations, the need for new or improved facilities within the twenty year planning period can be determined.

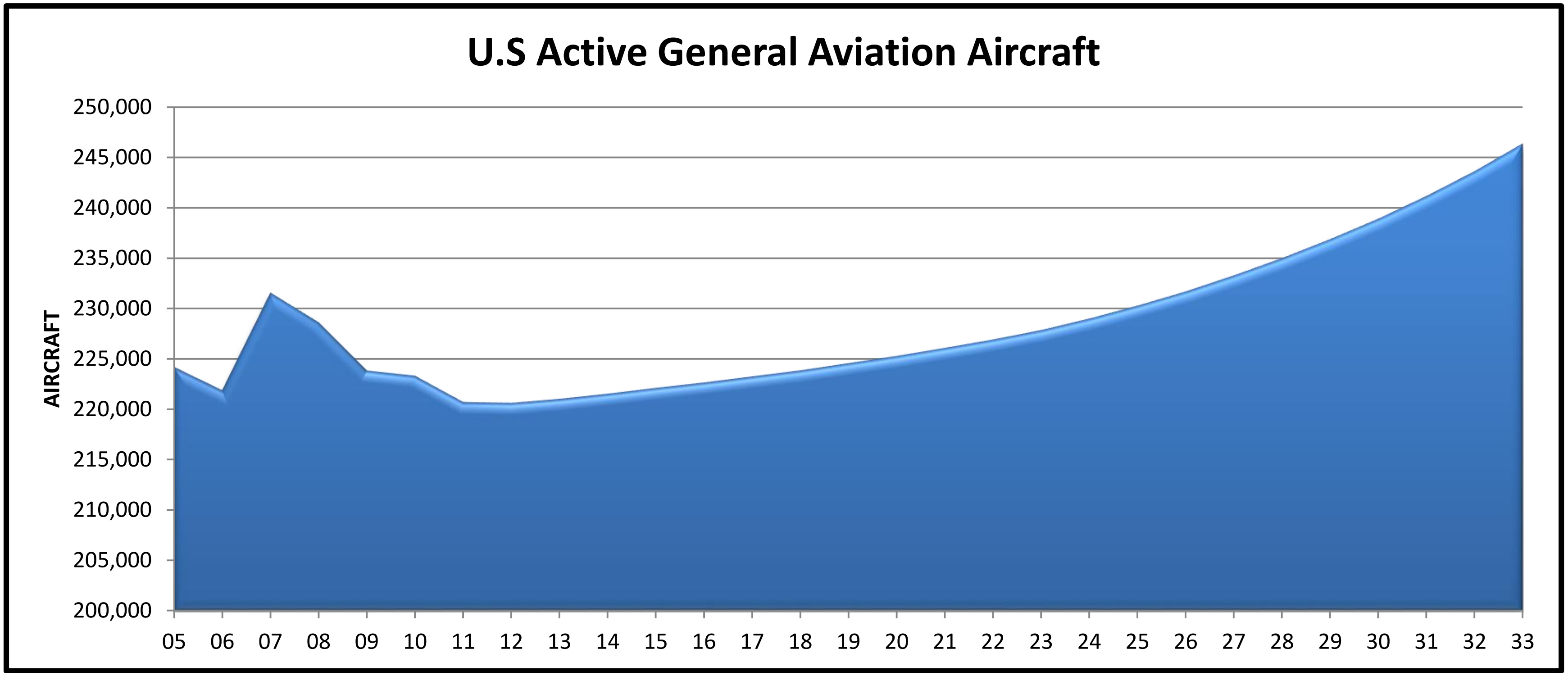
Aviation activity and the demand for aviation services is affected by a variety of unforeseeable and unpredictable influences such as competition; local, regional, national and global economies; fuel supply volatility and pricing; and the implementation of effective airport sales and marketing programs. Planning and projecting aviation activities for a twenty year planning period are forecasts which serve as guidelines. Planning and development of improvements must remain a dynamic process, flexible enough to respond to unforeseen facility needs.

2.2 National Aviation Trends

The Federal Aviation Administration (FAA) publishes its national aviation forecast each year which includes forecasts for major air carriers, regional/commuters and general aviation. The forecast uses the economic performance of the United States as an indicator of future aviation industry growth. The current edition at the time of this chapter's preparation was FAA Aerospace Forecast Fiscal Years 2013-2033.

The FAA forecast indicates that the aviation industry is in the process of recovering from the shocks of the past decade including the terror attacks of September 11, skyrocketing oil pricing, and a global recession which led to a reduced demand for air travel. As the economy recovers from the most serious economic downturn since the Great Depression, the FAA forecasts that aviation will continue to grow over the long term.

Figure 2-1 depicts the FAA forecast for active general aviation aircraft in the United States. The FAA forecasts general aviation active aircraft to increase at an average annual rate of 0.5 percent over the next 20 years. The growth in business jet aircraft is expected to outpace that of personal/recreational use aircraft. The turbine-powered fleet is projected to grow at an average of 2.8 percent a year over the forecast period with the turbine jet portion increasing at 3.5 percent a year.



	Average Annual Growth												
	Fixed Wing						Rotorcraft						
	Piston			Turbine									
	Single Engine	Multi-Engine	Total	Turbo Prop	Turbo Jet	Total	Piston	Turbine	Total	Experimental	Sport Aircraft	Other	Total
2000-12	-0.8%	-2.5%	-1.0%	4.4%	4.5%	4.5%	2.9%	3.7%	3.4%	1.5%	NA	-1.4%	0.1%
2012-13	-0.7%	-0.4%	-0.7%	1.7%	2.9%	2.3%	2.7%	3.3%	3.1%	1.4%	3.7%	-0.1%	0.2%
2012-22	-0.5%	-0.6%	-0.5%	1.7%	3.2%	2.6%	2.4%	3.2%	2.9%	1.2%	2.2%	-0.1%	0.3%
2012-33	-0.2%	-0.6%	-0.3%	1.7%	3.5%	2.8%	2.2%	2.9%	2.7%	1.1%	2.0%	-0.1%	0.5%

Figure 2-1 US General Aviation Aircraft Forecasts[i]

2.3 Airport Service Area

An airport service area is the general geographic area which provides the majority of airport users for a particular airport. The airport service area is determined by evaluating the surface travel time (usually within 30 to 60 minutes) between populated areas and the airport. The location of competing airports, their capabilities and services, and their relative attractiveness and convenience is also considered to assess how much aviation demand would likely be accommodated by a specific airport.

The service area for Rolle Field, which is located on land within the rapidly developing city of San Luis, includes the cities of Yuma, San Luis and Somerton. Rolle Field is one of only two public use airports in Yuma County. Yuma International Airport, the other public airport, is located approximately 10 nautical miles northeast of Rolle Field and offers fuel, maintenance, aircraft storage, and tiedown services which are currently unavailable to the public anywhere else in the county, including Rolle Field. Yuma International Airport currently has 120 based aircraft reported on the FAA 5010 Form. The Somerton Airport, located 5.5 miles northeast of Rolle Field is a privately owned airport that is not open to the public without prior permission. The Somerton Airport offers fuel, maintenance, aircraft storage and tiedowns, and currently has 40 based aircraft.

Increased economic relations with Mexico continue to drive population and economic growth in the City of San Luis. In addition, a growing aerospace and defense testing industry and a strong logistics and distribution sector in Yuma County support a growing regional economy. Along with the potential for increased business and corporate aviation activity, this growing population and economy should also bring an increase in the number of personal or recreational general aviation aircraft owners and pilots. The forecast analysis conducted in the following sections takes into consideration the expected local and regional growth as well as any nearby airport(s) that may influence the Rolle Field service area.

2.4 Population Projections

Table 2-1 presents a summary of historical and forecast population for San Luis, Somerton, the City of Yuma and Yuma County**.** Between 1990 and 2012 each of these entities showed a positive increase in population, led by San Luis's staggering 29.0 percent Average Annual Growth Rate (AAGR) over the 22 year period. The AAGR for the populations of Somerton (8.1 percent), the City of Yuma (3.18 percent) and Yuma County (4.08 percent) more closely paralleled that of Arizona (3.48 percent), as a whole, for the same time period. The majority of San Luis' population growth can be attributed to the booming trade relations between the United States and Mexico.

Population projections for San Luis forecast a total population of 58,696 (2.06 percent AAGR) by the year 2033. While the forecast reflects a more moderate rate of growth for San Luis than currently exists, the growth rate remains higher than Somerton (1.77 percent annually), the city of Yuma (1.07) and Yuma County (1.55 percent annually), over the same forecasting period.

Table 2-1: Historic and Forecast Population[ii]

Year	San Luis	Somerton	Yuma (City)	Yuma County
Historical				
1990	4,210	5,315	55,805	108,100
2000	17,038	7,558	79,486	164,992
2012	31,080	14,796	94,825	205,174
Forecast				
2018	41,556	15,831	115,799	227,200
2023	47,740	17,850	124,777	250,200
2028	53,496	19,730	133,133	273,600
2033	58,696	21,428	140,684	297,700

2.5 Economic Outlook

According to the Arizona Department of Administration Office of Employment and Population Statistics, the primary sectors of Yuma County's economy are agriculture, trade, transportation and military/government. Agriculture and military/government are the two leading employment sectors and account for a combined 46 percent of total employment. Major employers in the area include the US Army, Yuma Regional Medical Center, Yuma Elementary School District, Wal-Mart Stores, Yuma City and County Government, the Marine Corps Air Station, Bose Corporation and the US Border Patrol. Although the region is heavily dependent on government and military related employment, it provides a relatively stable base. The manufacturing and industrial base on both sides of the border has grown at a steady rate, generating additional trade in the Yuma-Rio Colorado region. Maquiladoras, assembly plants located along the U.S.-Mexico border, are generally owned by non-Mexico corporations, and produce finished goods for the U.S. market. Originating in the 1960's but significant only since the 1980's; they depend on low-cost labor, favorable tariffs, and their proximity to the United States. A multibillion dollar industry, maquiladoras constitute one of Mexico's primary sources of export income and have stimulated migration to the border cities.

Despite the existing high unemployment rate for Yuma County, San Luis, and Somerton, the overall outlook for the Airfield's service area economies is good. Of particular importance is the continuing booming expansion and development of San Luis, as Rolle Field is now part of that community, and is positioned to contribute to and service this growing economy. The new commercial port of entry project and the private prison facility project discussed in Chapter One should spark growth in what is now eastern San Luis as both vendors and employees seek to be closer to their sources of income and prosperity.

2.6 Aviation Forecasts

Forecasts of general aviation activity, defined as all activity other than commercial, air taxi and military, are prepared to determine the types and sizes of facilities that should be planned to accommodate demand. Elements of general aviation demand that are examined usually include: based aircraft, the based aircraft fleet mix, annual operations, and peak activity. The remainder of this chapter will examine historical trends regarding these areas of general aviation and project future demand for these segments of general aviation activity at Rolle Field.

2.7 Based Aircraft

The number of general aviation aircraft which can be expected to base at an airport facility is dependent on several factors, such as airport communication practices, available facilities, airport operator's services, airport proximity and access, and similar considerations. Typically, a forecast of based aircraft begins with an examination of historic based aircraft data. However, Rolle Field currently does not have any existing based aircraft; therefore the future potential for based aircraft must be analyzed and forecasted. The basis for appraising this potential is an examination of the current Yuma County registered aircraft; historical based aircraft per 1,000 residents for the county; current based aircraft and future projections at Yuma International Airport; and forecasts from the 2008 Arizona State Aviation System Plan.

As a point of reference, **Table 2-2** summarizes historical registered aircraft in Yuma County and historical based aircraft at Yuma International Airport. From 123 aircraft in 1992 to 187 aircraft in 2012, the Yuma County registered aircraft grew at an average annual growth rate of 2.6 percent. For the same reporting period, the percentage of Yuma County registered aircraft based at Yuma International Airport has grown from 105 aircraft to 120 aircraft, reflecting an average annual growth rate of 0.7 percent. For further reference, the second section of Table 2-2 presents comparative forecasts from the current Yuma International Airport Master Plan Update and the Arizona State Aviation System Plan.

Table 2-2: Historical Registered Aircraft, Yuma County
Historical and Forecast Based Aircraft – Yuma International Airport[iii]

Year	Yuma County Registered Aircraft	Yuma International Airport Based Aircraft	Percentage of Yuma County Registered Aircraft Based at Yuma International Airport
1992	123	105	85%
1997	138	118	86%
2002	NA	152	NA
2007	NA	179	NA
2012	187	120	54%

Forecasts – Yuma International Airport

	2018	2023	2028	2033
2009 Yuma International Airport Master Plan Update	178	216	NA	NA
2008 Arizona State Aviation System Plan				
Low	218	239	262	NA
Medium	222	246	272	NA
High	239	273	312	NA

NA: Data Not Available

For Rolle Field, the 2008 Arizona State Aviation Systems Plan indicates a low and medium forecast of 1 based aircraft and a high forecast of 2 based aircraft throughout the system plan's 20-year forecasting period. These forecasts are based on Rolle Field's existing facilities at the time of the study, which did not include apron space and the currently existing hangar. In the same period, for Yuma International Airport, the system plan predicted an increase from 178 aircraft in 2007 to a range between 272 and 328 (low to high forecasts) by 2030. The 2001 Master Plan for Rolle Field forecast an increase from 0 based aircraft to 18 based aircraft by the end of its planning period in 2020.

One measure for forecasting potential based aircraft for Rolle Field would be based aircraft per 1,000 residents for the Airfield's service area. Typically, as an area's population increases, the number of aircraft per 1,000 residents decreases. For reference, a summary of historical and forecast registered aircraft per 1,000 residents for Yuma County is presented in **Table 2-3**.

Table 2-3: Yuma County, Aircraft per 1,000 Residents

Year	Yuma County Registered Aircraft	Yuma County Population	Aircraft Per 1,000 Residents
2012	187	205,174	0.91
Forecast			
2018	203	222,600	0.91
2023	223	245,500	0.91
2028	245	268,900	0.91
2028	245	268,900	0.91
2033	266	292,800	0.91

Rolle Field has no based aircraft, primarily because up until to 2011 there were no facilities for based aircraft and the airfield conditions were poor. Today a new hangar, parking apron, and four tiedown spaces have been constructed, and a runway overlay completed. Assuming that within a 5 year timeframe, with improved access roads and possibly provision for fueling, the hangar as well as some of the tie-down positions could easily be occupied. In addition, YCAA has plans to add a second hangar and double the size of the apron within the next five years. Assuming occupation of the existing hangar and a partial occupation of the additional facilities, it is reasonable to expect 3 based aircraft in the five year time horizon.

These three (3) aircraft in 2018 along with the combined projected populations of San Luis / Somerton of 57,387 equates to a 2018 ratio of 0.05 aircraft per 1,000 residents for the airfield's most immediate potential service area. Furthermore, these 3 aircraft represent approximately 1.4 percent of the total Yuma County registered aircraft. Utilization of these two factors (0.12 aircraft per 1,000 San Luis / Somerton residents, and 1.4 percent of the total Yuma County registered aircraft) allows one to prepare reasonable potential based aircraft forecasts for Rolle Field.

Table 2-4 presents future forecasts based on aircraft per 1,000 residents for the combined populations of the cities of San Luis and Somerton.

Table 2-4: Aircraft per 1,000 Residents

Year	Rolle Field Based Aircraft	Cities of San Luis and Somerton, Combined Population	Aircraft per 1,000 Residents
2013	0	45,876	0.00
2018	3	57,387	0.05
2023	7	65,591	0.10
2028	11	73,225	0.15
2033	12	80,124	0.15

It was assumed that for the first several years the aircraft per 1,000 residents would rise slightly over its 2018 ratio of 0.05 due to such factors as population growth, economic development and expansion (through annexation) of the city limits of San Luis. Eventually, however, the ratio of aircraft per 1,000 residents (population) should level as these influential socioeconomic factors return to more moderate levels. Potential based aircraft from the San Luis/Somerton area using this forecast method increases from 0 aircraft in 2013 to 12 aircraft by 2033.

Table 2-5 depicts San Luis/Somerton area potential based aircraft forecasts which are predicated on, first, a constant market share (1.4 percent) of forecast Yuma County registered aircraft, and secondly, an increasing market share percentage. Maintaining a constant 1.4 market share of Yuma County registered aircraft, potential based aircraft for Rolle Field should increase from 3 aircraft in 2018 to 4 aircraft by 2033, the end of the forecast period. By using a moderately increasing market share ratio of Yuma county registered aircraft, 8 potential based aircraft are projected for the airfield by the year 2033.

Table 2-5: Forecasts of Market Share of Yuma County Registered Aircraft

Constant Share			
Year	Yuma County Registered Aircraft	Rolle Field Based Aircraft	Percent of Yuma County Registered Aircraft at Rolle Field
2013	187	0	0.0%
2018	203	3	1.4%
2023	223	3	1.4%
2028	245	3	1.4%
2033	266	4	1.4%
Increasing Share			
Year	Yuma County Registered Aircraft	Rolle Field Based Aircraft	Percent of Yuma County Registered Aircraft at Rolle Field
2013	187	0	0.0%
2018	203	3	1.4%
2023	223	4	2.0%
2028	245	6	2.5%
2033	266	8	3.0%

A summary of all forecasts for potential based aircraft at Rolle Field, along with the selected 20 year planning forecast is presented in **Table 2-6**. The planning forecast is a median range projection which reflects Rolle Field garnering a larger percentage of Yuma County registered aircraft over the planning period. The expected continuation of local and regional economic and population growth supports the long-range capacity for potential based aircraft growth in the airfield's immediate service area. The planning forecast projects a potential of 8 based aircraft at Rolle Field by 2033. In all likelihood, actual activity will not follow any one of the projections exactly. A more logical and likely scenario is that potential based aircraft levels will fluctuate within the range of the projections depicted in **Table 2-6**.

Table 2-6: Rolle Field Potential Based Aircraft Forecast Summary

	2018	2023	2028	2033
Aircraft per 1000 Residents:				
San Luis / Somerton Area	3	7	11	12
Constant Market Share of:				
Yuma County Based Aircraft	3	3	3	4
Increasing Market Share of:				
Yuma County Based Aircraft	3	4	6	8
Other Forecasts:				
2008 State Aviation System Plan	2	2	2	2
Planning Forecast	**3**	**4**	**6**	**8**

2.8 Fleet Mix

The forecast mix of potential based aircraft was determined by examining existing and forecast U.S. General Aviation fleet trends. The FAA Aerospace Forecast Fiscal Years 2013-2033 was consulted for general aviation fleet mix trends and considered in the fleet mix projections. The fleet makeup of potential based aircraft at Rolle Field is anticipated to remain mostly single-engine piston aircraft; however, a small percentage of the future mix could consist of fixed wing, multi-engine and turboprop aircraft, as well as helicopters. This is consistent with national trends. The potential based aircraft fleet mix projections are summarized in **Table 2-7**.

Table 2-7: Based Aircraft Fleet Mix

Year	Total Based Aircraft	Single Engine	Multi Engine	Turbo Prop	Helicopter
Existing					
2013	0	0	0	0	0
Forecast					
2018	3	3	0	0	0
2023	4	3	1	0	0
2028	6	4	1	1	0
2033	8	6	1	1	0

2.9 Annual Operations

Currently, operations at Rolle Field consist of local training operations, both military and civilian. The airfield is used on a regular basis by flight instructors based at the Somerton Airport, and Yuma International Airport to practice touch-and-go operations as well as full-stop landings and takeoffs with students.

Since the airfield is unattended (no on-site employees) and has no airport traffic control tower, historic aircraft operations have not been accurately documented. The most current FAA Form 5010 available indicates 3100 total operations, consisting of 3,000 GA local operations and 100 military operations as of May 1, 2007. The FAA, in its advisory circular on Aviation System Planning, AC150/5070-7, advises using the regression model outlined in the white paper "Model for Estimating General Aviation Operations at Non-Towered Airports Using Towered and Non-Towered Airport Data" for estimating general aviation operations at non-towered airports. The white paper develops and presents a regression model for estimating general aviation operations at non-towered airports. Independent variables used in the model include airport characteristics, demographics, and geographic features. The model results in an operational level of 7257 total operations for the current year. Interviews with flight instructors based at both the Somerton Airport and Yuma International Airport suggest that this is a conservative estimate.

Table 2-8 shows historic operations estimates obtained from available FAA Form 5010 records together with the current year estimate derived from the FAA's "Model for Estimating General Aviation Operations at Non-Towered Airports." While the model estimates only total general aviation operations, it is known that military training occurs at Rolle Field. An estimate of 100 annual military operations based on the 2007 FAA Form 5010 is used for the 2007 and current year estimates.

Table 2-8: Estimated Aircraft Operations Summary

Year	General Aviation	Military	Total
1988	5,400	600	6,000
1989	2,600	1,000	3,600
1990	2,600	1,000	3,600
1992	2,600	1,000	3,600
1995	2,900	1,000	3,900
1996	2,900	1,000	3,900
1998	2,900	1,000	3,900
2007	3,000	100	3,100
2012	7,257	100	7,357

For forecasting purposes, two forecasts utilizing a percentage of Yuma County registered aircraft general aviation operations have been developed. These two forecasts use, as a baseline, Rolle Field's current estimated percentage share of the historical Yuma County general aviation operations as shown in **Table 2-9**.

Table 2-9: Historical Percentage of Total Yuma County General Aviation Operations[iv]

Year	Combined Total Yuma County General Aviation Operations [1]	Rolle Field General Aviation Operations	Rolle Field Percentage of Yuma County GA Operations
1996	28,385	2,900	10.2%
1998	24,380	2,900	11.9%
2007	42,047	3,000	7.1%
2012	75,911	7,257	9.6%

[1] Combined Yuma International Airport and Rolle Field Operations

The first forecast, shown on the first line of **Table 2-10** below, using a constant percentage equal to the current 9.6 percent share of total Yuma County General Aviation operations, results in an operational level of 9,564 in 2033. The second projection, on the second line of the table, uses an increasing share (0.1 percent annually) of total operations to arrive at 7,100 operations by the year 2020. A third forecasting method, on the third row of the table, uses the FAA's projected 1.5 percent annual increase, as described in the *FAA Aerospace Forecast Fiscal Years 2013-2033*, for a total of 9,921 operations by 2033. The fourth method, on the fourth line of the table, is based on the relationship between operations at Rolle Field and the projected growth in Yuma County Population. As an additional reference, the median growth rate of 1.96% for operations forecasts from the 2008 Arizona SASP is presented on the fifth line of the table. The last line of **Table 2-10** is the planning forecast, which was arrived at by analyzing and comparing these varied methodologies, and then weighing the results along with several other factors influencing growth both on and around the airfield. Together these forecasts, including the planning forecast represent the "planning envelope."

Table 2-10: Comparative Annual General Aviation Operations Forecast Summary

	2018	2023	2028	2033
Constant Share of YIA Operations	7,910	7,910	8,966	9,564
Increasing Share of YIA Operations (+0.1% Annually)	8,358	9,356	10,403	11,549
FAA's Projected 1.5 Percent Annual Increase	7,935	8,548	9,209	9,921
Constant Share of Projected Yuma County Population	7,952	8,757	9,576	10,420
SASP Projected 1.96 Percent Annual Increase	8,153	8,984	9,900	10,909
Planning Forecast	**7,952**	**8,757**	**9,576**	**10,420**

Figure 2-2 depicts the planning forecast and "forecast envelope." For the short term, at least, it is assumed that training (local operations) will continue to be the driving factor in the number of operations at Rolle Field. Additional activity, however, resulting from the anticipated economic and population growth in the airport's service area should begin to exert some influence on the number of annual operations at Rolle Field in the next few years, and will most likely lead to an increase in the number of annual operations. The planning forecast accounts for this additional activity, as well as additional activity resulting from the increased numbers of potential based aircraft and, given the development of the proper airfield facilities, increased itinerant use of Rolle Field. This forecast projects annual operations at Rolle Field of 10,420 by the year 2033.

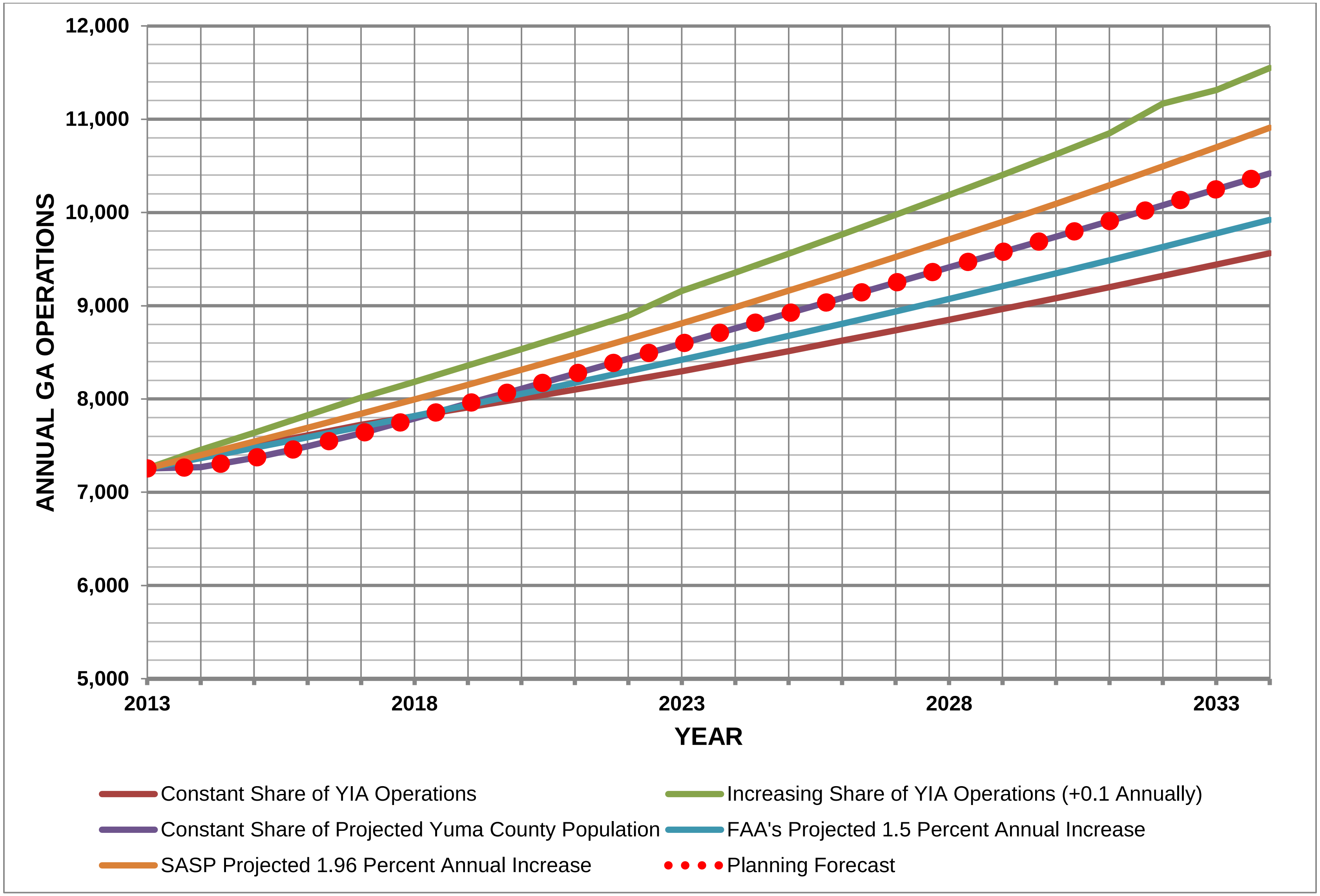


Figure 2-2: Annual General Aviation Operations Forecast

There are two types of general aviation operations at an airport: local and itinerant. A local operation is a take-off or landing performed by an aircraft that operates within sight of the airport, or which executes simulated approaches or touch-and-go operations at the airport. Generally, local operations are characterized by training operations. Itinerant operations are those performed by aircraft with a specific origin or destination away from the airport. Typically, itinerant operations increase with business and industry use since business aircraft are used primarily to carry people from one location to another.

Without a tower or formal airport records, percentage of local to total airfield operations can only be estimated. Given Rolle Field's close proximity to Yuma International Airport, plus the neighboring restricted airspace, and lack of existing landside facilities to attract based aircraft, it is assumed that, for the immediate future, local (training related) operations will continue to account for the majority of operations at Rolle Field. It is further assumed that, eventually, based on potential based aircraft projections and the continued regional economic growth, the demand for adequate landside facilities will need to be addressed. Once this occurs, the airfield will begin to experience an increasing percentage of itinerant operations. Projections of the long term (20 year) operations mix total shown in Table **2-11** reflect an estimate of 90 percent local to 10 percent itinerant operations in the short term, growing to an estimate of 80 percent local to 20 percent itinerant at the end of the planning period.

Table 2-11: Aviation Forecast Summary

	2018	2023	2028	2033
Annual Operations				
GA Itinerant Operations	795	1,751	1,915	2,084
GA Local Operations	7,157	7,006	7,661	8,336
Total Annual GA Operations	**7,952**	**8,757**	**9,576**	**10,420**
Military Operations	100	100	100	100
Total Annual Operations	**8,052**	**8,857**	**9,676**	**10,520**
Based Aircraft	**3**	**4**	**6**	**8**

2.10 Peaking Characteristics

Many airport facility needs area related to the levels of activity during peak periods. The periods used in developing facility requirements for this study are as follows:

- **Peak Month** – the calendar month when peak operations occur
- **Design Day** – The average day in the peak month. Normally, this indicator is derived by dividing the peak month operations by the number of days in a month.
- **Busy Day** – The busy day of a typical week in the peak month.
- **Design Hour** – The peak hour within the design day. This descriptor is used primarily in airfield demand/capacity analysis, and in determining terminal building and access road requirements.

Adequate operational information is not available to directly determine peak aviation activity at the airport; therefore, peak period forecasts have been determined according to trends experienced at similar airports across the country. Typically, the peak month for activity at general aviation airports approximates 10-12 percent of the airport's annual operations. Peak month operations have been estimated as 11 percent of annual operations. The forecast of busy day operations at the airport was calculated as 1.25 times design day activity. Design hour operations were calculated as 13.0 percent of design day operations. **Table 2-12** summarizes peak activity forecasts for Rolle Field.

Table 2-12: Peak Period Forecasts

	2018	2023	2028	2033
Annual Operations	8,052	8,857	9,676	10,520
Peak Month	886	974	1064	1157
Design Day	30	32	35	39
Busy Day	32	36	39	42
Design Hour	5	5	6	6

2.11 UAS FORECASTS

While unmanned aircraft systems (UAS) have existed for decades, they began to reach new heights in 2009 when the U.S. Department of Defense actually started training more pilots to fly unmanned aircraft than manned aircraft.[v]

The unmanned aircraft industry continues a pattern of steady growth in the US, and significant Pentagon spending on UASs in recent years has attracted new manufacturers and new service providers to join the existing pool of large defense contractors already in the business. Demand continues to increase for non-federal unmanned aircraft as well, including smaller UASs. "As this technology shifts from the battlefield to civilian and commercial uses, we will only see more of these jobs created," said fellow co-chair Howard McKeon, a Republican from California. "Defense, intelligence, scientific, and law enforcement agencies along with broad support from the general public recognize the true value of unmanned systems and their ability to provide exceptional situational awareness at a substantially lower cost, minimizing risks and protecting lives," McKeon said in a letter to the acting administrator of the FAA encouraging continued integration of UASs into the national airspace system.[vi]

Rolle Field is an ideal environment for UAS testing due to its clear, stable air and extremely dry climate where inclement weather is a rarity. In addition, Rolle Field has a low density altitude, which can translate into enhanced engine performance. Other attributes include its remote location, few high density population centers, diverse airspace, and capability to expand.

When considering the forecast for Rolle Field, the FAA's role and ability to integrate UASs into the NAS will be considered, in addition to scenarios from several other UAS groups and associations. A summary of those scenarios have been listed in the table below:

Table 2-13: UAS Growth Scenarios[vii]

NO GROWTH SCENARIO – Much of the future job growth is contingent on what the FAA decides in 2012, 2013 and 2015. Once the rulings are finalized the courts will likely be expected to rule on privacy and national security concerns. Federal regulations could dramatically limit the UAS industry in the name of privacy or national security, frightening away venture capital investors, reducing job creation in the sector, and limiting any need for specialized training programs.
LIMITED GROWTH SCENARIO – The FAA and Congress have already placed limits on unmanned aircraft uses based on weight classifications. Police organizations in Houston, Arlington, and Montgomery County are already using unmanned aircraft under 50 pounds. Non-government users may be further limited to aircraft less than 20 pounds, which would also limit range and payload capabilities. This lack of certainty is slowing investment and commercialization opportunities in the UAS market, and Congress has mandated the FAA to develop the new regulations by Sept. 2015. Under this scenario, the small UAS market can be expected to dominate the commercial UAS space while larger platforms remain primarily used for military applications. These size restrictions would limit some commercial applications such as unmanned large cargo package delivery services.
HIGH GROWTH SCENARIO – The FAA could allow small unmanned aircraft for private use early on in this process. That would involve rules regarding the kind of training that pilots will need in addition to meeting airworthiness standards for the aircraft. If the FAA opens the American skies to unmanned aircraft then the Association for the Unmanned Vehicle Systems International (AUVSI) trade association's projections that the industry would grow from around 25,000 non-military workers today to more than 46,000 direct workers in 2025 could become a reality. Such a scenario would generate significant training demand for specialized UAS skills.

2.11.1 UAS Service Area Considerations

The service area for the UAS market does not follow the traditional considerations of population and the location of other airports within the regional service area due to the UAS market's specific operational and use criteria. The UAS mission is more specific in nature and does not inherently follow the same track as general aviation aircraft operations and use. However, southern Arizona already offers a number of advantages to a developing UAS industry with its open spaces, good weather, and technically compatible environment. Many UAS, and other similar research and development operations are already located in the region in the form of military and government test ranges. One of the busiest UAS training centers in Arizona is Fort Huachuca with 35,000 UAS takeoffs and landings annually. In addition to the Army's operations at Fort Huachuca, Yuma Proving Grounds is utilized as the Army's desert environment test center covering 1,200 square miles of terrain and 2,000 square miles of restricted airspace. The Yuma Test Center continues to play a key role in the development and testing of UAS in Arizona today. Rolle Field is uniquely positioned to offer support to existing operators and facilities in the region, and to serve as a new base for development and testing of UAS outside of the existing military or government reservations.

To adequately compete in this arena, Rolle Field will also need to overcome a number of disadvantages and challenges as well. Supporting infrastructure necessary to UAS operations will need to be developed including adequate electrical and utilities, support structures, hangars, and communications including comprehensive radio frequency coordination to allow operations of UAS without interference to existing operators at Yuma International Airport and other operators in the surrounding region. The additional challenges of operating a future "mixed fleet" of UAS vehicles and conventional General Aviation Aircraft in a coordinated and safe fashion at Rolle Field will need to be addressed as well.

For the purpose of this master plan the Rolle Field service area will be defined as including the Yuma Proving Grounds (YPG) and continuing east to areas along the Barry Goldwater range and south to the US/Mexican Border. See **Figure 2-3** below.

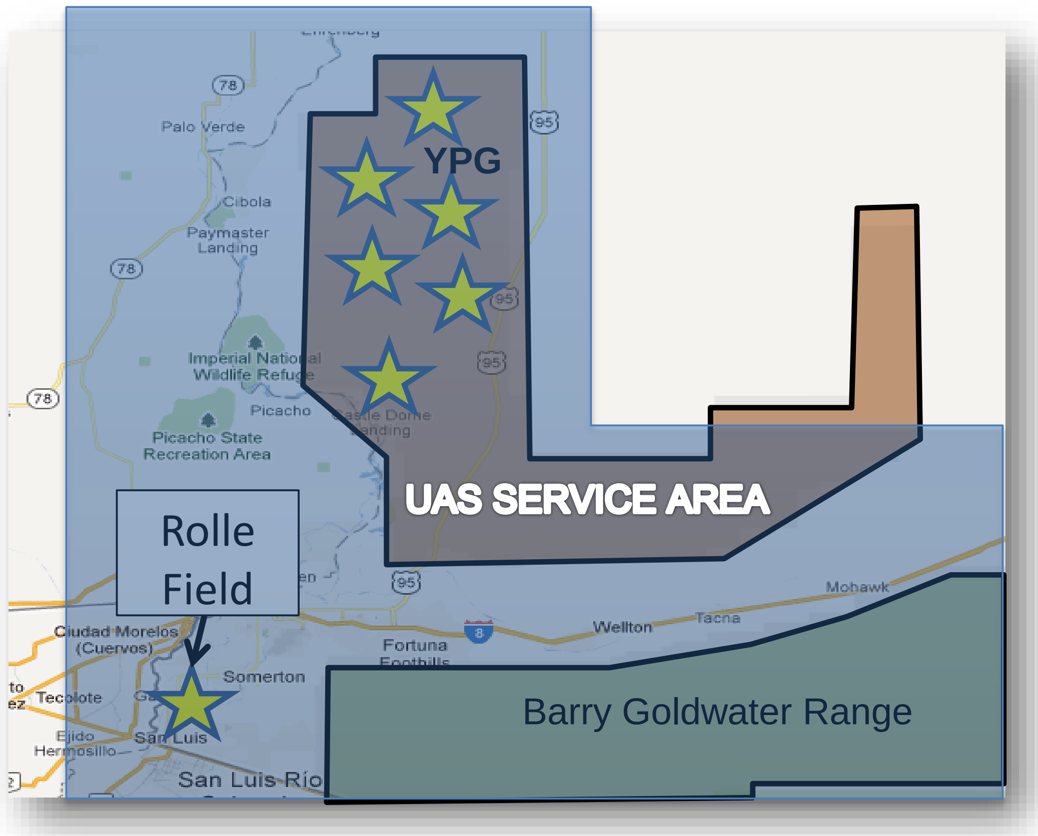


Figure 2-3: UAS Service Area

2.11.2 Economic Variables

<u>UAS Market Impact</u>

The UAS market will continue to generate a large economic impact to the Southwest and Yuma. According to the Arizona Aerospace and Defense Commission, the committee has already identified Yuma Proving Grounds (YPG) as a prime location for a Test Range, and the residual effects of those operations, and new UAS development in Arizona will certainly exert a strong influence on Rolle Field in the future.

There are currently eight (8) UAS test sites in the YPG range ranging from small to large in size and facilities. As the UAS Market expands, the need for more test sites will be evident, and

Rolle Field is in prime location to support such future expansion that will incorporate UAS's into the NAS. In addition, the expansion of elements of the DCC to Rolle Field will provide the necessary resources and amenities to UAS test site accommodations.

While the state of Arizona was not identified as one of the six designated test sites by the federal government, the forecast for UAS operations at Rolle Field is still significant. Anchored by the Yuma International Airport's Defense Contractors Complex (DCC), coupled with a successful FAA integration of the UAS to the NAS, forecasts indicate that Arizona will have a financial impact estimated at over $94 million by 2015.[viii]

UAS Market for Rolle Field

For the purpose of this master plan, the economic impact forecasts will be directly linked to our operational forecasts and the "limited growth scenario" applied to our calculations. This allows for the provision of a more realistic or "high probability" approach to Rolle Field airport development forecasting with regard to the UAS market within the southwest. In the event the "high growth scenario" occurs within the 20-year planning period, a new evaluation will be required. In conclusion, an annual growth factor of 5% of operations occurring within the service area of Rolle Field will be applied as a starting point of future operations that may be accommodated at the airport.

The Economic Impact Study by the Association for the Unmanned Vehicle Systems International dated March 2013 was used as a basis for our calculations. This study is a comprehensive look at economic impact to the US when the UAS market is fully integrated to the NAS. This study concluded the following:

1. The economic impact of the integration of UAS into the NAS will total more than $13.6 billion in the first three years of integration and will grow sustainably for the foreseeable future, cumulating to more than $82.1 billion between 2015 and 2025

2. Integration into the NAS will create more than 34,000 manufacturing jobs and more than 70,000 new jobs in the first three years

3. By 2025, total job creation is estimated at 103,776

4. The manufacturing jobs created will be high paying ($40,000) and require technical baccalaureate degrees

5. Tax revenue to the states will total more than $482 million in the first 11 years following integration (2015-2025)

6. Every year that integration is delayed, the United States loses more than $10 billion in potential economic impact. This translates to a loss of $27.6 million per day that UAS are not integrated into the NAS.

It is important to note that the projections from the March 2013 AUVSI Economic Impact Report are based on the current airspace activity and infrastructure in a given state. As a result, states with an already thriving aerospace industry are projected to reap the most economic gains. However, a variety of factors such as: state laws, tax incentives, regulations, the establishment of test sites and the adoption of UAS technology by end users will ultimately determine where jobs flow. The same report shows that Arizona will continue to prosper and capture a significant portion of the UAS market. See the below table:

Table 2-14: Arizona Economic Impact

Year	Direct Employment	Total Employment Impact	Total Direct Spending ($M)	Total Economic Impact ($M)	Total State Taxes ($K)	Percent Change Over Previous Year
2015	494	961	$47.19	$93.43	$430.90	
2016	989	1922	$94.37	$186.86	$861.80	100%
2017	1483	2883	$141.56	$280.29	$1,292.70	50%
2018	1557	3027	$148.64	$294.30	$1,357.34	5%
2019	1635	3179	$156.07	$309.02	$1,425.20	5%
2020	1717	3338	$163.87	$324.47	$1,496.46	5%
2021	1803	3504	$172.07	$340.69	$1,571.29	5%
2022	1893	3680	$180.67	$357.73	$1,649.85	5%
2023	1988	3864	$189.70	$375.61	$1,732.34	5%
2024	2087	4057	$199.19	$394.39	$1,818.96	5%
2025	2191	4260	$209.15	$414.11	$1,909.91	5%

With the federal government's current emphasis on airspace integration and developing federal policies underway, further consideration will be provided in this master plan for providing facilities to accommodate a portion of the potential UAS market at Rolle Field.

2.11.3 UAS Aircraft Forecast

Unmanned Aircraft Systems (UAS) come in a variety of shapes and sizes, and serve many purposes. Some have wingspans as large as a Boeing 737 and some are smaller than a radio controlled model airplane. UAS have changed from remotely piloted vehicles with limited capabilities to semi and fully autonomous vehicles with expanded potential commercial applications. In the United States alone, over 50 companies, universities, and government organizations are developing and producing over 155 unmanned aircraft designs. For the purpose of this study, the UAS aircraft will be divided into two types, medium sized and small UAS. More specific speculation of the different sizes and types are very difficult to project, due to the classified nature of most UAS operations today.

Forecast Considerations

Although the UAS market has shown positive growth on all fronts, a growing opposition at the federal, state and local level to the deployment of UASs by law enforcement agencies and private enterprises without federal guidelines for privacy protections has slowed efforts by the Federal Aviation Administration (FAA) to begin the integration process of UAS into the national airspace system.

Dyke Weatherington, the deputy director for Unmanned Warfare in the Office of the Undersecretary of Defense for Acquisition, Technology and Logistics (AT&L), said the industry should be prepared to see at least a 25 percent reduction in Department of Defense (DOD) UAS spending from FY 2013 through FY 2016. In addition, Weatherington displayed a chart that showed a $5.8 billion reduction in FY 2013 budget requests at the service and DOD-wide levels for unmanned aerial systems.

Larger fixed wing UAS's ability to use Rolle Field will be limited by runway length. In addition, because the allowable crosswind component for a UAS is generally lower, the lack of crosswind runways may also limit UAS operations to some degree.

For forecasting purposes a balance must be reached that accounts for a dramatic increase in demand for UAS services, especially when integration into the NAS is achieved, and future legal and funding constraints that may occur. Therefore, this report will take a conservative approach to its forecasts based on current available data.

UAS "Based" Aircraft Forecast

The Federal Aviation Administration definition of based aircraft states: *A based aircraft at your facility is an aircraft that is "operational & air worthy", which is typically based at your facility for a MAJORITY of the year.*[ix] No references between manned and unmanned vehicles are included in the FAA's current definition. But, while the FAA does not officially consider UAS aircraft as based aircraft today, they are currently evaluating how they will be integrated into the NAS, and as such their position on based aircraft status should change in the future. The current requirements for Special Airworthiness Certification, and Certification for Civil Operated Unmanned Aircraft Systems (UAS) and Optionally Piloted Aircraft (OPA), all precursors to registration requirements, already play a major role towards that determination.

The Evaluation and Special Projects Branch, AIR-240, directs the airworthiness certification process for civil operation of UAS and OPA. In no case may any UAS or OPA be operated in the National Airspace System as civil unless there is an appropriate and valid airworthiness certificate issued for that UAS or OPA. U.S. registration is a prerequisite for the issuance of a special airworthiness certificate to UAS and OPA. Currently, the FAA issues UAS and OPA two types of special airworthiness certificates: special flight permits and experimental certificates. Special flight permits are issued for production flight testing of new production aircraft. Experimental certificates are issued only for the purposes of:

- Research and Development
- Crew Training
- Market Survey

FAA Order 8130.34 provides requirements for airworthiness certification of UAS and OPA, and provides guidelines to ensure that applicants qualify as a civil operator. Public operators of UAS and OPA follow Certificate of Authorization or Waiver (COA) procedures.

Depending on the eventual FAA decision pertaining to "based aircraft status" for UAS vehicles, the profile for based aircraft at Rolle Field Airport could change dramatically. For example, the FAA could rule that only UAS aircraft that meet or exceed a specific weight and size specification such as 500 pounds and/or a wingspan of 20 feet are eligible to be considered as based aircraft. This would allow most of the larger versions of UAS vehicles to be counted. However, if FAA rules that any UAS vehicle regardless of size or weight could be counted as a based aircraft, then the count would likely be substantially higher.

Until such time as FAA changes the status of UAS vehicles and their "based aircraft" designation, the presence of UAS vehicles on the field will not increase the facilities "based aircraft" count. Instead this report will identify UAS vehicles that may be stored or housed at facilities on Rolle Field separately from traditional based aircraft.

Methodology

Since UAS development still represents a relatively new emerging technology, historical information or trends upon which to base future forecasts is very limited. Estimates of future activity may be derived from the forecast numbers of UAS's as shown in the **Table 2-15**, with potential extrapolations made from those vehicles that are likely to be deployed from the Rolle Field Service Area. Because of the strong economic impact potential of the Yuma County area, the forecast utilized the percent of growth factor from the forecast economic impact for the overall market in Arizona. This correlation is anticipated to represent the highest probability for the UAS Market and its potential for operating as part of the DCC at Rolle Field.

YPG tested over 2,600 UAS in 2011[x]. The customer base included the DOD, large experienced contractors, and small businesses testing the UAS systems from flight, payload to air vehicle performance and on range flight operations. The presentation also discussed challenges facing YPG and the continued growth of the UAS market in the commercial arena. These challenges included: safety, non-traditional use of restricted areas, training for UAS support personnel and support for longer range flight operations.[xi] Rolle Field's centralized location adjacent to YPG's training and operations area, other federal lands, and large farming communities, make its location a viable airfield alternative for YPG's continued mission of air combat systems tests. Therefore, Rolle Field could ultimately capture a portion of YPG's UAS operations and testing for longer range flight operations.

Fleet Mix

The fleet mix continues to be highly speculative due to the emerging new technologies and diverse market factors that are driving both new commercial UAS development and traditional military UAS missions. This master plan takes into account those factors identified above, along with the factors and resources present at the DCC at Yuma International Airport and how they would apply or extend to Rolle Field.

The DCC provides government agencies and defense contractors with a secure center for completing defense testing and technological based activities in Southwest Arizona.[xii] The park supports companies within the defense aviation industry, and the Yuma County Airport Authority provides tenant accommodations tailored to their needs. This mission will also apply to Rolle

Field, providing an airfield and open facilities to contractors that need UAS and UAS testing support.

The type of UASs that may be accommodated at Rolle Field will likely vary from small to medium sized systems, and all can be accommodated within its surrounding airspace. However, airfield facilities are currently restrictive and building facilities are limited. In this study, based on trends and actual UAS operations within Rolle Field's service area, accommodation of small UAS testing is highly variable based on the current airspace and FAA regulations. For the near term, UAS under Cat I & II will reflect the most realistic type of UAS activities likely to occur. They are small to medium size in category. (See the following table and explanation of UAS alignment of UAS Categories with current FAA Regulations).

Table 2-15: Alignment of UAS Categories with FAA Regulations[xiii]

		Certified Aircraft/UAS (Cat III)	Non-Standard Aircraft/UAS (Cat II)	RC Model Aircraft/UAS (Cat I)
FAA Regulation		14 CFR 91	14 CFR 91,101,& 103	Non (AC 91-57)
Airspace Usage		All	Class E, G & non-joint use Class D	Class G (<1200 AGL)
Airspeed Limits, KIAS		None	NTE 250 proposed	100 proposed
Example Types	Manned	Airlines	Light Sport	None
	Unmanned	Predator, Global Hawk	Pioneer, Shadow	Dragon Eye, Raven

According to the UAS 2005-2030 Roadmap Report by the Department of Defense the following section regarding UAS categories describes how UAS categories compare to FAA regulations. The following sections listed below are from Section F in the study and describes each category in detail. The terms within **Table 2-15** are further defined below:

- **UAS – Cat III**: capable of flying throughout all categories of airspace and conforms to Part 91. (i.e., all the things a regulated manned aircraft must do including the ability "to see and avoid"). Airworthiness and operator certification are required. UA are generally built for beyond line-of-sight operations. Examples: Global Hawk, Predator.

- **UAS – Cat II**: non-standard aircraft that perform special purpose operations. Operators must provide evidence of airworthiness and operator qualification. Cat II UA may perform routine operations within a specific set of restrictions. Examples: Pioneer, Shadow
  - The FAA approved a light-sport category in the regulations, and does not require either airworthiness or pilot certification (similar to Part 103 aircraft) for certain uses and limited operations. These aircraft achieve an equivalent level of safety to certificated aircraft with a slightly lower level of reliability. There are also many restricted category aircraft that perform special purpose operations. A number of U.S. military UA (U.S. Navy's Pioneer, U.S. Army's Shadow and Hunter) share similar characteristics and performance. This plan calls for these UA (Cat II) to be treated similarly to ultra-lights, light-sport, or restricted category aircraft.

- **UAS – Cat I**: analogous to RC models as covered in AC 91-57. Operators must provide evidence of airworthiness and operator qualification. Small UA are generally limited to visual line-of-sight operations. Examples: Pointer, Dragon Eye
  - The FAA has chosen not to explicitly regulate certain other aircraft, such as model rockets, fireworks, and radio-controlled (RC) model aircraft. 14 CFR Part 101 specifically exempts smaller balloons, rockets and kites from the regulation and AC 91-57 addresses RC model airplanes, but is advisory only. These systems are omitted from the regulations. All three U.S. Military Departments currently employ UASs in the same size, weight, and performance regimes as those of RC models (e.g., Pointer/Raven for the Army and Air Force, and Dragon Eye for the Marine Corps). This plan calls for small UAS similar to RC model aircraft (and operated similarly) (UA (Cat I)) to be treated similarly to RC model aircraft. In addition, the FAA uses non-mutually exclusive categories such as balloon, glider, airship, airplane, rotorcraft, and engine-driven aircraft for determining which flight has the right-of-way. 14 CFR 103 requires ultra-lights to yield the right-of-way to all other manned aircraft. Similarly, the FAA provides avoidance (right-of- way) advice for RC model aircraft in an Advisory Circular.

Note: It is important to note that the FAA uses the term “category” in two different ways (14 CFR 1). The first category term is used with respect to the certification, ratings, privileges, and limitations of airmen. The term “category” means a broad classification of aircraft. *Examples include airplane, rotorcraft, glider, and lighter-than-air.* The second category term used with respect to the certification of aircraft, the term “category” means a grouping of aircraft based upon intended use or operating limitations. *Examples include transport, normal, utility, acrobatic, limited, restricted, and provisional.*

In addition to regulatory changes necessary for routine operation of military UAS in civil airspace, FAA’s UAS integration to the NAS will require changes to the Advisory Circulars and FAA Order 7610.4K (Special Military Operations).

This master plan addresses the use of UAS that fall under CAT I & II, and the majority will, most likely, be small Group 1 – 2 and medium Group 3 to include the Shadow that weighs in less than 1,320 lbs. (See Chapter 1, Table 1-5 for categories). Rolle Field may accommodate larger UAS, when FAA airspace integration is achieved in 2015. Further discussions of facilities requirements will be presented in the next chapter.

UAS OPERATIONS FORECAST

Methodology

The Rolle Field’s service area includes YPG, which is Yuma County’s, and Arizona’s largest single employer of civilians and the county’s primary high tech workplace. The proving ground sends over $425 million dollars into the economy each year. One of the largest military installations in the world, bigger than the state of Rhode Island, the role of U.S. Army Yuma Proving Ground (YPG) is to conduct military tests consisting of nearly every weapon system and munitions in the ground combat arsenal. Yuma Proving Ground performed over two million man-hours of work, making it the Army’s busiest test center for the second year in a row.[xiv]

The YPG test center routinely hosts 1,500 UAS takeoffs and landings per day.[xv] The total number of aircraft operations was over 547,000 operations last year. YPG’s TEMO hosts a fewer number of UAS units than conventional ground units, and faces unique challenges accommodating units that take to the skies. Because of YPG's robust UAS testing schedule, there are challenges accommodating the current level of UAS testing demands, and indications are that this demand level will continue to grow in the future. This is an opportunity for Rolle Field to act as a type of "reliever" to those companies' testing at YPG and unable to be accommodated "on site" due to airspace traffic, facility limitations and operations.

The same high probability assumption was applied to UAS operations forecast as previously used in the manned aircraft forecasts. Assuming 5% economic growth, the master plan will utilize the same percentage to capture the number of possible operations that may utilize Rolle Field Airport in the future. The growth will continue consistently through the 20 year planning period.

Table 2-16: UAS Aircraft and Operations Forecast

	Stored UAS	Temporary UAS	TOTAL UAS Stored Aircraft	Transient UAS	*Total UAS	UAS Forecast Operations	Percent Growth
Existing							
2013	0	0	**0**	0	0	0	0.00%
Forecast							
2018	13	26	**39**	91	130	27,375	5.00%
2023	14	27	**41**	96	137	28,744	5.00%
2028	14	28	**42**	100	142	30,181	5.00%
2033	15	30	**45**	104	149	31,690	5.00%

Assumptions:

1. Stored UAS: 1% of Total UAS
2. Temporary UAS: 20% of Total UAS + 100% Small UASs categorized in Cat I & II, Groups 1A through 2
3. Total UAS Stored Aircraft: Aircraft numbers used to calculate Facility Requirements
4. Transient UAS: UAS projected to test at Rolle Field and/or utilize the airfield on a daily basis, but do not have permanent operations at the airport
5. Total UAS: includes all UASs that may use the facility for testing, R&D and marketing purposes. These users may not reside at the airfield for extended periods.

Note: For the purpose of this study, based or stored aircraft counts include the temporary UAS users anticipated to use the facility in short time frames (6 months or less). This allows for a systematic and realistic facility development for the 20-year planning period.

Endnote References: Chapter 2

[i] FAA Aerospace Forecast Fiscal Years 2013-2033

[ii] Historic Estimates 2000-2012- Arizona Office of Employment and Population Statistics, The State Demographer's Office (http://www.workforce.az.gov/)Yuma County forecasts 2012 - 2050 - Arizona Department of Administration, Office of Employment & Population Statistics, 12/07/2012Somerton, San Luis Forecast 2006 - 2055 Source: Arizona Department of Economic Security, Research Administration, Population Statistics Unit, 12/01/06. Note: population projections for Yuma County completed 12/7/2012. Projections for San Luis and Somerton 12/1/06 most current available at time forecast prepared.

[iii] 1991-1997, 2001 Rolle Field Master Plan; 2002-2007 Yuma International Airport Master Plan Update; 1998-2001; 2008-2012 FAA Terminal Area Forecast (TAF); Note: TAF based aircraft excludes "other", presumed military aircraft; Registered Aircraft Data: FAA Aircraft Registry Database (http://registry.faa.gov/aircraftinquiry/StateCounty_Results.aspx?Statetxt=AZ&Countytxt=YUMA&PageNo=1); Forecast Data Sources: 2008 Master Plan Update, 2008 State Aviation System Plan

[iv] 1996 and 1998 Data - 2001 Rolle Field Master Plan; 2007 Data - FAA Form 5010, Airport Master Record, and 2009 Yuma International Airport Master Plan

[v] Walter Pincus. “Air Force to Train More Remote Than Actual Pilots.” The Washington Post. August 11, 2009.

[vi] Congressional unmanned systems caucus press release. “Congressman McKeon shares concerns with FAA over unmanned systems integration into the national airspace.” August 7, 2012

[vii] Table from an article dated September 2012, Unmanned Aircraft Systems, by Mick Normington and Michael Bettersworth

[viii] AUVSI Economic Impact Report 2013

[ix] http://www.BasedAircraft.com

[x] Based on a YPG UAS overview presentation given by Mary Beth Weaver, lead test director for UAS testing at YPG’s Aviation Systems Branch, in 2011.

[xi] adrc.asu.edu/sites/default/files/erau/Weaver.pdf

[xii] www.defensetesting.com/about.htm

[xiii] Table from Appendix F in UAS Roadmap 2005-2030, Office of the Secretary of Defense Report

[xiv] “Yuma Proving Ground – the Army’s busiest test center”, by Mark Schauer, March 11 2013

[xv] “Southwest Arizona proving ground developing into unmanned aircraft testing hub”, by Mark Schauer, April 13, 2013

Facility Requirements

This page intentionally left blank.

CHAPTER THREE:

FACILITY REQUIREMENTS

3.1 Introduction

The previous chapter forecasted the levels of aviation demand that could reasonably be expected to occur at Rolle Field through the planning period (2033). This chapter will assess whether or not existing facilities are adequate to meet that demand. This chapter will also identify what types and quantities of new facilities may be required as well as establish a time frame for when these facilities may be needed to accommodate the future demand. Further, an extensive analysis will be conducted to insure that all airside facilities meet current FAA design standards and, if necessary, a list of all deviations from the current standards will be provided.

The FAA outlines the essential facilities into the following categories:

- Runways
- Taxiways
- Navigational Aids
- Aprons
- Terminal Building and Associated Facilities
- Airport Access and Automobile Parking
- Airport Support Facilities

This chapter will provide a complete assessment of these facilities at Rolle Field. The requirements for new facilities will be expressed in Planning Horizon Activity Levels rather than in years. This is because the need to develop facilities is determined by demand, rather than a point in time. Activity levels for short, intermediate and long term planning horizons roughly correlate to five-year, ten-year, and twenty-year time frames in the forecasts. Future facility needs will be tied to these activity levels rather than a specific year in order to retain flexibility in the plan. **Table 3-1** summarizes the activity levels that define the planning horizons used in the remainder of this master plan.

Table 3-1: General Aviation Planning Horizon Activity Levels

	Short Term Planning Horizon	Intermediate Term Planning Horizon	Long Term Planning Horizon
Based GA Aircraft	3	4	8
Annual GA Operations	8,052	8,857	10,520

Separate planning activity levels for requirements related to Unmanned Aircraft Systems (UAS) at Rolle Field are provided in Section 3-7 of this chapter.

3.2 General Aviation Demand / Capacity Analysis

Based on the forecasts from Chapter 2, it is expected that within 20 years, the airport is likely to provide service for over 10,500 General Aviation operations per year. Future development at the airport within this time frame will be necessary to accommodate this future demand. The next step in the Demand / Capacity Analysis is to determine the current capacity of the airfield.

The principal guidance for the analysis of airfield capacity is FAA Advisory Circular 150/5060-5, Airport Capacity and Delay. There are two key measurements of airfield capacity that assist planners in evaluating the adequacy of airfield facilities. Hourly capacity considers the throughput during a typical busy hour. Factors such as percentage of arrivals, runway crossings, and taxiway exit locations are considered to arrive at an hourly number of aircraft that can use the airfield without undue delays.

Annual Service Volume (ASV) is an estimate of the number of aircraft operations that can be accommodated in one year. This measure is used to program additional runways, and/or modified taxiway exits. Airfield capacity improvements are typically programmed when actual annual operations reach 60 percent of ASV and constructed when operations reach 80 percent of ASV.

This approach utilizes the projections of annual operations by the specified fleet mix as projected in the Aviation Activity Forecasts. It considers a variety of factors including airfield layout, meteorological conditions, runway conditions, runway use, aircraft mix, percent arrivals, percent touch-and-go's, and exit taxiway locations. The demand characteristics that are relevant to calculating airfield capacity are the mix of aircraft types that utilize the airport in the busy hour along with the percentage of arrivals and the percentage of touch-and-go operations. Aircraft types are classified according to size as shown below.

Class A: Small single engine aircraft weighing less than 12,500 pounds

Class B: Small twin engine aircraft weighing less than 12,500 pounds.

Class C: Aircraft weighing between 12,500 pounds and 300,000 pounds

Class D: Aircraft weighing more than 300,000 pounds

Rolle Field has a single runway with no parallel taxiway, has no instrument approach procedures and no aircraft in Class D. According to FAA Advisory Circular 150/5060-5, Airport Capacity and Delay, this airfield configuration should yield an hourly capacity of approximately 98 aircraft per hour in VFR conditions. The approximate annual capacity of this airfield configuration is estimated at 230,000 operations. The Annual Service Volume and the VFR hourly far exceed the demand projections for the 20 year period.

3.3 Airfield Requirements

The Federal Aviation Administration (FAA) introduced a new Airport Design Advisory Circular 150/5300-13A in September 2012 which included clarifications, revisions and the introduction of new terms. In February 2014, the FAA issued Change 1 to the Airport Design Advisory Circular which added new Approach and Departure Reference Codes to replace Runway Reference Codes and expanded Taxiway Fillet Design criteria.

As always, the planning and design of airfield facilities is based primarily on the types of aircraft using the airport. The FAA has established the Airport Reference Code (ARC) for planning and design purposes that signifies the airport's highest Runway Design Code (RDC). The RDC is a code based on planned development and signifies the design standards to which the runway is to be built. The Runway Design Code has three components. The first component, depicted by a letter, is the Aircraft Approach Category (AAC) and relates to **aircraft approach speed**. The second component, depicted by a Roman numeral, is the Airplane Design Group (ADG). ADG is a function of the design aircraft's **wingspan**. The third component of the RDC is the Visibility Minimums and is used to establish runway to taxiway separation distances.

The FAA has also introduced the Approach Reference Code (APRC) which is comprised of the same three components as the RDC; however, the APRC describes the **current operation** capabilities of a runway where no special operating procedures are necessary. The Departure Reference Code (DPRC) represents those aircraft that can take off from a runway while any aircraft are present on adjacent taxiways with no special operating procedures necessary. The DPRC is composed of two components, AAC and ADG.

For layout of airport facilities, the design aircraft is the most demanding aircraft or group of aircraft having, or forecast to have, more than 500 annual operations at the airport.

Aircraft Approach Category is a grouping of aircraft based on 1.3 times their stall speed in their landing configuration at their maximum certificated landing weight. FAA design standards recognize the following Aircraft Approach Categories:

- Category A: Speed less than 91 knots.
- Category B: Speed 91 knots or more but less than 121 knots.
- Category C: Speed 121 knots or more but less than 141 knots.
- Category D: Speed 141 knots or more but less than 166 knots.
- Category E: Speed 166 knots or more.

A knot = 1.15078 miles per hour, therefore 91 knots is the equivalent of 104.72 miles per hour.

Airplane Design Group is a grouping of aircraft based on wingspan. FAA design standards recognize the following Airplane Design Groups.

- Group I: Up to but not including 49 feet, tail height less than 20 feet.
- Group II: 49 feet up to but not including 79 feet, tail height 20 feet to less than 30 feet.
- Group III: 79 feet up to but not including 118 feet, tail height 30 feet to less than 45 feet.
- Group IV: 118 feet up to but not including 171 feet, tail height 45 feet to less than 60 feet.
- Group V: 171 feet up to but not including 214 feet, tail height 60 feet to less than 66 feet.
- Group VI: 214 feet up to but not including 262 feet, tail height 66 feet to less than 80 feet.

Visibility Minimums are expressed as Runway Visual Range (RVR) values in feet corresponding to the following Flight Visibility categories.

- 5000 ft. Not Lower than 1 mile
- 4000 ft: Lower than 1 mile but not lower than ¾ mile
- 2400 ft: Lower than ¾ mile but not lower than ½ mile
- 1600 ft: Lower than ½ mile but not lower than ¼ mile
- 1200 ft: Lower than ¼ mile

Therefore, for example, RDC B-I/2400 is an aircraft meeting the requirements for Aircraft Approach Category B (91 knots or more but less than 121 knots) and Airplane Design Group I (wingspan up to but not including 49 feet, tail height less than 20 feet) with visibilities lower ¾ mile. Typically, increasing the Aircraft Approach Category or Airplane Design Group, and providing for lower approach visibility minimums will increase required airport geometric design standards.

Additional design criteria are determined based on aircraft weight and type of approach. A small aircraft is defined in Advisory Circular 150/5300-13A, Airport Design, as “an airplane of 12,500 pounds or less maximum certificated takeoff weight”. An aircraft weighing more than 12,500 pounds is considered a large aircraft. Aircraft weight affects the required Part 77 surfaces and pavement design strength. Part 77 of the Federal Aviation Regulations defines “Objects Affecting Navigable Airspace” and establishes imaginary surfaces around airfields and approach/departure slopes to and from runways. **Figure 3-1** shows the existing Part 77 airspace surface structure at Rolle Field.

It is important to note that it is not necessary to design all of the airfield system to the standards of the most demanding aircraft using the airfield. For airports with two or more runways it is generally most practical to design some airfield components for a less demanding RDC. **Figure 3-2** on the follow page provides a visual representation of various aircraft and their associated RDC’s

ITEM	VISUAL RUNWAY		NON-PRECISION INSTRUMENT RUNWAY			PRECISION INSTRUMENT RUNWAY
				B		
	A	B	A	C	D	
WIDTH OF PRIMARY SURFACE AND APPROACH SURFACE WIDTH AT INNER END.	250	500	500	500	1,000	1,000
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
				B		
	A	B	A	C	D	
APPROACH SURFACE WIDTH AT END	1,250	1,500	2,000	3,500	4,000	16,000
APPROACH SURFACE LENGTH	5,000	5,000	5,000	10,000	10,000	a
APPROACH SLOPE	20:1	20:1	20:1	34:1	34:1	a

A– UTILITY RUNWAYS.
B– RUNWAYS LARGER THAN UTILITY (EXISTING VISUAL).
C– VISIBILITY MINIMUMS GREATER THAN 3/4 MILE.
D– VISIBILITY MINIMUMS AS LOW AS 3/4 MILE (ULTIMATE).
a PRECISION INSTRUMENT APPROACH SLOPE IS 50:1 FOR INNER 10,000 FEET AND 40:1 FOR AN ADDITIONAL 40,000 FEET.

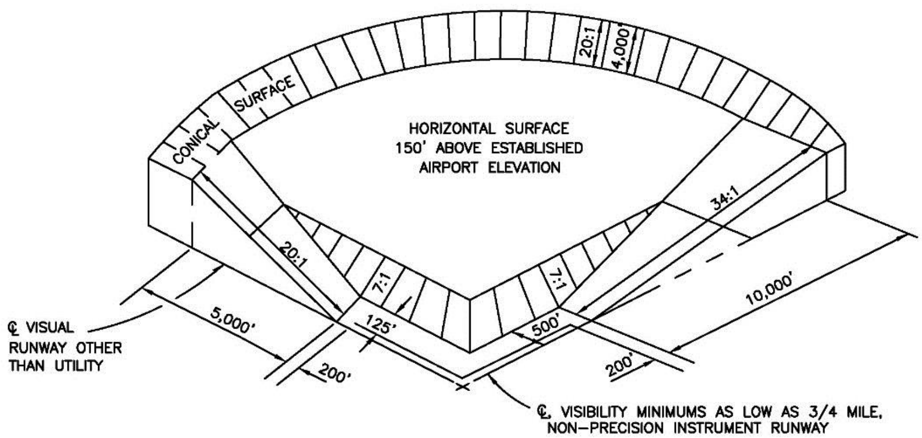


Figure 3-1 Typical Civil Aircraft Imaginary Surfaces Detail

Figure 3-2 Runway Design Group

While Rolle Field's current RDC designation is B-I, the forecasts conducted in the previous chapter indicate that the airfield will most likely have a B-II classification by the end of the planning period. Currently there are no based aircraft at Rolle Field and the airfield is used primarily for student pilot training utilizing mainly single engine, piston-powered aircraft performing standard training maneuvers such as touch-and-go's, etc. In the short term, it is assumed that flight training will continue to be the main role of the airfield. However, given the expected continuation of the economic and population expansion of the San Luis and Yuma area, the extended forecasts call for increases in the number of based aircraft as well as a more varied fleet mix.

B-II aircraft weighing 12,500 pounds or more are projected be the most demanding type of aircraft operating at Rolle Field in the future. This design classification includes the twin turboprop Beech Super King Air 300, Cessna 441 Conquest as well as the Cessna Citation and Dassalt Falcon series of business jet aircraft. These aircraft comprise the majority of active business aircraft and are the most cost-effective for corporations to own and operate. While the airfield's present RRC of B-I is most likely adequate for the short term planning horizon, the extended future airside and landside facilities planning should consider FAA design criteria for RRC B-II.

Under former guidance, taxiway design was based on Airplane Design Groups (ADG). In the updated Advisory Circular AC 150/5300-13A, taxiway design is based on newly established Taxiway Design Groups (TDG), which are based on the overall Main Gear Width (MGW) and the Cockpit to Main Gear (CMG) distance. With respect to the current design standards, all taxiway lateral clearances should be planned for ultimate Group II lateral clearances on the Airport Layout Plan.

It should be noted that C-II corporate prop-jet and jet aircraft may use Rolle Field. Their operations are projected to be less than 500 per year during the planning period. Designers should be aware of post study Airplane and Taxiway design group higher aircraft classification possibility and establish clearances accordingly.

Separation standards are based on both FAA Airport Design Advisory Circular (AC) 150/5300-13A Change 1 criteria and also the Part 77 Imaginary Surfaces shown in Figure 3-1. In the case of Rolle Field, the difference between visibility minimums of 5,000 feet and 4,000 feet is in the Primary Surface Part 77 Width. The Design AC has an Approach primary surface width of 500 feet for 5,000 feet visibility, and 1,000 feet for 4,000 feet not lower than ¾ mile visibility. The Design AC controls as the Part 77 primary surface widths increase to 1,000 feet at visibility minimums as low as ¾ mile.

Due to Rolle Field's close proximity to Mexican airspace, establishment of precision instrument approaches with visibility minimums lower than ¾ mile are not considered feasible. Lateral clearances will be based on the non-precision instrument approach of 5,000 feet – Not lower than 1-mile Flight Visibility standard.

In summary, the Runway Design Code and Taxiway Design Groups of the associated airside facilities are shown in **Table 3-2** on the following page. The "(S)" is how the FAA designates runways designed for small aircraft.

.

Table 3-2 Facility Classifications

	Existing Classification	Ultimate Classification
Runway 17-35	RDC B/I(S)VIS	RDC B/II/5000
Taxiways	TDG 2*	TDG 1B**

* Based on width of existing taxiway (35'); TDG 1A required

** Some RRC B-II corporate jets require TDG 2 fillets in order operate efficiently on TDG 1B taxiways.

3.3.1 Runway Requirements

In consideration of the forecast of future aviation activity, the existing runway was analyzed from several perspectives. These include airfield capacity, runway orientation, runway length, pavement strength, and compliance with applicable FAA design standards. The analysis for these various aspects of the runway system design is the basis for recommendations pertaining to airside improvements.

Runway Length

The critical aircraft selection is the primary consideration for the length requirements for Runway 17-35 The FAA Airport Design software program was used for evaluating the runway. Variables required by the program include the airport elevation, mean maximum temperature of the hottest month, the difference in feet between the high and low points of the runway, and the stage length of the longest non-stop trip destinations. Input variables for Rolle Field are:

Airport Elevation:	163 Feet
Effective Runway Gradient:	0.01 %
Mean Maximum Temperature:	106.3 Degrees F

The results from the program can be found in **Table 3-3.** The software's output provides information for different classifications and percentages of aircraft that the runway will be designed to accommodate. The first distinction is between small and large aircraft. Small aircraft are defined as those weighing less than 12,500 pounds. Aircraft in the small category are almost exclusively piston driven propeller aircraft, although there are some small turboprop aircraft in this category as well. Large aircraft are those weighing in excess of 12,500 pounds and encompass the remainder of the fleet.

The current length of Runway 17-35, 2800 feet, is capable of accommodating 75 percent of small aircraft with less than ten passenger seats. This runway length is adequate for the current RRC B-I classification, however, for ARC B-II, a runway length of 5,000 feet is recommended by the end of the long term planning horizon. If necessary or desired, this 2,200 foot runway extension could be accomplished in stages. The recommended minimum initial stage runway extension would be 510 feet for a total interim length of 3,310 feet. This would allow the airfield to accommodate 95 percent of small aircraft (12,500 pounds or less) with less than ten passenger seats. On the other hand, the recommended long-term planning horizon runway length of 5,000 would accommodate 75 percent of large airplanes of 60,000 pounds or less at 60 percent of their useful load.

Table 3-3 FAA Runway Lengths, FAA Design Software

AIRPORT AND RUNWAY DATA
Airport elevation . . . . 163 feet Mean daily maximum temperature of the hottest month . . . . 106.3 F. Maximum difference in runway centerline elevation . . . . .0.3 feet
RUNWAY LENGTHS RECOMMENDED FOR AIRPORT DESIGN
Small airplanes with approach speeds of less than 30 knots . . . . 300 feet Small airplanes with approach speeds of less than 50 knots . . . . 810 feet Small airplanes with less than 10 passenger seats 75 percent of these small airplanes . . . . .2,730 feet 95 percent of these small airplanes . . . . .3,310 feet 100 percent of these small airplanes . . . . 4,090 feet Small airplanes with 10 or more passenger seats . . . . .4,580 feet
Large airplanes of 60,000 pounds or less 75 percent of these large airplanes at 60 percent useful load . . . . .4,960 feet 100 percent of these large airplanes at 60 percent useful load . . . . .8,180 feet
Airplanes of more than 60,000 pounds . . . . Approximately 5,070 feet
REFERENCE: Chapter 2 of AC 150/5325-4B, Runway Length Requirements for Airport Design, no Changes included.

Runway Orientation, Additional Runways

FAA design standards recommend additional runway orientations when the primary runway orientation provides less than 95 percent wind coverage. The Rolle Field runway orientation was analyzed according to various crosswind components and calculated for all-weather conditions.

Crosswind limitations are a function of an aircraft's stall speed, pilot proficiency and other factors. For general planning purposes, the FAA has established crosswind limits of 10.5 knots for general aviation A-I and B-I aircraft, 13 knots for A-II and B-II general aviation aircraft and 16 knots for transport aircraft A-III, B-III and C-I through D-III. Aircraft in approach category IV (A-IV through D-VI) have a crosswind limit of 20 knots.

The wind roses at the Rolle Field were analyzed using 10.5 knot and 13 knot crosswind components. **Table 3-4** summarizes wind coverage data for the airport. For the 10.5 knot crosswind limit, existing Runway 17-35 is available 95.99% of the time. For the 13 knot crosswind limit the runway is available 97.75 percent of the time.

The most optimum orientation is a Runway 15-33 orientation. The current Runway 17-35 and closed northeast southwest runway provide combined coverage of 97.05% for 10.5 knot winds. It should be noted that the Rolle Field wind rose is based on Yuma International weather. Local Instructor Pilots using Rolle Field report that, at times, there is an east-west wind component that is relatively strong. An east-west runway alignment would have 91.4% wind coverage at 10.5 knots.

Table 3-4 Wind Coverage Summary Rolle Field

	10.5 Knots Crosswind	13 Knots Crosswind
Runway 17-35	95.99%	97.75%

Because Runway 17-35 achieves greater than 95% coverage at 10.5 knots, 13 knots and 16 knot crosswinds at Rolle Field, the FAA and ADOT will not participate in the construction of a crosswind runway.

Runway Width

The width of the existing runway was also examined to determine if it meets the needs for aircraft the currently and are forecasted to use the airfield. Currently, Runway 17-35 is 60 feet wide. This width will accommodate the requirements for Airplane Design Group (ADG) B-I, however, in order to accommodate ADG B-II criteria, a width of 75 feet is required. Widening of the runway to 75 feet should be coordinated with the recommended runway extension. (Group C-II runways are 100-ft wide)

Runway Pavement Strength

The previous Airport Layout Plan (ALP) drawing indicates Runway 17-35 has a pavement strength rating of 8,000 pounds single-wheel gear loading (SWL). Recent reconstruction of the runway restored failing pavement to its original strength. Given the current nature of operations at the Airfield this rating is adequate. Should the runway be extended, it is recommended the pavement strength rating be increased to 12,500 pounds single-wheel gear loading (SWL). The larger ARC B-II corporate type aircraft, however, which are projected to use the Airfield in the future could weigh up to 30,000 pounds in a dual-wheel gear (DWL) configuration. Future planning, therefore, should incorporate ultimately strengthening this runway to 30,000 pounds DWL. This upgrade to the pavement strength of Runway 17-35 could be integrated with the recommended runway lengthening and widening projects discussed previously.

Runway Lighting

Runway marking, lighting and signage requirements are addressed later in this chapter.

3.3.2 Taxiway Requirements

Under former guidance, taxiway design was based on Airplane Design Groups (ADG). In the updated Advisory Circular AC 150/5300-13A, taxiway design is based on newly established Taxiway Design Groups (TDG), which are based on the overall Main Gear Width (MGW) and the Cockpit to Main Gear (CMG) distance.

As discussed in Chapter 1, *Inventory*, Rolle Field does not currently have a parallel taxiway system. A 35 foot wide connecting taxiway (Taxiway D) links the aircraft parking apron to the Runway 17 end of Runway 17-35. There are paved turnouts / holding aprons at each runway end which allow aircraft to turn around while utilizing the runway for taxiing purposes. These paved turnouts are currently in poor condition and in need of reconstruction.

A full-length parallel taxiway and connecting stubs should be constructed by the end of the long-term planning horizon, in order to maintain the efficiency of the ultimate 5,000 foot length of Runway 17-35. This taxiway system must meet the ultimate TDG 1B design criteria with regard to width and runway-taxiway separation distance. TDG 1B design standards specify a taxiway width of 25 feet and a runway-taxiway separation of 240 feet. Future taxiway improvements should include considerations for marking, lighting and signage. These items enhance both the safety and efficient movement of aircraft to and from the runway system. Future planning requirements regarding taxiway marking, lighting and signage are addressed in the section dealing with runway/taxiway marking and lighting which follows later in this chapter.

3.3.3 FAA Design Standards

One of the key considerations of any airport planning effort is to evaluate the dimensional standards for the airfield layout, established by the FAA. **Table 3-5** presents a summary of significant FAA design standards that need to be compared with existing conditions to evaluate whether Rolle Field meets criteria for the aircraft currently being served. The application of these design standards establishes airport geometry. The airport is currently classified as a B-I small aircraft facility and is planned to ultimately be a B-II large aircraft facility. C-II standards are noted in the discussion following the table for the post study period and to identify possible development restraints.

Table 3-5 FAA Design Standards

	Existing RW 17-35	FAA Standards for B-I (Small Aircraft)	FAA Standards for B-II (Large Aircraft)
Runway Object Free Area			
Width	400’	400’	500’
Length Beyond Runway End	240’	240’	300
Runway Safety Area			
Width	120’	120’	150’
Length Beyond Runway End	240	240	300
Runway Obstacle Free Zone			
Width	250’	250’	400’
Length Beyond Runway End	200’	200’	200’
Taxiway Object Free Area			
Width	89’	89’	131’
Taxiway Safety Area			
Width	49’	49’	79’
Design Criteria			
Runway Width	60’	60	75’
Taxiway Width	35’	25’ (TDG 1A)	25’ (TDG 1B)
Runway Centerline to Parallel T/W Centerline	NA	225’	240’
Runway Centerline to Holdline	200’	200’	200’
Runway Centerline to Edge of Aircraft Parking	370’	200’	250’
Taxiway Centerline to Fixed or Movable Object	NA	39.5’	57.5’

Runway Object Free Area (OFA): The Runway Object Free Area is a two dimensional ground area surrounding the runway. The runway OFA clearing standard precludes parked airplanes and objects except those whose location is fixed by function such as a navigational aid. In order to meet the standard for RDC B-I, the OFA for Runway 17-35 must be 400 feet wide and extend 240 feet beyond each runway end. In order to meet the standard for RDC B-II, the OFA for Runway 17-35 must be 500 feet wide and extend 300 feet beyond each runway end. (The C-II standard is 800-ft wide and 1000-ft beyond each runway end).

Runway Safety Area (RSA): The Runway Safety Area is a defined surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot, or excursion from the runway. The RSA should be cleared and graded and have no potentially hazardous ruts, humps, depressions, or other surface variations. The RSA dimensions associated with B-I standards are a width of 120 feet and an extension of 240 feet beyond the runway end. The RSA dimensions associated with B-II standards are a width of 150 feet and an extension of 300 feet beyond the runway end. (The C-II standard is 500-ft wide and 1000-ft beyond runway end).

Runway Obstacle Free Zone (OFZ): The runway OFZ is a defined volume of airspace centered above the runway centerline. It is the airspace above a surface whose elevation at any point is the same as the elevation of the nearest point on the runway centerline. The standard OFZ for RDC B-I aircraft is 250 feet wide and 200 feet beyond the runway end. The standard OFZ for RDC B-II aircraft is 400 feet wide and 200 feet beyond the runway end. (The C-II standard is 400-ft wide and 200-ft beyond runway end).

Taxiway Object Free Area (TOFA): The TOFA is a two dimensional ground area adjacent to taxiways. The taxiway OFA clearing standard precludes vehicle service roads, parked airplanes, and objects except those whose location is fixed by function such as a navigational aid. The FAA standard TOFA for Group I aircraft is 89' wide centered on the taxiway centerline. The FAA standard TOFA for Group II aircraft is 131' wide centered on the taxiway centerline. This indicates that parked aircraft need to be at least 65.5 feet from the centerline of the nearest taxiway.

Taxiway Safety Area (TSA): The TSA is a defined surface alongside the taxiway prepared or suitable for reducing risk of damage to an airplane unintentionally departing the taxiway. The minimum standard TSA width for Group II aircraft is 79 feet.

3.3.4 Design Criteria

Runway Width: The design standards for runway width take into account not only aircraft approach category, but also consider operations conducted during reduced visibility. The FAA runway width design standard for RDC B-I aircraft is 60 feet. For RRC B-II aircraft the runway width design standard is 75 feet. Runway 17-35 is 60 feet wide and meets FAA B-I standards. In order to meet RDC B-II standards the Runway will need to be widened to 75 feet. (For C-II standards, a 100-ft wide runway is required).

Line of Sight: FAA line of sight standards require that two points five feet above the centerline of a runway, without a parallel taxiway, be mutually visible for the entire runway. For runways with a full parallel taxiway, the standard requires that two points, five feet above the centerline, be mutually visible for one half of the runway length. Further, there is a requirement that for intersecting runways, points five feet above the centerline must be mutually visible within the Runway Visibility Zone (RVZ).

Line of sight requirements are currently met at Rolle Field; however, care must be taken not to create a problem should the runway be lengthened in the course of development.

Taxiway Width: Taxiway width is correlated to the physical characteristics of the aircraft design group without respect to the operational characteristics of the airport approach category. The Taxiway Design Group (TDG) 1A width standard is 25 feet and the TDG 1B width standard is 25 feet. Existing taxiway D is 35 feet wide and meets TDG 2 standards. Future Taxiways should similarly be designed to 25 feet wide TDG 1B standards. Fillets should be designed to TDG 2 standards to accommodate occasional use by larger corporate aircraft.

Runway Centerline to Parallel Taxiway Centerline: This design criterion establishes the minimum separation between the centerline of the runway and the centerline of the parallel taxiway. This separation is determined based upon the RDC. The separation standard for Runways and Parallel Taxiways with a RDC of B-I is 225 feet and B-II is 240 feet. The separation standard for C-II is 300 feet. The existing apron was designed for a future parallel taxiway with a 240 foot separation from the runway centerline. Future parallel taxiways should be designed to meet the 240 foot RDC at a minimum. During the alternatives analysis process, consideration should be given to locating future parallel taxiways at 300 feet from runway centerline.

Runway Centerline to Holdline: This standard provides for marking on pavement and placing signs at locations on taxiways where aircraft hold prior to receiving clearance to enter the runway. These locations are chosen to ensure that aircraft are clear of the RSA and OFZ during operations by other aircraft on the runway. The standard holding positions for RRC B-I and B-II aircraft are located 200 feet from the runway centerline.

A holdline position of 200 feet of separation is provided for Runway 17-35 on Taxiway D. This meets the standard for RDC B-I and B-II. A holdline position of 250 feet is the standard for RDC C-II.

Runway Centerline to Edge of Parking Area: This standard is designed to allow additional clearance between aircraft parking areas and aircraft operations on the runway, while protecting space between these areas for a parallel taxiway. The FAA standard for RDC B-I is 200 feet and B-II is 250 feet. The standard for RDC C-II is 400 feet.

The airport's aircraft parking separation currently exceeds the required distance for B-II and is close to meeting C-II standards.

3.3.5 Navigational and Approach Aids

Electronic and visual approach aids provide guidance to arriving aircraft and enhance the safety and capacity of the airfield. Such facilities are vital to the success of the airport and provide additional safety to passengers using the air transportation system. While instrument approach aids are especially helpful during poor weather, they are often used by commercial pilots when visibility is good.

Instrument approaches are categorized as either precision or non-precision. Precision instrument approach aids provide an exact alignment and decent path for an aircraft on final approach to a runway while non-precision instrument approach aids provide only runway alignment information. Most existing precision instrument approaches in the United States are instrument landing systems (ILS) utilizing glide slope and localizer electric equipment installed adjacent to the runway.

With the advent of Global Positioning System (GPS), stand-alone instrument assisted approaches will eventually be established that provide vertical guidance down to visibility minimums currently associated with precision instrument runways. As a result, airport design standards that formerly were associated with a type of instrument procedure (precision/non-precision) are now revised to relate instead to the designated or planned approach visibility minimums.

The *Arizona State Airports System Plan*, released by the Aeronautics Division of ADOT in 2008, recommends the development of an instrument approach at Rolle Field. It is expected that future instrument approaches to the airport will involve the use of GPS to provide vertical guidance and runway alignment information with visibilities of 1 mile or less. **Table 3-6** compares the landing surface requirements which must be met in order to establish a GPS approach and a comparison of these standards to existing airport facilities. As reflected in the table, the existing Runway 17-35 could support a one-mile visibility minimum GPS approach by installing low or medium intensity runway edge lighting and by increasing the total width of the existing primary surface from 250 feet to the required minimum of 500 feet. Other than vegetation, there are no obstructions within the required primary surface area which would need to be removed. The establishment of any future GPS approach will require coordination with the appropriate military jurisdictions as Rolle Field is located within special-use airspace (Dome MOA).

Table 3-6: GPS Instrument Approach Requirements[i]

Requirement	One-Half Mile Visibility	¾ Mile Visibility Greater than 250 - Foot Cloud Ceiling	One-Mile Visibility Greater than 450 – Foot Cloud Ceiling	Existing Conditions Runway 17-35
Minimum Runway Length	4,200 Feet	3,500 Feet	2,400 Feet	2,800 Feet
Runway Markings	Precision	Nonprecision	Visual	Visual
Runway Edge Lighting	High / Medium Intensity	High / Medium Intensity	Medium / Low Intensity	None
Approach Lighting	MALSR	ODALS Recommended	Not Required	None
Primary Surface	500 feet clearance on each side of runway	500 feet clearance on each side of runway	250 feet clearance on each side of runway	125 feet clearance on each side of runway

MALSR: Medium intensity Approach Lighting System with Runway Alignment Lighting
ODALS: Omni-directional Approach Lighting System

3.3.6 Airfield Marking, Lighting and Signage

Pavement markings, lighting and signage facilitate the safe movement of aircraft about the airfield by directing pilots to their destinations. Runway markings are designed according to the type of instrument approach available on the runway. FAA Advisory Circular (AC) 150/5340-1J, Standards for Airport Markings, provides the guidance necessary to design an airport's markings.

Runway 17-35 has the necessary markings for the visual approach that serves the runway. Besides routine maintenance of the runway markings, these markings will suffice through the planning period until a non-precision approach is published by the FAA. As previously noted, establishment of a precision instrument approach is not anticipated due to Rolle Field's proximity to Mexican air space.

Taxiway and apron areas also require marking. Yellow centerline stripes are currently painted on all taxiway surfaces at the airport to provide guidance to pilots. A portion of the Taxiway D is currently painted with three parallel stripes, which is not standard. This should be corrected in the short-term. Aircraft holding positions are delineated on Taxiway D as well as the turnout/holding aprons located at each runway end. Non-standard markings delineate the helipad located near the Runway 35 (south) end. Extension of Runway 17-35 will require reapplication of the basic centerline and runway designation markings as well as holding position markings. All future taxiways will require both centerline and pavement edge marking. Additionally, it is recommended that the helipad be remarked with FAA standard helipad markings, and that all closed runway/taxiway markings be retained and/or reapplied where and when necessary.

Airport lighting systems provide critical guidance to pilots during nighttime and low visibility operations. At present, runway edge lighting is not available at Rolle Field. One requirement for a one-mile GPS approach is the presence of low or medium intensity runway edge lighting (LIRL/MIRL). Future planning should, therefore, include the implementation of a MIRL system to be coordinated along with the installation of runway threshold lighting delineating the thresholds for Runway 17-35.

Effective ground movement at night is enhanced by the availability of taxiway lighting. The single existing taxiway connecting the runway to the aircraft parking apron could be adequately served by taxiway reflectors delineating the taxiway centerline and edges. Medium intensity taxiway lighting (MITL), however, is recommended for the proposed full-length parallel taxiway and related exit stubs which are to be constructed by the end of the long term planning horizon.

3.3.7 Approach Lighting

Normally, the landing phase of any flight must be conducted in visual conditions. To provide pilots with visual guidance information during landings to the runway electronic visual approach. Currently, there are no approach lighting systems located at Rolle Field. An approach lighting system is not required for the implementation of a one mile visibility minimum GPS approach to Runway 17. This condition is adequate with regard to the recommended airside improvements presented in this report.

Visual Glide Slope Indicators (VGSI) are a system of lights located at the side of the runway and provide visual descent guidance information to pilots during an approach to the runway. There are currently no VGSIs available at Rolle Field. PAPI-2s (precision approach path indicator) are recommended for each end of Runway 17-35.

3.3.8 Wind Indicators

Wind indicating devices provide pilots with information as to ground level wind conditions while segmented circles indicate airport traffic patterns. It is recommended that the segmented circle / wind cone located east of Runway 17-35 be upgraded to a lighted wind device for night time operations. In addition, supplemental wind cones are recommended for installation at or near each ultimate runway end at the time it is lengthened to 5000 feet.

3.4 Landside Facility Requirements

Landside facilities are those that support the airside facilities, but are not actually a part of the aircraft operating areas. The capacities of the various components of each area were examined in relation to projected demand to identify future landside facility needs during the planning period for the following types of facilities:

- General Aviation Terminal Services
- Hangars
- Aircraft Parking Apron
- Access and Vehicle Parking
- Fuel Storage

3.4.1 General Aviation Terminal Facilities

Terminal Building

A general aviation terminal can serve several functions including providing space for passenger waiting, pilot's lounge, flight planning, concessions, line service, and airport management offices. Currently, there is no terminal building at Rolle Field to support any of the above mentioned functions.

General aviation terminal space requirements were determined based on the number of airport users expected to utilize general aviation facilities during the design hour. The planning criteria used provides 120 square feet per design hour itinerant passenger. The number of design hour itinerant passengers is determined by multiplying design hour itinerant operations by the number of passengers on the aircraft (multiplier). An increasing passenger count (from 1.9 to 2.2) is used to account for the likely increase in larger, more sophisticated aircraft using the airport. **Table 3-7** outlines the general space requirements for a public general aviation terminal at Rolle Field. Until such time as demand warrants construction of such dedicated GA terminal facilities many of the necessary basic functions (restrooms, potable water, storage, etc.) can be provided within the proposed hangar storage facilities.

Table 3-7 General Aviation Terminal Area Facilities

	Short Term	Intermediate Term	Long Term
Design Hour Itinerant Operations	5	6	6
Multiplier	1.8	1.9	2
Total Design Hour Passengers	10	11	13
General Aviation Building Space (s.f.)	1,200	1,320	1,560

Utilities

Potable water is currently supplied to the hangar area by an on-site well which was installed in 2011. Fire suppression is provided to the existing hangar by means of a dry chemical fire extinguisher. There is currently no fire suppression water system. Since it has no future plans for scheduled airline flights, Rolle Field is exempt from Federal Aviation Regulation (FAR) Part 139 Standards, and is not required to have airport rescue and firefighting (ARFF) equipment on site. New building construction at the Airfield (hangars or conventional structures) must conform to applicable sections of the National Fire Protection Association (NFPA) code, the Uniform Fire Code, the Uniform Building Code, and is subject to inspection and approval of the State Fire Marshall's office. Specific hangar activities, such as aircraft repair and maintenance, may require the implementation of a fire suppression system at Rolle Field. Components of such systems may include storage tanks, piping, and/or a booster pump station.

Sanitary sewer service is currently provided in the form of a septic system. Connection to the regional sewer system would be preferable, but, given the airfield's location, connecting to the regional sewer system is a matter of economics and logistics. Should connecting to the sewer system prove not feasible or cost effective, the septic system will need to be expanded with future airfield development.

Solid waste pickup and disposal are currently provided by YCAA maintenance services. Should this activity become beyond the capabilities of YCAA, these services could be contracted with the local service provider to place a dumpster at the Airport.

Electrical service at Rolle Field is currently provided by a diesel generator which was installed in 2011. As the airfield develops, connecting to a more sustainable power source, such as the local power grid and/or solar should be considered. Providing this connection will be a matter of logistics and economics, as well as coordination between the YCAA, Yuma County, The City of San Luis, and the service provider, Arizona Public Service (APS).

There is currently no natural gas service at Rolle Field. If it is determined that natural gas or propane should be made available at the Airfield, like the previously discussed utilities it is a matter of feasibility and affordability, with the most cost effective solution being the most logical choice. Natural gas would require that the area service provider, Southwest Gas Corporation provide hookup service to the Airfield property. Southwest Gas Corporation has a 6” steel main line parallel and along County 20th street which is a mile north of Rolle Field. Propane could be provided with on-site storage tanks at the Airfield.

Telecommunications and internet connectivity is currently available via a Verizon 4G network cellular service. Land line telecommunications connectivity, including fiber optics, will play a critical role in meeting the security and data needs of Rolle Field tenants as the airfield develops. Telecommunications service to the Airfield will require coordination between the YCAA and the service provider as to the costs, logistics, and level of service which can be provided. The use of microwave links can be considered in the short term to link Yuma International Airport with Rolle Field until such time as fiber optics are extended to Rolle Field.

The capacity, absence or limitation, of each of the mentioned utilities will be considered when determining future airport master plan design alternatives.

3.4.2 Hangars

The demand for hangar facilities typically depends on the number and type of aircraft expected to be based at the airport. For planning purposes, it is necessary to estimate hangar and apron facilities based on peak design periods. However, hangar and apron development should be based on actual demand trends and financial investment conditions.

Typical utilization of hangar space varies across the country as a function of local climate conditions, airport security and owner preferences. Nationwide trends for general aviation aircraft, whether single or multi-engine, are toward larger, more sophisticated and expensive aircraft. Owners of these types of aircraft normally desire hangar space to protect their investment. Due to climatic and security issues, it is believed that the majority of based aircraft owners at Rolle Field will desire enclosed hangar storage facilities.

The future allocation of based aircraft storage is presented in **Table 3-8**. Single-engine aircraft use was split between conventional hangars and T-hangars / condos, with a small percentage being stored using tie-downs. Conventional hangar use was assumed for 100 percent of the multi-engine, helicopter fleet and business jet fleet in the long term.

Table 3-8: Based Aircraft Storage Distribution

	Current Need	Short Term	Intermediate Term	Long Term
Tie Down				
Single Engine	40%	30%	20%	10%
Multi Engine	0%	0%	0%	0%
Jet	0%	0%	0%	0%
Rotorcraft	0%	0%	0%	0%
T-Hangar				
Single Engine	57%	60%	70%	70%
Multi Engine	50%	45%	40%	30%
Jet	100%	50%	50%	30%
Rotorcraft	50%	0%	0%	0%
Conventional Hangar				
Single Engine	3%	10%	10%	20%
Multi Engine	50%	55%	60%	100%
Jet	0%	50%	50%	100%
Rotorcraft	50%	100%	100%	100%

Determining hangar requirements involves estimating the area necessary to accommodate the required hangar space. A planning standard of 1,250 square feet per based aircraft stored in T-hangars was used. For conventional hangars, a planning standard of 1,500 square feet for single-engines and 2,500 square feet for twin-engine, jet and helicopters was used. Current hangars provide an average of 1950 square feet for each aircraft based on the airfield. Since portions of conventional hangars are also used for aircraft maintenance and servicing, requirements for service hangar area were estimated using a planning standard of approximately 15 percent of the total hangar space needs.

Table 3-9 compares existing hangar availability to the future hangar requirements for the planning period. From the analysis, additional hangar area is justified in the near term.

Table 3-9: Hangar Requirements

	Currently Available	Current Need	Short Term	Intermediate Term	Long Term
Based Aircraft					
Single Engine		0	3	4	5
Multi Engine		0	0	0	1
Jet		0	0	0	1
Rotorcraft		0	0	0	1
Total Based Aircraft		0	3	4	8
Aircraft to be Hangared					
T-Hangar /Condo Positions	0	0	2	3	4
Conventional Hangar Positions	1	0	0	0	4
Total Aircraft to be Hangared	1	0	2	3	8
Hangar Area (s.f.)					
T-Hangar/Condo Area (s.f.)	0	0	2,250	3,500	4,375
Conventional Hangar Area (s.f.)	2,500	0	450	600	9,000
Maintenance Area (s.f.)		0	405	615	2,006
Total Hangar Area (s.f.)	2,500	0	3,105	4,715	15,381

3.4.3 Aircraft Parking Apron

An aircraft parking apron should be designed to accommodate transient aircraft as well as locally based aircraft that are not stored in hangars. The number of tiedowns required is based on the number of potential based aircraft as well as an estimated percentage of transient aircraft requiring tiedown space. As noted in the analysis of hangar space requirements above, it is expected that most future based aircraft will be stored in enclosed hangar storage facilities. If hangars are not provided, additional apron space will be required.

Transient apron space is determined by estimating the percentage of busy-day operations that will require tie-down space at a given time. At Rolle Field, the number of transient spaces required was estimated to be approximately 25 percent of busy day itinerant operations. Because transient apron space serves a larger variety of aircraft than local based aircraft apron space, it is typically designed to a higher square footage per aircraft ratio. Since Rolle Field does not currently have based aircraft, all estimates are based on future potential regarding both based aircraft and itinerant operations. Because of this uncertainty, and to maintain flexibility in future planning, the number of transient and local tiedown positions required has been combined into a single total estimate.

In determining future total apron area requirements, a planning criterion of 570 square yards per aircraft parking position has been applied for both local and transient aircraft.

Table 3-10 compares existing apron area availability to the future apron requirements for the planning period. It should be noted that the areas shown do not include area for taxilane circulation, which will depend on parking space configuration. From the analysis, additional apron area for aircraft storage will be required in the long term. Additional apron area may also be required in the short and intermediate term depending on parking space configuration and hangar layout to support efficient aircraft circulation in the hangar area.

Table 3-10: GA Aircraft Parking Apron Requirements

	Currently Available	Current Need	Short Term	Intermediate Term	Long Term
Based Aircraft					
Non-Hangared Aircraft		0	1	1	2
Transient Aircraft					
Busy Day Itinerant Operations		3	3	7	13
Transient Parking Positions		1	1	2	4
Total Parking Apron Positions	4	1	2	3	5
GA Apron Area (s.y.)*	2,050	570	1,140	1,710	2,850

* Does not include required taxilane area which will depend on parking space configuration

3.4.4 Access and Vehicle Parking

Rolle Field is located in southwestern Yuma County on land annexed by the City of San Luis in 1999. Regional access to Rolle Field is provided mainly by U.S. Highway 95 which is located approximately five (5) miles west, and runs north and south connecting San Luis to the City of Yuma as well as other western Arizona cities located along the Colorado River. Additionally, U.S. 95 intersects Interstate 8 in the City of Yuma. Interstate 8 is an east-west auto and trucking route which extends from Casa Grande north of Tucson to San Diego, California in the west. Local access from San Luis is provided via County 23rd St. Access from Somerton or Yuma, to the north, is via Avenue B which intersects U.S. 95 east of Somerton and south of the City of Yuma. From either of these points, you must continue on to the Airfield via unimproved (dirt) roads. Access to the airfield is through a controlled access security gate located near the end of Runway 17. It is recommended that the existing unimproved access road be replaced with a new paved access road configuration. This configuration should consider Yuma County's planned extension of Avenue E along the eastern property boundary of Rolle Field, which is noted in Chapter One.

A small automobile parking area is located north of the apron area and hangar. Eighteen (18) vehicle spaces are marked with two of them being handicap parking spaces. This number of spaces is expected to be adequate for the planning period. However, space should be reserved for expansion of the vehicle parking area should parking needs outpace anticipated demand.

3.4.5 Fuel Storage

There are currently no fuel storage or aircraft fueling facilities available at Rolle Field. Since the availability of fuel at an airport makes it more attractive and usable to both based aircraft owners and itinerant pilots, consideration should be given to providing fueling at Rolle. The typical fuel storage tank capacity for an airport with the potential number of based aircraft and forecast operations level as Rolle Field is 12,000 gallons. The type of fuel available, such as 100LL or both 100LL and Jet-A, is dependent upon the types of aircraft that would most likely utilize such facilities.

3.5 Security

An eight foot chain-link perimeter fence with a three strand barbed wire which serves as a perimeter security fence was installed around the Runway 17-35 air operations area in 2011. Additionally, a four-strand barbed wire is in place to deter off-road vehicles. Access to the airfield is through a controlled access gate. While the security fencing is adequate, the perimeter road used to inspect the fence is on unstable sand. A perimeter road with an all-weather surface is recommended. Gravel or asphalt millings surfacing will meet all-weather criteria standards.

3.6 Revenue Support

While it is desirable for the airport to directly pay for itself, it is rare for a small airport to generate enough revenue to offset its operating costs. Rolle Field has a valuable resource in its land holdings. While a portion of these holdings will need to be reserved for aviation-related improvements, considerable land can be developed for additional commercial/industrial uses to increase airport revenues. The alternatives development will consider provision for airport compatible revenue generating land lease such as aircraft storage and commercial / industrial development.

3.7 UAS Facility Requirements

As the FAA continues to evaluate and develop regulations to govern Unmanned Aircraft Systems (UAS) integration into the National Air Space, a number of questions still need to be answered to clarify where UAS flights will fall within the spectrum of possible procedures and policies. Considerations may include UAS mandated by the FAA to fly Visual Flight Rules (VFR) only, or to fly solely based on its GPS and electronic navigation capabilities, without the benefit of a manned pilot's vision. Resolutions to issues such as these are yet to be determined.

3.7.1 UAS Planning Horizon Activity Levels

The facility requirements discussed in this chapter are based on forecasts presented in Chapter 2. The following table shows the UAS aircraft and operations forecasts for Rolle Field over the next 20-year planning period:

Table 3-11: UAS Planning Horizon Activity Levels

	Short Term Planning Horizon	Intermediate Term Planning Horizon	Long Term Planning Horizon
Aircraft Stored	13	14	15
Aircraft Stored / Temporary	39	41	45
Aircraft Total	130	137	149
Operations	27,375	28,744	31,690

The UAS developmental approach differs from a traditional General Aviation (GA) master planning approach because of the unique circumstances and nature of UAS operations and missions. Although Rolle Field will have GA operations that share common runways with UAS in the short term; this master plan's objective is to ultimately separate those operations at this airport. Safety considerations and the ultimate growth of the UAS market will drive the need to separate and manage UAS operations independently from GA services.

As discussed in the previous chapter, this plan anticipates that the majority of UAS vehicles will be of the medium to small variety. However, due to the variety of sizes that fall within those categories, this master plan will present facilities designed for the most demanding UAS anticipated to regularly use the airfield, or "critical aircraft." The RQ-7B Shadow 200 and the MQ-8B Fire Scout have been selected as the critical UAS for Rolle Field. Although there may be other UAS that may utilize the main runway for operations, this plan does not anticipate a significant number of UAS utilizing the existing runway for testing. A separate Launch and Recovery Site will be proposed. This will enable Rolle Field to provide the most flexible facilities that can be provided in the Intermediate Term.

Table 3-12 and **Table 3-13** depict the dimensions of the critical UAS selected for Rolle Field:

Table 3-12: Shadow 200 Dimensions

Wing Span (ft)	14
Length (ft)	11.33
Height (ft)	3.2
Basic Empty Gross Weight (lbs)	252 to 257
Basic Mission Take-Off Weight (lbs)	370 to 375
Assembly Configuration: Single Tricycle	95% on Main (assumed)
Tire Pressure, Main Gear (at Max T/O weight)	35+1 psig
Note: many of characteristics are still to be determined.	

Shadow 200 Launch[ii]

The **Shadow 200** TUAS is the latest-generation, combat-proven system. AAI manufactures the Shadow 200 TUAS, and the aircraft can see targets up to 125 kilometers away from the brigade tactical operations center, and recognize tactical vehicles up to 8,000 feet above the ground at more than 3.5 kilometers slant range, day or night. It is the choice of the U.S. Army and Marine Corps for reconnaissance, surveillance, targeting, and assessment. Designated as the RQ-7B by the U.S. Army, the aircraft enables brigade commanders to see, understand, and act decisively when time is critical.[iii]

Table 3-13: MQ-8B Fire Scout Dimensions

Max Length (Main rotor Spread, tail rotor vertical) (ft)	31.67
Length (nose to tail, main rotor folded over tail, tail rotor vertical) (ft)	23.25
Length (nose to tail rotor horizontal)(ft)	24.73
Width (outer diameter of skid tubes) (ft)	6.2
Height of main rotor blades (ground to flat rotor disc) (ft)	8.92
Height of vertical stabilizer antenna (ft)	9.75
Main rotor diameter (ft)	27.71
Tail rotor diameter (ft)	4.25
Ground clearance (fuselage, Water Line to ground) (in)	21
Ground clearance (tail skid) (ft)	3.25
Turning Radius in tow (ft)	20
Maximum gross take-off weight (lbs)	3,150
Maximum towing weight (lbs)	3,150
Basic Empty Gross Weight (lbs)	2,029

The **Northrop Grumman MQ-8 Fire Scout** is an unmanned autonomous helicopter developed by Northrop Grumman for use by the United States Armed Forces. The Fire Scout is designed to provide reconnaissance, situational awareness, and precision targeting support for ground, air and sea forces.

Northrop Grumman MQ-8 Fire Scout[iv]

3.7.2 Runway and Launch and Recovery Sites

The anticipated UAS will utilize the current apron and Runway until new facilities are available. However, the majority of the UAS operations will still need Launch and Recovery Sites in addition to the Runway. The existing runway at Rolle Field is more than adequate to accommodate the current level of anticipated UAS operations. However, as the number of test UAS vehicles utilizing the airport grows, a separate facility will need to be addressed. **Figure 3-4** shows a standard launch / recovery site layout for a Shadow 200.

Dimensions: Rectangular area at least 450 feet long and 164 feet wide. In addition to the main rectangular area, an additional area on either side of the operating strip called the net run-out area is required. Each net run-out area is 100 feet long and 50 feet wide. This makes the operating surface with net run-out areas at least 650 feet long and 50 feet wide. See the following illustrations for more detail.

Runway Orientation: Aligned with the prevailing wind direction.

Runway Grading & Pavement Strength: Runway direction slope may not exceed ± 1.7% grade within the entire runway and rollout space. The slope perpendicular to runway direction must also fall within the ± 1.7% grade. Pavement strength does not differ from calculations for runway; similar calculations to existing runway can be used.

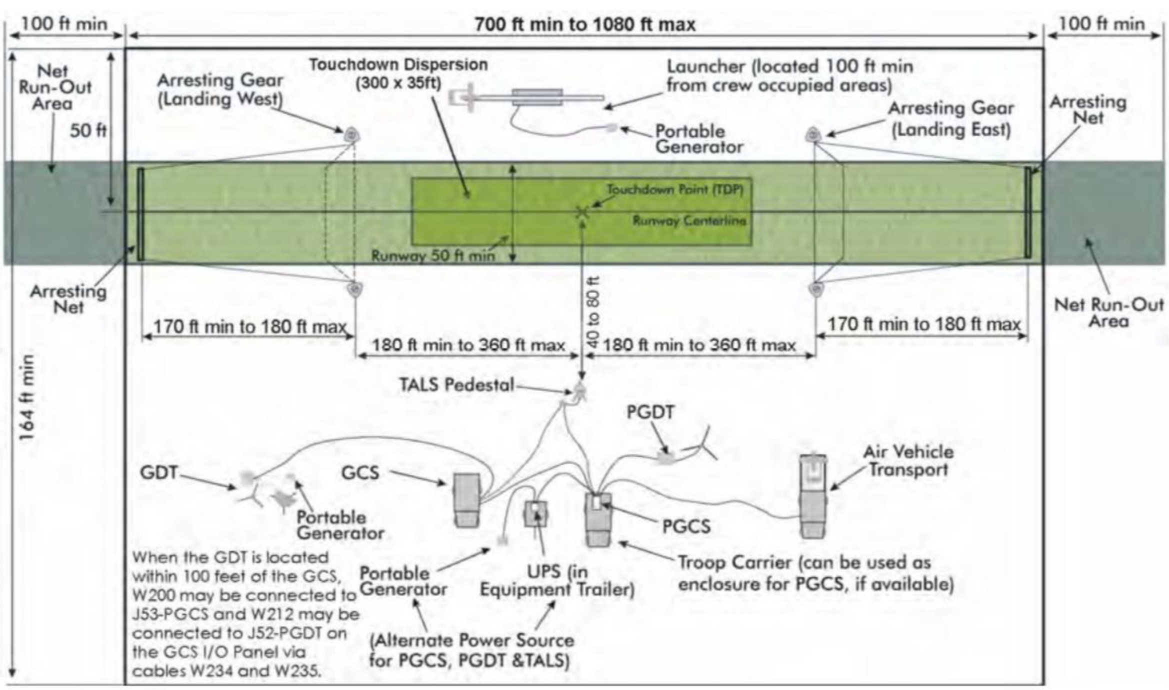


Figure 3-3: Shadow 200 Launch and Recovery Site[v]

Helipad: The Fire Scout is designed to be launched from a ship or from land. The Fire Scout can utilize any cleared area to launch and recover. The limited-use helipad (50 ft by 50 ft) described in UFC 3-260-01 is acceptable for this aircraft. See **Figure 3-4**.

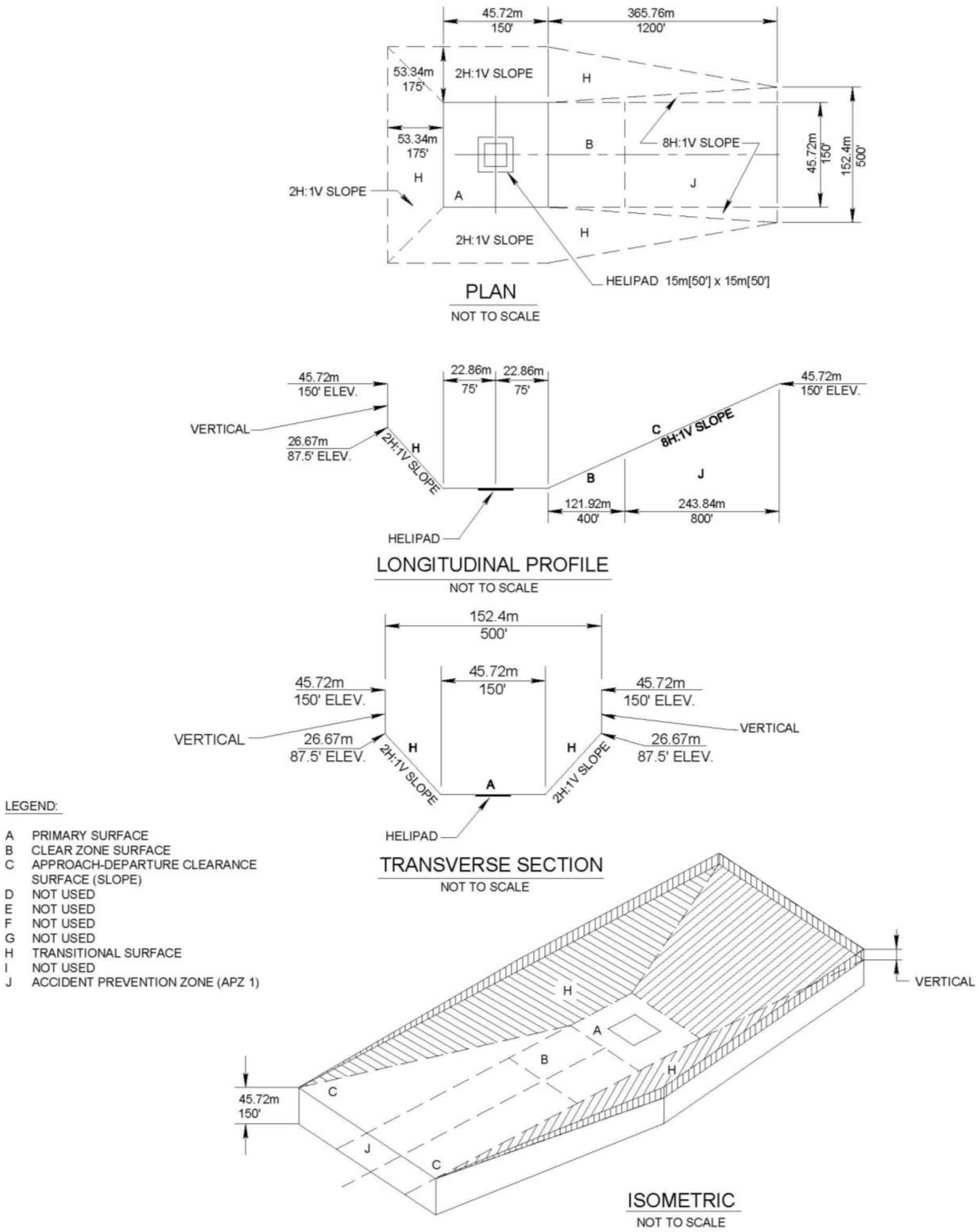


Figure 3-4: Army and Air Force VFR Limited Use Helipad with Same Direction Ingress / Egress [vi]

3.7.3 Taxiway Requirements

Existing taxiway structure is adequate for UAS operations.

3.7.4 Airfield Marking, Lighting and Signage

Helipad marking and signage will be utilized as indicated by the latest FAA Design Criteria and Advisory Circulars. Launch and Recovery Pad will utilize white edge marking, lighting is not necessary.

3.7.5 Approach Lighting

No approach lighting is required for UAS operations.

3.7.6 Navigational and Approach Aids

Airspace:

The UAS airfield facilities will use standard Part 77 Imaginary Surfaces.

The introduction of UASs into the National Airspace system that has traditionally been dominated by manned flights creates a number of safety issues, including potential air collisions, ground collisions and system reliability. In order to avoid collisions, UASs must have the same ability to detect-and-avoid as other aircraft while moving through the air. Different methods of vehicle control have been tested, from completely autonomous flight to direct input by an operator, as well as a variety of traffic surveillance methods including ATC or plain eyesight.[vii] Regardless of the avoidance system used, it is "likely to be required for all UAVs that operate within the boundaries of airways and on the same flight levels as current traffic at both high and low altitudes. This may either be provided by air traffic control or by a form of active collision avoidance by the UAV system".[viii]

Due to variety of UAS sizes and testing parameters, this study uses the limited growth activity levels and small UAVs assumption to provide a starting point for development.

Table 2-15 from Chapter 2 reprinted below as **Table 3-14** is used to determine appropriate airspace that UAS operate at Rolle Field:

Table 3-14: Alignment of UAS Categories with FAA Regulations [ix]

		Certified Aircraft/UAS (Cat III)	Non-Standard Aircraft/UAS (Cat II)	RC Model Aircraft/UAS (Cat I)
FAA Regulation		14 CFR 91	14 CFR 91,101,& 103	Non (AC 91-57)
Airspace Usage		All	Class E, G & non-joint use Class D	Class G (<1200 AGL)
Airspeed Limits, KIAS		None	NTE 250 proposed	100 proposed
Example Types	Manned	Airlines	Light Sport	None
	Unmanned	Predator, Global Hawk	Pioneer, Shadow	Dragon Eye, Raven

The airspace around Rolle Field will support up to CAT II type of UAS operations. No additional airspace is needed to achieve forecasts. However, application for certification to FAA will be needed in the short term until the FAA integrates the UAS to NAS. Table 1-5 from Chapter 1, reprinted below as **Table 3-15**, identifies the UAS Small and Medium (CAT I and II) UAS that may operate at Rolle Field.

Table 3-15: Group Class Description[x]

UAS Class	Group	Maximum Weight (lbs)	Normal Operating Altitude (ft)	Speed (knots)	Representative UAS
Small CAT I	Group 1A	0-5	<400 AGL	<50	Wasp, Raven (RQ-11)
	Group 1	5-20	<1,200 AGL	<100	Puma
	Group 2	21-55	<3,500 AGL	<250	Scan Eagle
Medium* CAT II	Group 3	<1,320	< FL 180		Shadow (RQ-7B)
Large CAT III	Group 4	>1,320		Any Airspeed	Fire Scout (M/RQ-88) - Predator (MQ-1B), Grey Eagle (MQ-1C), Hummingbird (A-160T)
	Group 5		> FL 180		Reaper (MQ-9A), Global Hawk (RQ-4), BAMS (RQ-4N)

* CAT II – includes Fire Scout (M/RQ-88)

Table 3-16 summarizes the appropriate application be made to the FAA by Rolle Field or Rolle Field tenants for UAS certifications to operate at Rolle Field.

Table 3-16: UAS Applications to FAA

Application	Reason
UAS certification granted under a Certification of Authorization (COA) or Waiver for public operation mostly US government organizations ---	This is most appropriate if YAA is able to work with University of Arizona and their UAS program as a main tenant. This also can be applicable if a future tenant is related to governmental organizations such as Police, Department of Agriculture, etc.
Special Airworthiness Certifications (SAW-EC), experimental category for civilian/private industry operations.[xi] The two types of special airworthiness certificates are special flight permits and experimental certificates. Special flight permits are used for production testing of new aircraft. Experimental certificates are used for research, crew training, and market survey activities.	This option is recommended in the short term.

Procedures:
When utilizing the runway, UAS operators will follow current flight patterns and procedures at Rolle Field.

Rolle Field, as noted earlier in this chapter, is authorized for VFR general aviation aircraft operations during daylight hours only. The addition of UAS to the aircraft mix will not have any impact to current operating procedures. The testing and R&D for UAS systems will occur during the daylight hours. Military, agriculture, and law enforcement aircraft including UAS conducting night operations at the airport do so at their own risk. Furthermore, requests for military and UAS training at the Airfield will require 48 hours advance notice so as to allow time for publishing NOTAMS in order to inform general aviation and UAS activity at Rolle Field. Standard and current arrival and departure procedures for Rolle Field will apply.

Since UAS flights from Rolle Field may cross international borders, it is important that regulations are kept in mind and integrated with the minimum standards to operations at the airport. The International Civil Aviation Organization (ICAO) would be the most likely body regulating unmanned civil drones and it has concluded that currently unmanned flight is permissible within the established “rules of the road” in international airspace.

3.7.7 Hangars

Storage Distribution:
Due to the nature of UAS operations, a minimum of 20% of anticipated aircraft may be stored in hangars. (See **Table 3-17**) Most UAS operations are mobile, and the required equipment, manpower and aircraft are housed in mobile units. Apron space for these units may be more critical than storage hangars. **Table 3-17** below provides approximate size and utilization for Hangar requirements.

Hangar Requirements:
The need for staff to utilize facilities such as rest rooms, meeting rooms, training rooms and maintenance space will be considered as part of the hangar calculation equation. The best approach to providing occupied hangar space is to provide empty shells with basic power, water and restrooms. Tenant improvements can then be done as each individual tenant leases the space. While looking at similar current facilities with UAS testing operations such as New Mexico State University and Yuma Proving Grounds, space requirements vary from 10,000 sf to 15,000 sf. This size provides adequate space for training and potential minor maintenance facilities.

Table 3-17: UAS Hangar Requirements

Hangar Requirements	Currently Available	Short Term	Intermediate	Long Term
Stored Aircraft Total		13	14	15
Hangar Area (sf)	2,500	10,000	---	15,000
Storage Distribution		100%	100%	100%
Total Hangars	1	2		3
Hangar Area Use				
Meeting Rooms (sf)		1,000	1,000	1,000
Training Rooms (sf)				1,000
Restrooms (sf)				250
Maintenance Areas				5,750
Aircraft Parking		5,000	5,000	7,000

The facility requirements suggested in this section are for UAS forecasts only, and provide guidance to facilities needed to test UAS systems at the airport. Further facility needs may be provided specific to future tenant improvements.

3.7.8 Apron

Apron requirements are based on an 80% assumption of anticipated aircraft forecasts. (See previous table for aircraft numbers) Since the critical aircrafts chosen for the airport come typically with support vehicles, a staging area will also be necessary in addition to aircraft tie down facilities. The apron shown in the following Alternatives Chapter will show configurations for large 18 wheeler transportation vehicle parking, to be utilized as provisional storage for the majority of small UAS support vehicles and aircraft. The loads for the pavement will be designed for the traditional wheel loading for B-II aircraft, and tie down spaces will be configured for single engine aircraft dimension. Markings will follow FAA Design Guidelines for Aircraft parking and parking guidelines for Yuma County Commercial Vehicles.

Table 3-18: UAS Apron Requirements, Group I

	Currently Available	Short Term	Intermediate Term	Long Term
Design Group I Aircraft				
Aircraft Parking Positions	4	39	41	45
Tie-down Area (s.f.)	18,450	87,360	91,840	100,800
Tie-down Area (s.y.)	2,050	9,707	10,204	11,200
Support Vehicles				
Support Vehicle Parking Positions	0	3	3	4
Support Vehicle Area (sf)	-	2,400	2,400	3,200
Total Parking Apron (s.f.)*	18,450	89,760	94,240	104,000
Total Parking Apron (s.y.)*	2,050	9,973	10,471	11,556
*Does not include required taxilane area which will depend on parking space configuration				

Table 3-19: UAS Apron Requirements, Group II

	Currently Available	Short Term	Intermediate Term	Long Term
Design Group II Aircraft				
Aircraft Parking Positions	4	39	41	45
Tie-down Area (s.f.)	18,450	111,540	117,260	128,700
Tie-down Area (s.y.)	2,050	12,393	13,029	14,300
Support Vehicles				
Support Vehicle Parking Positions	0	3	3	4
Support Vehicle Area (sf)	-	2,400	2,400	3,200
Total Parking Apron (s.f.)*	18,450	113,940	119,660	131,900
Total Parking Apron (s.y.)*	2,050	12,660	13,296	14,656
* Does not include required taxilane area which will depend on parking space configuration				

3.7.9 Runway Requirements for Large (CAT III UAS)

Airfield requirements for large UAS such as the Global Hawk, Reaper, Predator and Warrior are defined in Department of Air Force Engineering Technical Letter (ETL) 09-1 *Airfield Planning and Design Criteria for Unmanned Aircraft Systems (UAS)* and the Department of Defense Unified Facilities Criteria (UFC) 3-260-01 *Airfield and Heliport Planning and Design*.

Wingspans and Maximum Take-off Weight of larger UAS are:

Global Hawk	116’ to 131’	27,000# to 32,000#
Reaper	66’	10,500#
Predator	49’	2,250#
Warrior	56’	2,250#

The Global Hawk, depending on version, would be a Group III or IV aircraft, the others, Group II. The Global Hawk requires a USAF Class B airfield, the others a Class A as defined in UFC 3-260-01. Class A runways are intended for small light aircraft equivalent to a FAA RDC of C-II (100 ft Runway width). Class B runways are intended for high performance (F-15 and F-16) and large, heavy aircraft. The equivalent of FAA RDC designations could be from C-III through D-V with 150’ wide runways.

The Global Hawk could not operate at Rolle under normal conditions due to runway length and width. Runway lengths at zero percent longitudinal grade and no wind are discussed below.

The Reaper will require close to 5000 feet of runway at 107 degrees (mean-maximum temperature hottest month) for takeoff at 10,500 pounds without correction for slope, head or tail winds and runway condition (wet or dry). Using a landing weight of 8,500 pounds, a runway length of 3,500 feet is required.

For the predator, about 3,000 feet of runway (uncorrected) is required at 2,250 lbs. Using a landing weight of 2,200 pounds, a landing length of 1600 feet (uncorrected) is required.

UAS landing lengths are very sensitive to slope, landing weight and wind conditions (head or tail wind). Under some scenarios, landing lengths can exceed take off lengths.

The General Aviation requirements discussed in Section 3.3 are generally adequate to support smaller "large" UAVs like the RQ-1B Predator or MQ-IC ERMP Warrior which have wing spans in the 49 to 56 foot range and operate at weights less than 4,000 pounds. Runway width waivers to use a 75 foot wide runway would be required unless Rolle Field is constructed to C-II standards.

3.7.10 Security

Infrastructure Security:
Security of the ground control stations and data link infrastructure is a critical requirement for UAS integration. With the expected number of civilian and non-military governmental UAVs in the US forecasted to reach 30,000 over the next five years, it is important that Rolle Field provide adequate and secured facilities for future UAV operations. The following facility upgrades should be considered to accommodate the anticipated UAS testing and operations at Rolle Field. The facility upgrades will represent capital expenditures that may be covered through Federal Funding. Other possible funding sources will be discussed in Chapter 6 *Financial Analysis*.

Special considerations pertaining to airport infrastructure at Rolle Field will be necessary to provide appropriate future growth opportunities for UAS and general aviation activities. The following list summarizes a preliminary look at infrastructure improvements that need to be considered:

Administration:
- Define airport security organization and formalize organizational procedures.
- Consider operational and security requirements in site layout.
- Evaluate all critical assets to ensure physical resistance to blast effects (blast mitigation, standoff distance, placement of screening checkpoint).
- Develop contingency plans and enhance coordination with infrastructure providers (e.g. electric power, telecommunications, water supply and transportation) to ensure infrastructure interdependency.
- Make airport personnel aware, of security risks according to their roles and responsibilities. Provide training to respond to incidents (i.e. trained to detect weapons, explosives and CBRN products) and to analyze complex situations (i.e. Psychological profiling through cameras and covert observation at different areas of the airport).
- Develop a security awareness program for airport employees.
- Conduct background investigations for new hires and periodic updates for current employees (especially for those with access to planes and secure areas). Implement structured security requirements for critical suppliers and partners.
- Formalize and communicate security policies and procedures to airport personnel.
- Ensure fast response teams have the right equipment, are stationed in critical areas and provide both visual and covert security protection.
- Establish an emergency evacuation and protection system.
- Implement ID management for all airport and tenants to efficiently manage both the issuance and cancellation of ID access cards. Access control should provide different levels of security for staff, authorized personnel and visitors.
- Hold public meeting with surrounding communities prior to UAS operations at the airport.

Infrastructure:

- All hangars or occupied buildings should have CBRNE (Chemical, Biological, Radiological, Nuclear and Explosive weapons) detection and HVAC (Heating, Ventilation and Air Conditioning) protection. Areas for quarantine, detox, chem-bio screening of people and vehicles should also be defined.
- A security boundary should be implemented between public and secured areas (physical barriers, patrols, surveillance / CCTV (closed circuit television), sensors).
- The access to airside and secure areas should be controlled (people, vehicle, deliveries, etc.) and unauthorized access detected.
- The perimeters of airside and other secured areas should use common security technologies based on physical protection (to delay), intrusion detection system (IDS), video surveillance (CCTV), tracking of people, vehicles for interception, and patrol roads. Moreover, it should include gate monitoring (controlling people and goods) with CBRNE detection, analysis and recovery disposal, and should be reinforced with unmanned vehicles; all these measures supervised from a command and control room with tactical situation display.
- Airside roads should be restricted to authorized vehicles. The airside perimeter roads should provide unobstructed views of the fence and maintain fencing clear area, positioning of roads shall consider patrols, maintenance access, emergency access and routes.
- Landside roads should include building screening capability, CCTV monitoring for security and safety, and minimize proximity to airside.

3.7.11 Additional UAS Requirements: A number of additional factors apply where UAS operations are mixed with traditional manned aircraft operations:

Separation:
Ultimately, the UAS operations will need to be separated due to the nature of their flight characteristics. The majority of UAS testing will occur from 400ft to 1,200ft AGL and at speeds slower than 120 knots at Rolle Field. The growing operations could hinder General Aviation traffic and may ultimately prove to be a safety hazard. In many airports, the basic justification for separating rotorcraft and fixed wing aircraft for safety reasons apply.

Airfield Location:
The Rolle Field location will play a large role in the operational safety of UAS operations at the airport. If a UAS system fails, and impacts a populated area and the debris penetrates shelters, it is possible that the public on the ground could be fatally injured. Surrounded by farm land and open areas the potential aircraft impacts from Rolle Field operations are minimized. All flights, manned or unmanned, are associated with some risk, but Weibel and Hanson's ground impact model predicts a low risk of catastrophic accidents after accounting for population, debris size, vehicle reliability and the previous incidence of failure.[xii] They conclude that smaller UAVs could fly over 95% of the country with little risk while larger UAVs could fly over 20% of the country and meet the current established levels of risk if the vehicles could operate around 100,000 hours between accidents, the current standard for aviation safety. In the case of Rolle Field, its current location is ideal and minimal impact to nearby populations is anticipated.

Utilities:
Utilities and related facilities provided will need to include a secure common data link (CDL) that connects the UAS to the remote operating ground station and pilot who controls it. Support

infrastructure that includes ground control stations (GCS), satellite communication links, ground data terminals (GDT), and associated equipment such as HVAC systems and generators, power at the staging area, apron and launch & recovery sites adequate to meet forecasted demand should be provided.

Power requirements will be determined at the time UAS tenants are acquired.

Communications:
Communications requirements include line of site access in any launch and recovery area between the subject UAS and the UHF/VHF antennas connected to the ground control station. Remotely operated UASs require two separate radio communications links to operate: one communications link feeds (Full Motion Video) to a Remote Viewing Terminal (RVT) through a Video Data Link (VDL), the other communication link controls the UAS through a Common Data Link (CDL). The VDL uses an omnidirectional antenna to broadcast its communication feed in all directions, allowing any RVT tuned into the UASs VDL frequency to observe the UASs FMV. Video quality and consistency of reception relies upon the VDL signal strength. The CDL can use either an omnidirectional antenna or a directional antenna that broadcasts only in the direction of the Ground Control Station (GCS).[xiii]

The FAA is currently evaluating the weaknesses of the civilian Global Positioning Satellite (GPS) system and is working with the DOD to determine appropriate measures to address those issues prior to the scheduled full integration of UAS into the NAS in 2015. This process must maintain the flexibility to accommodate future changes that will be key to the continued growth of the UAS industry and those facilities that will be providing UAS testing and operational services, such as Rolle Field.

Local Radio Frequency Analysis, Conflict Identification, and Coordination:
As the mission and direction of the Rolle Field Airport is being refined it is important to consider the radio spectrum environment and its potential effects on Unmanned Aerial Systems that may reside there in the future. UAS operations are heavily dependent upon both local line of sight and airborne or satellite uplink/downlink radio communications for their command and control requirements. Many of these communications links may occur in the VHF, UHF or microwave frequencies, and are susceptible to potential interference or conflict from other local radio communication, radar, and microwave link sources operating on the same frequencies, or related harmonic frequencies as the UAS platforms.

The area around Rolle Field is host to numerous military radar and communication facilities and operations utilizing VHF, UHF and microwave frequencies. Commercial and private aviation operations in the local area are also heavy users of the VHF, UHF and microwave spectrum, in addition to commercial radio stations, local government, law enforcement and utility providers. Additionally, large scale communication and utility companies often utilize high power microwave beams for transmitting data over long distances. These microwave beam paths are usually licensed and protected by law from infringement by other competing or adjacent RF users. Therefore, it is important to know the locations and influence areas of such radio transmissions to effectively plan and structure the future Rolle Field Airport operating environment.

An appropriate analysis of the RF spectrum is an integral part of creating a viable operational environment for UAS development. A separate study should be initiated that provides identification of local radio and microwave frequencies, paths, and influence areas, includes an interference analysis, and provides a structure for required frequency coordination and licensing. This process in turn will help protect the RF spectrum necessary to UAS operations, enhance safety of operations, and establish the Rolle Field Airport as a viable location for UAS operations and related command and control processes.

3.8 General Aviation and UAS Requirements Summary

The GA facility requirements evaluation in Sections 3.1 – 3.6 and the UAS facility requirements evaluation in Section 3.7 have identified several facility improvements for the airfield, in the airfield, and GA terminal area and UAS facilities. Key recommendations in each of these areas are summarized in **Figure 3-5**, **Figure 3-6** and **Figure 3-7**.

RUNWAYS AND TAXIWAYS		
EXISTING	**SHORT TERM (2018)**	**LONG TERM (2033)**
Runway 17-35 2800' X 60' **8,000 lbs SWL**	**Runway 17-35** 3310' x 75' 12,500 lbs. SWL Relocated Same	**Runway 17-35** 5000' x 75' 30,000 lbs. DWL Relocated Same
Two Paved Turnouts/ Holding Aprons (At Each Runway End on West Side)	**Taxiway** Single, Mid-Field Connecting 25' TDG 1A Taxiway	**Taxiways** Same Full-length 25' Parallel Taxiway and Connecting Stubs
Helipad		
UAS Facilities Runway 17-35 adequate for CAT I and CAT II UAS	**UAS Facilities** UAS Launch & Recovery Site for CAT I & II UAS	**UAS Facilities** At 5000', Runway 17-35 could accommodate CAT III UAS with gross wt. less than 4000 lbs. (i.e. Predator, Warrior)

NAVIGATIONAL AIDS, AIRFIELD LIGHTING AND MARKING		
EXISTING	**SHORT TERM (2018)**	**LONG TERM (2033)**
Runway 17-35 Basic Runway Markings (Visual)	**Runway 17-35** Non-Precision Runway Markings Medium Intensity Runway Lighting (MIRL) Runway Threshold Lights Global Positioning System Approach to Runway 17 PAPI-2's Runways 17 & 35	**Runway 17-35** Same Same Same Same Same
Helipad Non-standard Markings	**Helipad** Standard Markings	**Helipad** Same
	Taxiway Centerline/Edge Marking Centerline/Edge Reflectors on Mid-Field Taxiway	**Taxiways** Same Same Centerline/Edge Marking Medium Intensity Taxiway Lighting (MITL) on Parallel Taxiway & Connecting Stubs
Segmented Circle/ Wind Cone	Lighted Wind Device	Same Wind Cones at Runways 17 & 35
	Rotating Beacon	Same
	UAS Facilities Marking and lighting in accordance with USAF ETL 09-1	**UAS Facilities** Same

Figure 3-5: General Aviation & UAS Airfield Facility Requirements

	Short Term Need	Intermediate Need	Long Term Need
Aircraft Storage Hangars			
T-Hangar Positions	4	6	9
Conventional Hangar Positions	1	2	6
T-Hangar Area (s.f.)	5,250	7,250	11,375
Conventional Hangar (s.f.)	1,050	3,800	11,400
Apron Area			
Total Local / Transient Aircraft Positions	4	4	6
Total Local / Transient Aircraft Area (s.y.)	2,280	2,280	3,420
Terminal Facility			
Building Space (s.f.)	1,200	1,320	1,560
Other Landside Considerations			
Fire suppression system for future landside development			
Consider connection to local power grid / solar			
Consider connection to telecommunications network / fiber optics			
Consider addition of 12,000 gallon fuel storage capability			
Pave perimeter road			
Pave access road			

Figure 3-6: General Aviation Landside Facility Requirements

	Currently Available	Short Term	Intermediate Term	Long Term
Apron Requirements				
Design Group II Aircraft				
Aircraft Parking Positions	4	39	41	45
Tie-down Area (sf)	18,450	111,540	117,260	128,700
Tie-down Area (sy)	2,050	12,393	13,029	14,300
Support Vehicles				
Support Vehicle Parking Positions	0	3	3	4
Support Vehicle Area (sf)	-	2,400	2,400	3,200
Total Parking Apron (sf)*	18,450	113,940	119,660	131,900
Total Parking Apron (sy)*	2,050	12,660	13,296	14,656
* Does not include required taxilane area which will depend on parking space configuration				
Hangar Requirements				
Stored Aircraft Total		13	14	15
Hangar Area (sf)	2,500	10,000	---	15,000
Storage Distribution		100%	100%	100%
Total Hangars	1	2		3
Hangar Area Use				
Meeting Rooms (sf)		1,000	1,000	1,000
Training Rooms (sf)				1,000
Restrooms (sf)				250
Maintenance Areas (sf)				5,750
Aircraft Parking (sf)		5,000	5,000	7,000
Other Landside Considerations				
See Section 3.7.10 and 3.7.11 for Infrastructure, Security and Administration requirements.				

Figure 3-7: UAS Landside Facility Requirements

Endnote References: Chapter III

[i] Source: Table 3-5, FAA AC 150/5300-13A Airport Design
ii Picture from www.army-technology.com
[iii] http://www.aaicorp.com/products/uas/shadow_family.html
[iv] Picture from todopormexico.foroactivo.com.mx
v Picture from ETL 09-1 Airfield Planning and Design Criteria for Unmanned Aircraft Systems, September 2009
[vi] Picture from UFC 3-260-01_2008, Chapter 4 Rotary Wing, page 91
[vii] Weibel, R. & Hansman, R. 2005,"Safety Considerations for Operation of Unmanned Aerial Vehicles in the National Airspace System." Massachusetts Institute of Technology. Accessed July 1, 2012, at http://dspace.mit.edu/handle/1721.1/34912
[viii] Ibid footnote #1.
[ix] Table from Appendix F in UAS Roadmap 2005-2030, Office of the Secretary of Defense Report
[x] RFI for Arizona's Combined Autonomous Center for Test and Training of Unmanned Aircraft Systems (AzTTC, May 15, 2012
[xi] http://www.faa.gov/aircraft/air_cert/design_approvals/uas/cert/
[xii] Weibel, R. & Hansman, R. 2005. "Safety Considerations for Operation of Unmanned Aerial Vehicles in the National Airspace System." Massachusetts Institute of Technology. Accessed July 1, 2012, at http://dspace.mit.edu/handle/1721.1/34912, pg. 68
[xiii] Yochim, J.A. 2001. "The Vulnerabilities of Unmanned Aircraft System Common Data Links to Electronic Attack." M.M.A.S. Thesis, Fort Leavenworth, Kansas.

This page intentionally left blank.

Airport Alternatives

This page intentionally left blank.

CHAPTER FOUR:
ALTERNATIVES

4.1 Introduction

Chapter 3, Demand Capacity Analysis and Facility Requirements identified airport facility improvements required over a twenty-year planning period. The purpose of this chapter is to identify alternative development plans capable of meeting those needs. A series of improvement alternatives will be compared for their ability to meet airfield, terminal, general aviation and Unmanned Aircraft System (UAS) needs. Other improvements on the airport property which can provide revenue support will also be discussed. A preferred master plan concept will be recommended based on an evaluation of which alternative or combination of alternatives best meet the identified airport need. Because actual activity levels can vary from forecast levels, the plan must always retain an element of flexibility.

4.2 Do-Nothing Alternative

Before analyzing various development alternatives, it is important to consider the consequence of no future development at Rolle Field. The no action, or 'do-nothing", alternative considers keeping the Airfield in its present condition and not providing for any type of improvement to the existing facilities.

Aviation forecasts and facility requirement analysis for Rolle Airfield suggest both a current and future need for the development of a longer and wider main runway, an aircraft parking apron, taxiway system, navigational aids, runway lighting, minimal general aviation terminal facilities, aircraft storage facilities and an improved access road. It is important to remember that both the forecasts and facility requirements are based on potential future activity, however, if Rolle Airfield is to be a productive contributor to the dynamic growth happening in both San Luis and Yuma County it is essential that this development occurs. In addition, the Yuma County Airport Authority (YCAA) considers Rolle Field an integral part of Yuma International Airport's Defense Contractors' Complex (DCC). The do-nothing alternative does not follow YCAA's current mission and plans for future development of the DCC.

4.3 Airport Development Alternatives

The purpose for Rolle Field's development plan is to produce a balanced airside and landside complex to serve forecast aviation demands. Three primary functional areas will make up the development alternatives for Rolle Field: the airside (runways and taxiways) and landside (terminal facilities, aircraft storage hangars, and aircraft parking apron). In addition, facilities specifically for UAS needs will be incorporated. While each of these areas is treated separately, each relates to and affects the development potential of the other. Therefore, these areas must be examined both individually and collectively, and then integrated into a final plan that is functional, efficient, cost effective and minimizes environmental impacts. The result of this process is a functional airport concept that produces a realistic development plan.

4.4 Development Considerations

Development objectives have been established to show the intent, purpose, and direction for future airport development. Development objectives for Rolle Field are as follows:

- Develop a plan that preserves public and private investments
- Develop a plan that is reflective of community goals and objectives
- Develop a plan that takes advantage of the current trends in the aviation industry toward Unmanned Aircraft Systems (UAS)
- Develop a plan that maintains safety
- Develop a plan that preserves the environment
- Develop a plan that strengthens the economy

In attempting to meet these objectives, improvement of facilities should be undertaken in such a manner as to minimize operational constraints. Flexibility is essential to assure adequate capacity while minimizing financial commitments until market potential is realized. **Figure 4-1** summarizes the major airport development considerations based on facility requirements. While many of these development considerations reflect projects or topics which are demand driven, others are functional in nature.

Airfield Considerations
• **Plan for lengthening of Runway 17-35 to 5,000 feet within the planning period** • **Plan for full length parallel taxiway with connecting stubs within the planning period.** • **Add Medium Intensity Runway Lighting (MIRL) to Runway 17-35 within the planning period.** • **Add Precision Approach Path Indicators (PAPI) to Runway 17-35** • **Protect lateral ground clearance for possibility of future GPS Instrument Approaches**
Terminal / Access Considerations
• **Construct GA terminal / Administration building** • **Pave access road** • **All-weather perimeter road** • **Consider connection to local power grid and / or solar**
General Aviation Considerations
• **Apron expansion** • **Additional storage hangars** • **Segregated area for helicopter operators** • **Consider addition of 12,000 gallon fuel storage capability** •
Unmanned Aircraft Systems (UAS)
• **UAS Launch and Recovery Site for CAT I & II UAS** • **Additional storage hangars, training and meeting rooms** • **UAS support vehicle parking**

Figure 4-1 Rolle Field Alternative Development Considerations

FAA design criteria can have a substantial impact on the feasibility of various alternatives designed to meet airfield needs. These requirements define the physical attributes of runways, taxiways, as well as the separation of facilities, and the limits of imaginary surfaces, which protect aircraft from objects that could present a hazard to air navigation. FAA design requirements are based upon the approach speed and wingspan of the most demanding aircraft that will operate at the airport as well as the airport's approach visibility minimums. The airport's FAA defined Runway Design Code (RDC) establishes the design standards for Rolle Field. The RDC governing the future runway development at the Airfield was determined to be RDC B/II/5000 based upon the data presented in Chapter Three. The standards of RDC B/II/5000 are presented for comparison along with the existing small aircraft B/I(S)/VIS standards in **Table 4-1**.

Runway Safety Areas (RSAs) require clearing of objects, except for objects that need to be located in the RSA because of their function. The Runway Safety Area dimensions for an RDC B/II/5000 runway is 150 feet wide (centered on runway) and 300 feet beyond each runway end. As for the future 2,200 foot runway extension shown in Alternatives 1, 2 and the 5,000 foot runway shown in Alternative 3, in which the RPZs would extend off Airfield property, the FAA recommends that positive control of these areas be obtained by Rolle Field. This can be achieved by execution of an avigation easement.

FAA further advises that all shrubs and trees be removed from within the boundaries of both the runway object free area (OFA) and runway obstacle free zone (OFZ).

Additional surfaces that affect the safe operation of aircraft at an airport include the primary surface, the transitional surfaces, and the building restriction line (BRL). The primary surface and transitional surfaces are both components of Federal Aviation Regulations (FAR) Part 77, and are intended to protect aircraft operating areas from hazards that could affect the safe and efficient operation of aircraft arriving and departing the airport. The primary surface is a rectangular surface centered on the runway centerline and extends 200 feet beyond each runway end. All vegetation that may present an obstruction is to be cleared from the primary surface. The width of the primary surface is the same as the inner width of the Runway Protection Zone (RPZ).

For small aircraft, the width of the primary surface and inner width of the Approach RPZ is 250-ft. For large aircraft, the primary surface width and inner with of the Approach RPZ increases to 500-ft for visibility minimums not lower than 1-mile and 1000-ft for visibility minimums not lower than ¾ mile.

The transitional surface begins at the outside edge of the primary surface and rises at a slope of seven to one. There is no restriction on objects within the transitional area, as long as they do not penetrate the sloping surface. Currently, no objects other than native desert vegetation are known to penetrate either the primary or transitional surfaces at Rolle Field.

The building restriction line (BRL) is an imaginary line denoting a 35-foot clearance of the transitional surface. The distance for this line on either side of the runway from the runway centerline is 495 feet for RDC B/II/5000. Presently, there are no existing structures within these ultimate BRL's at Rolle Field. Future landside facilities will be designed and located accordingly.

Table 4-1 FAA Design Standards

	Existing Conditions	FAA Standards for B/I(S)/5000 (One Mile Approach Visibility Minimums)	FAA Standards for B/II/5000 (One Mile Approach Visibility Minimums)
Runway			
Width	60	60	75’
Runway Safety Area			
Width	120’	120’	150’
Length Beyond Runway End	240’	240	300
Object Free Area (OFA)			
Width	400’	400’	500’
Length Beyond Runway End	240’	240’	300
Runway Centerline to:			
Parallel T/W Centerline	NA	150’	240’
Edge of Aircraft Parking	370’	125’	250’
Runway Protection Zone			
Inner Width	250’	250’	500’
Outer Width	450’	450’	700’
Length	1,000’	1,000’	1,000’
Obstacle Clearance	20:1	20:1	20:1
Building Restriction Line (BRL)			
Distance from Runway Centerline (35 foot building height)	370’	370’	495’
Taxiways			
Width	35	25’ (TDG 1A)	25’ (TDG 1B)
Safety Area Width	49’	49’	79’
Object Free Area Width	89’	89’	131’
Taxiway Centerline to:			
Fixed or Movable Object	39.5’	39.5’	57.5’
Parallel taxiway / taxilane	NA	70’	105’
Taxilanes			
Taxilane Centerline to:			
Parallel Taxilane Centerline (ADG to TDG Direction Reversal)	NA	64’ to 70’	97’ to 105’
Fixed or Moveable Object	NA	39.5’	57.5’
Taxilane Object Free Area	NA	79’	115’

UAS Considerations

Rolle Field is uniquely positioned to participate in the testing and development of unmanned aircraft as an extension of the YCAA Defense Contractor Complex as well as participation in Arizona's commercial UAS developments as Unmanned Aircraft Systems (UAS) are allowed into the National Airspace System (NAS). The following section describes the unique considerations that are made with regard to UAS at Rolle Field.

There is a rapidly growing need to operate both military and civil Unmanned Aircraft Systems (UAS) in the same airspace as manned aircraft – particularly outside of segregated (i.e., restricted) airspace. Today, integration of manned and unmanned aircraft in civil airspace is not routine. For decades, unmanned aircraft access to the United States National Airspace System (NAS) has been granted on a case-by-case basis. Access involves significant operational constraints that reduce flexibility and thus also UAS mission utility.[i]

With the agriculture industry in Yuma County representing an annual gross economic return of $3.2 billion, or more than one-third of Arizona's annual total of $9.2 billion.[ii] UAS application in Yuma's agricultural economics has created an emerging domestic market for their use in America's food-producing fields. A report in April 2013 from the trade group Association for Unmanned Vehicle Systems International stated the vast majority of drones in the United States will probably be used for agriculture.

By 2015, the FAA has been ordered to have a plan in place to open up the skies to commercial drones, When that happens, the UAV market may be a "permanent fixture" on farms, performing duties that lower farmers' costs by streamlining their efforts. These include the use of unmanned aircraft for precision crop dusting. Instead of blanketing an entire field with pesticides or fertilizers, a UAV could target only the areas that need them, possibly reducing the amount of chemicals that are put on food in the fields.

With an increasing consumer demand for cheaper food, UAVs may be especially attractive to conventional farms that service large agribusiness companies or send their food overseas. But UAVs may also soon be used by watchdog groups to monitor animal cruelty on farms. People for the Ethical Treatment of Animals, or PETA, announced last month that it will be purchasing one or more drones to stalk hunters, but says it "also intends to fly the drones over factory farms, popular fishing spots, and other venues where animals routinely suffer and die."[iii]

As the FAA works on releasing the UAS airspace, the market for agricultural applications with UASs will have an impact for Rolle Field. The ultimate goal is that UAS regularly operate in civil airspace with risks to overall system safety appropriately mitigated and existing traffic flows undisrupted. The FAA's 2015 UAS integration to the NAS will address key safety and provide procedural assurance. Until this initiative is resolved, Rolle Field development will be phased and building blocks placed to accommodate the airport UAS goals.

Airspace Considerations for Development

There are restrictions on UAS operations that may present integration challenges. Applicable restrictions to Rolle Field include:

Table: 4-2 Airspace Considerations

Applicable to Rolle Field?	Challenges
Yes	**Temporary Flight Restrictions:** Temporary creation of airspace where access is either totally restricted to all other aircraft or restricted to aircraft appropriately equipped (e.g., with Mode C secondary surveillance transponders)
Yes with cooperation with Yuma International Airport	**Operations Contained in Positively Controlled Airspace:** All aircraft operating in Class A airspace must be equipped with Mode C transponders, be on an IFR flight plan, and be in two-way radio communications with Air Traffic Control (ATC). These requirements enable ATC to provide separation services.[iv]
Yes	**Visual Observers:** Observers on the ground or in a chase aircraft provide a visual see and avoid function by scanning the airspace around the unmanned aircraft for potential intruders.[v]
Yes with cooperation with Yuma International Airport	**Telephone Connection between Rolle Field UAS User and/or Airport Staff and ATC Supervisor at Yuma International Airport:** In the event of a lost UAS the GCS can contact ATC to inform them of situation.
Yes	Command and control link, air traffic controllers will be able to communicate with the pilot- in-command (PIC), who may not be in control of the aircraft due to the lost link) to learn what contingency procedure the aircraft is anticipated to execute.[vi]
Yes	**Limitations on Operating Distance from Origin:** In case there are mechanical or other on-board problems, ensures that the UAS can safely return to base.

Current FAA UAS Airspace Considerations:

- **Limitations on the Number of UAS which May Operate in each Air Traffic Control Facility:** Helps manage the degree of additional controller workload.
- **Low-Density Airspace:** The FAA is tending to grant waivers or Certification of Authorization (COA) for Public-use unmanned aircraft to operate in airspace with relatively low traffic densities. [vii]
- **Unpopulated Areas:** Similarly, the FAA is tending to grant waivers for UAS operations that will occur over areas with relatively low population densities on the ground.

FAA Initiatives:

Small UAS Line-of-sight Regulations

The FAA initiated an effort to develop regulations for the operation of civil* small UAS which will remain within visual line-of-sight (LOS). The effort included the establishment of an Aviation Rule-making Committee (RDC) to advise the FAA on appropriate rules and regulations.[viii] The RDC made their recommendations to the FAA towards the release of a Notice for Proposed Rule-Making (NPRM) 27 months from February 2012.

This rule would enable small UAS to operate for commercial purposes and could be used by public entities, such as law enforcement and the military, for routine operation of small UAS in civil airspace. This rule will apply to small UAS weighing less than 25 kilograms which would be able to operate within visual LOS of the pilot-in-command (PIC) or a qualified visual observer. Crew members (i.e., PIC and visual observers) will use their eyes to scan the airspace for aircraft, which may pose a conflict threat and maneuver their aircraft to remain well clear and, if necessary, maneuver to avoid a collision threat. [ix]

Ground-Based Sense and Avoid (GBSAA)–Dedicated Sensor

To enable operations beyond visual line-of-sight of a pilot on the ground, a capability to sense airborne targets in the airspace in the vicinity of the UAS will be needed. The FAA has been presented by the UAS community on the feasibility of air surveillance radars to provide three-dimensional (3D) position information via a display of traffic information to the UAS flight crew. This alternative has become known as Ground-Based Sense and Avoid (GBSAA). This may be an acceptable alternative means of compliance:

> *"If special types of radar or other sensors are utilized to mitigate risk, the applicant must provide supporting data which demonstrates that: both cooperative and non-cooperative aircraft, including targets with low radar reflectivity, such as gliders and balloons, can be consistently identified at all operational altitudes and ranges, and, the proposed system can effectively deconflict a potential collision."* [x]

GBSAA–Repurposed Sensors

Some in the aviation community are looking towards existing air surveillance sensors currently deployed for air traffic control and other purposes as being potential useful for GBSAA, thereby avoiding the life-cycle cost and delay of installing dedicated sensors.

This alternative is not available to Rolle Field.

Airborne-Based Sense and Avoid (ABSAA)–Cooperative

An alternative to the traffic sensors being on the ground is to locate them on-board the aircraft itself. In the UAS community, this approach is being referred to as Airborne-Based Sense and Avoid (ABSAA).

For a cooperative alternative to be viable, all aircraft that potentially are to be operating in the same airspace as the unmanned aircraft would need to be equipped with a capability that identifies their position. Transponding or reporting aircraft are often referred to as *cooperative aircraft*. Capabilities such as Mode C transponders or Automatic Dependent Surveillance Broadcast (ADS- B) are examples.[xi] Currently, the FAA is in the process of mandating ADS-B OUT* to be installed on aircraft by 2020 which operate in areas that today require installation of Mode C transponders. [xii]Other nations are mandating ADS-B OUT as well.[xiii]

Tracking and Transponders for UAS

Many UAS aircraft that are anticipated to be integrated to the NAS have been outfitted with Mode-S transponders to send periodic burst transmissions called "squitters". The squitters are used by Traffic Collision Avoidance System **(**TCAS) systems on other aircraft to aid in measuring the location and vertical rate of nearby aircraft. TCAS uses these measurements to identify potential conflicts that might arise from a pilot or controller error. Lately, a major new application for what is called the "extended squitter" is a set of messages used to broadcast an aircraft's GPS position, navigation system status, projected path, and identity so that other aircraft, and controllers, can track the aircraft with a high degree of accuracy. This supports applications that are a part of "Automatic Depend and Surveillance-Broadcast" or ADS-B system that is a key part of the FAA's Next-Generation ATC system (NexGen).

Squitters will be key in the FAA's initiatives for UAS to be integrated to the NAS. Their adaptations for UAS aircraft will help eliminate issues of UAS aircraft operations at General Aviation airports such as Rolle Field.

4.5 Development Alternatives

Three separate airside development alternatives are presented in this section. Each of these alternatives provides for an ultimate runway length of 5,000 feet for Runway 17-35. Arriving at this 2,200 foot extension differs for each alternative and could, if necessary, be accomplished in stages. A minimum length of 3,310 feet is the recommended interim or initial runway length.

All three alternatives depict a full parallel taxiway as recommended in the facility requirements section. The runway-taxiway separation is recommended at 300 feet, which is the standard for RDC B/II/2400. Coincidently, this is also the separation standard for RDC C/II/4000. Because the airport is relatively undeveloped and has little, if any, existing facilities requiring relocation to accommodate a 300 foot separation, this allows for long-term flexibility for the airfield, should it need to accommodate lower minimums or approach category C aircraft in the future.

Each alternative also provides for the accommodation of UAS facilities including, ultimately, a separate UAS launch / recovery site.

Aircraft storage hangars, aircraft parking apron, and general aviation terminal facilities are the primary landside facilities to be accommodated at Rolle Field. The long range landside layout for Rolle Field must consider the relationships between these functions. While some landside uses need to be grouped with similar uses or uses that are compatible, other functions should be separated, or at least have well defined boundaries, to ensure safety, security, and efficient operation. The following briefly describes the landside requirements defined for Rolle Field.

Enclosed T-Hangars: Approximately 10 T-Hangar units may be needed to satisfy projected long term general aviation demand as indicated by the facility requirements analysis. The quantity of T-hangars vs. conventional hangars will vary depending on future user preference.

Conventional Hangars: The facility requirements analysis indicated that 6 conventional hangars may be needed to satisfy long term general aviation demand. The quantity of T-hangars vs. conventional hangars will vary depending on future user preference.

Apron: While it is most likely that the majority of based aircraft will be stored in enclosed hangars, a small number of based aircraft may tie down on the apron. Tiedown space must also be provided for any transient aircraft utilizing the Airfield. A short term need of four (4) tiedown positions and 2,280 square yards of aircraft parking apron was identified in the facility requirements analysis. Long term requirements show a need for six (6) tiedown positions and 3,420 square yards of apron area. These forecast facility requirements account for both transient and based aircraft.

Terminal / Airport Administration Facilities: General aviation terminal facilities provide a wide range of services which can include: passenger waiting areas, a pilot's lounge and flight planning area, restrooms, food and beverage concessions, airport administrative and management offices, and storage. A short term need of 1,200 square feet and a long term requirement of 1,560 square feet of terminal facility space were identified in the facility requirements analysis. Currently, basic terminal facilities are not available at the Rolle. Each of the three development alternatives depicts a GA terminal site.

Access: Access to the airfield is currently unpaved. All three alternatives presented in this section depict a proposed paved access road illustrated on each of the airside alternatives.

Fuel Storage: Each alternative reserves of a site for a future fuel storage facility location. While current airport usage does not warrant the construction of a fuel storage facility, reservation of a site now can eliminate future development conflicts.

UAS Facilities: Considering Rolle Field's unique position to participate in the testing and development of unmanned aircraft, the alternatives analysis considers locations for UAS facilities including additional storage hangars, training and meeting rooms, a UAS Launch and Recovery Site for CAT I & II UAS and UAS support vehicle parking. Many functions of UAS can be performed with traditional GA facilities. For example, a conventional hangar constructed for GA use can also be used for UAS storage, maintenance and training.

Non-aviation Related Development Area:
Areas of the airfield which are not required for aeronautical purposes may be reserved for non-aviation related businesses which may find locating on Airfield property beneficial. These businesses can provide an additional revenue source to the Airfield sponsor, contributing to the financial self-sufficiency of the Airfield. Solar energy production has been identified in the past as a potential low-impact use that would be well suited to Rolle Field's location and compatible with its operations.

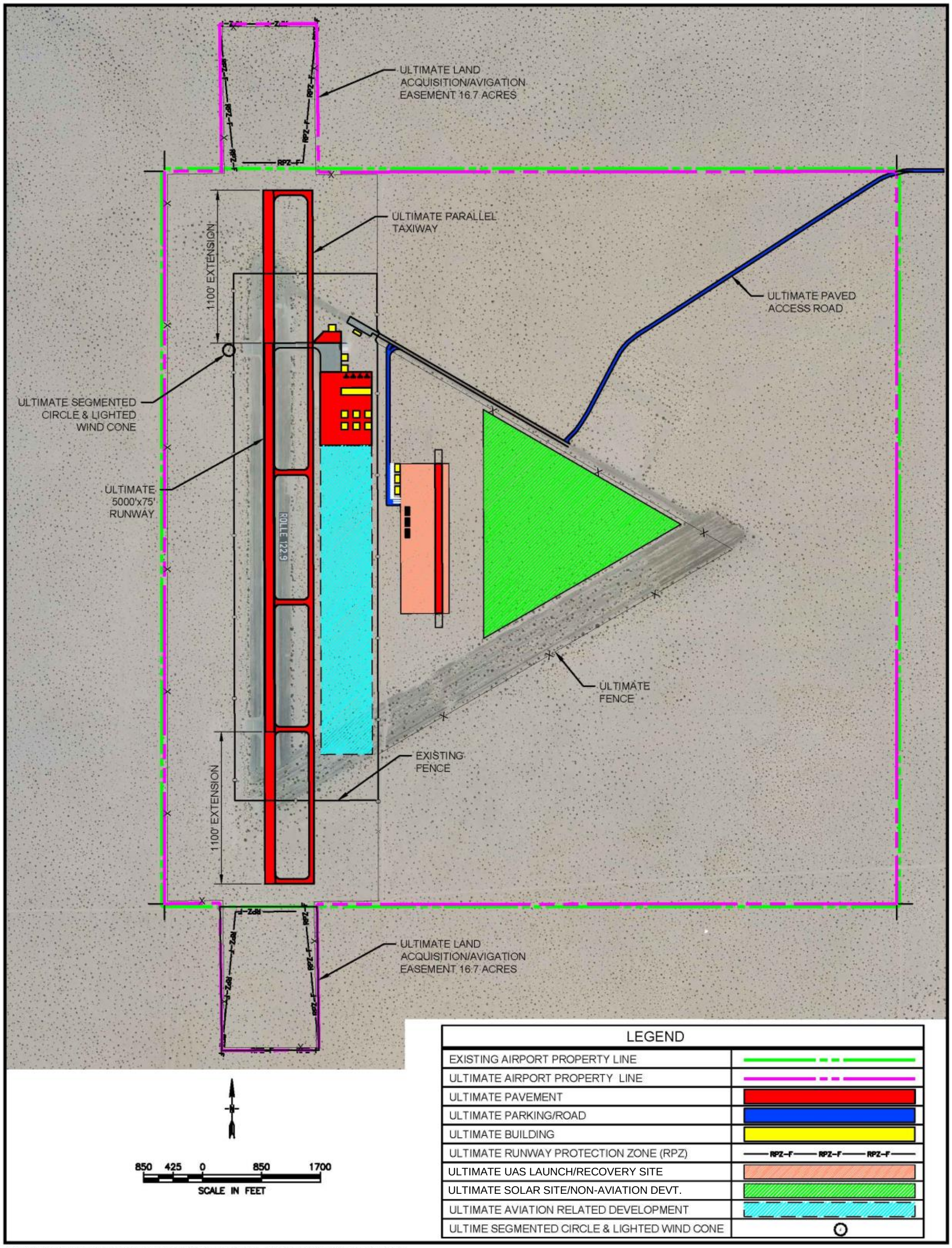
4.5.1 Development Alternative 1

Airside

Airside Alternative 1, shown on **Figure 4-2**, accomplishes the proposed 2,200 foot runway extension by extending each end of Runway 17-35 1,100 feet. In keeping with RDC B-II design standards, it further reflects an ultimate 75-foot runway width as well as an ultimate pavement strength rating of 30,000 pounds DWL. As discussed above, a future parallel taxiway and related exit stub taxiways are also depicted. Like Runway 17-35, all the proposed taxiways would be pavement strength rated at 30,000 DWL. The proposed 2,200 foot extension to Runway 17-35, places the RPZs for each runway end outside existing Airfield property. Rolle Field needs to obtain positive control of the RPZs.

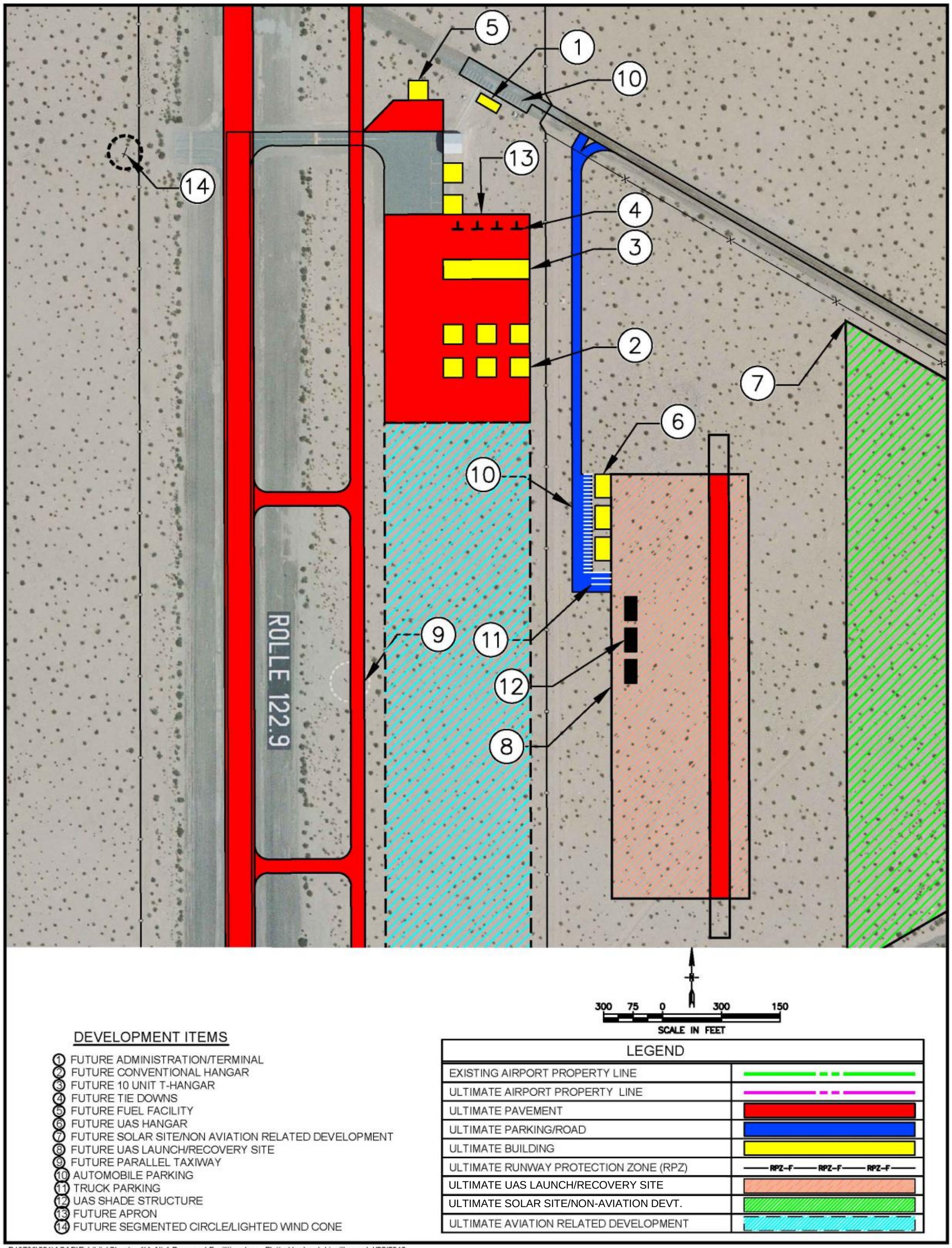
Landside

Figure 4-3 illustrates the landside element of Alternative 1. This alternative, along with Alternatives 2 and 3, proposes continued development of the existing apron east of Runway 17-35, at the north runway end. An area is reserved adjacent to the auto parking area for a future terminal or administration facility. Conventional hangars sites including a possible FBO are shown south of the existing hangar. A 10-unit T-hangar structure is also shown with taxilane access. Tiedowns are shown along the west edge of the expanded apron, to allow access to the hangars. Arranging both the tiedown area and T-hangar structure in this configuration would allow for future expansion of each of these facilities in a north-south direction, parallel to Runway 17-35. This alternative also shows an option for a self-serve fueling facility to the north of the existing apron.



P:\8788\001\ACAD\Exhibits\Chapter 1\1-Alt 1 Proposed Facilities.dwg Plotted by brad drinville on Jul/22/2013

Figure 4-2: Alternative 1 Airside



P:\8788\001\ACAD\Exhibits\Chapter 1\1-Alt 1 Proposed Facilities.dwg Plotted by brad drinville on Jul/22/2013

Figure 4-3: Alternative 1 Landside

UAS

In the short and intermediate term, UAS activities and facilities can be integrated with GA facilities. Hangars and apron constructed for GA can be utilized for UAS as needed. The existing runway length, width and strength are adequate to serve the launch and recovery needs of Category I and Category II UAS. Ultimately, a separate launch and recovery site may need to be provided to separate UAS and GA activity. **Figure 4-2** shows a separated UAS launch and recovery site that is isolated from GA. The layout of this site is based on the standard launch recovery site for a Shadow 200 as depicted in Chapter 3. The UAS launch recovery site would include a separate access road, suitable for truck traffic along with truck parking. Three hangars are shown which could house UAS storage, as well as maintenance and training functions.

4.5.2 Development Alternative 2

Airside

Exhibit 4-4, Development Alternative 2, proposes the entire 2,200 foot runway extension be constructed to the north, at the Runway 17 end. As with the first alternative, Alternative 2 also shows a full-length parallel taxiway. The same runway length, width, runway strength rating as well as RDC B-II design standards detailed for Alternative One apply to this alternative also. The main advantage of this alternative over Alternatives 1 and 3 is that by having the extension to the north it lessens any potential impacts on Mexican airspace. This alternative overall, however, is deemed less desirable than Alternative 1, as it would require obtaining positive control of an additional 34 acres for the proposed runway extension/related parallel taxiway, RPZ protection for Runway 17, and landside development.

Landside

Like the first alternative, the landside element of Alternative 2, depicted on **Figure 4-5,** proposes development on the east side of Runway 17-35 near the north end of the runway. Also, similar to the first alternative, Alternative 2 depicts a future terminal or administration facility adjacent to the auto parking area. Conventional hangars sites including a possible FBO are shown south of the existing hangar. A 10-unit T-hangar structure is also shown with taxilane access. Tiedowns are shown along the west edge of the expanded apron, to allow access to the hangars. Arranging both the tiedown area and T-hangar structure in this configuration would allow for future expansion of each of these facilities in a north-south direction, parallel to Runway 17-35, as is shown with additional conventional hangars. This alternative also shows a location for fuel storage immediately south of the existing hangar.

UAS

Alternative 2 shows a separated UAS launch and recovery site that is more isolated from GA than Alternatives 1 and 2. This option would be most beneficial for UAS users that desired full separation from general aviation activities. The primary disadvantage is that separate infrastructure would be required to serve the remote UAS area.

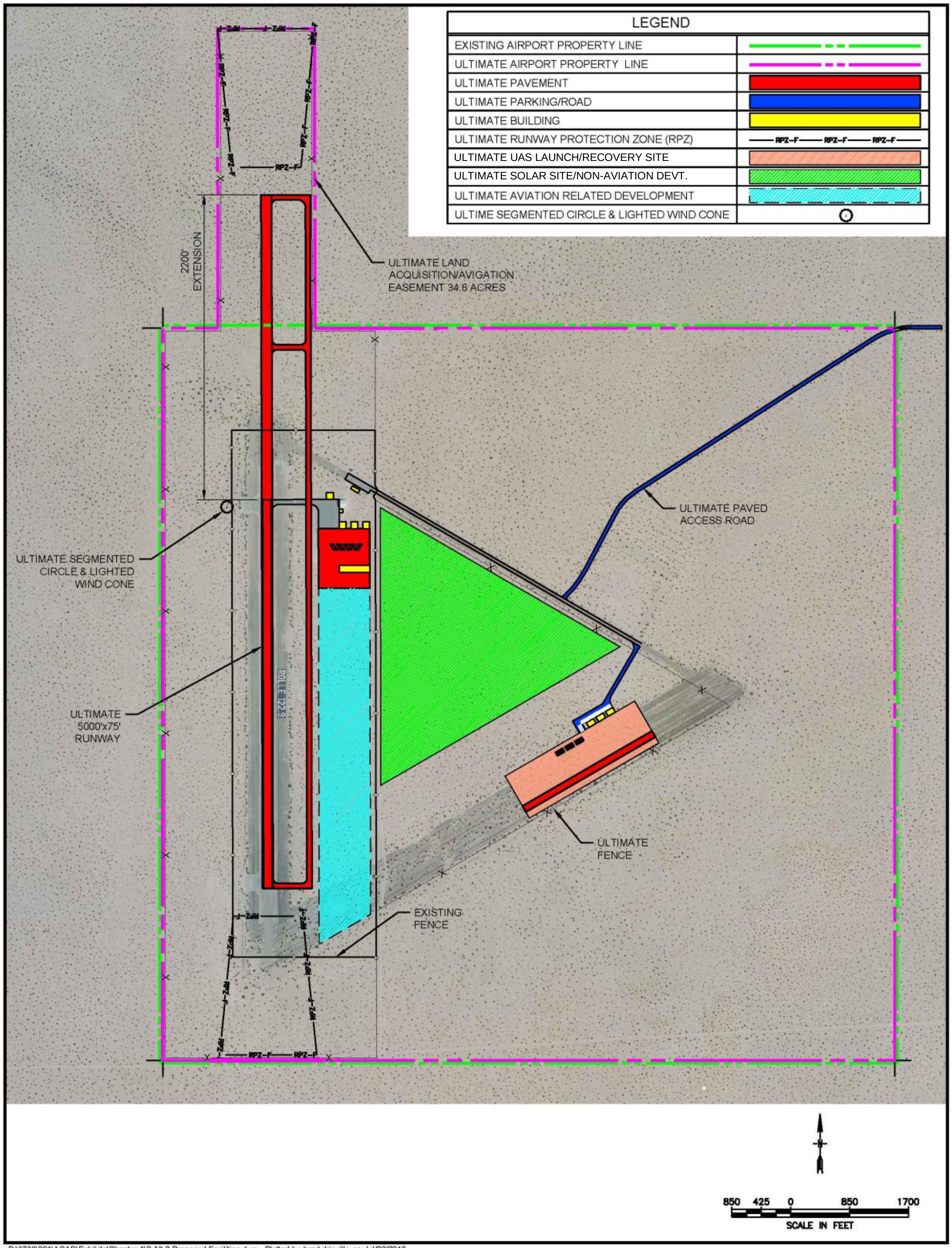
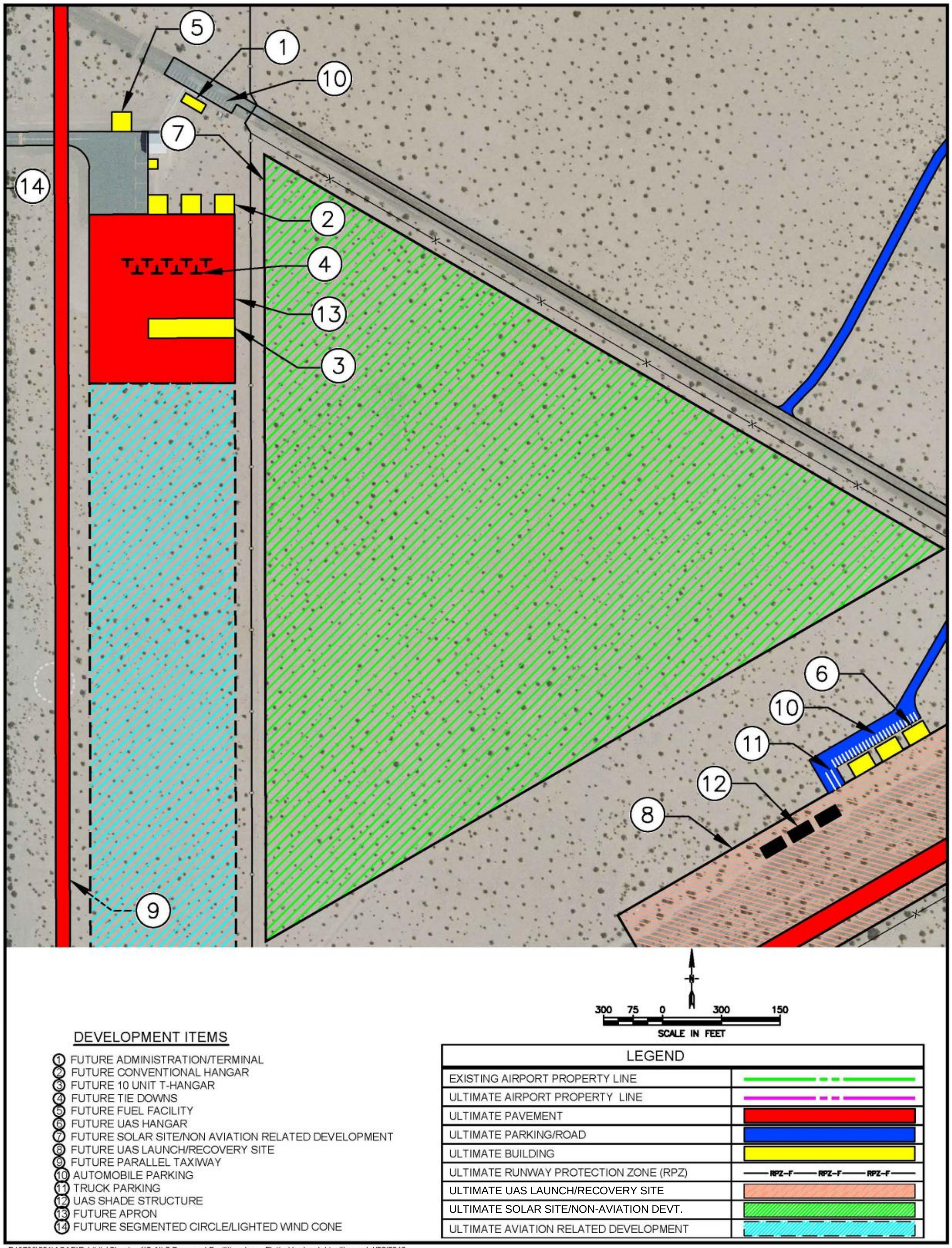


Figure 4-4: Alternative 2 Airside



P:\8788\001\ACAD\Exhibits\Chapter 1\2-Alt 2 Proposed Facilities.dwg Plotted by brad drinville on Jul/22/2013

Figure 4-5: Alternative 2 Landside

4.5.3 Development Alternative 3

Airside

The final alternative is presented on **Figure 4-6**, Alternative 3, and depicts a new 5,000 foot runway built on the alignment of the former northeast to southwest runway. This option would provide the airfield with two separate runways, increasing its utility in crosswind conditions. Alternative 3 also illustrates future full-length parallel taxiways along both runways. RDC BII runway and taxiway design standards, which were detailed under Alternative One, apply to this alternative as well. Alternative 3 would require an avigation easement totaling 21 acres for RPZ protection for the new northeast to southwest runway. The advantages of this option are that it allows the development of the airfield's needed 5000 foot runway on previously disturbed ground, reducing potential environmental concerns. This alternative would also provide the airfield with a dual runway system, which is advantageous in crosswind conditions and during periods of runway maintenance. Disadvantages include the fact that the prevailing wind conditions favor the existing north / south runway alignment and the cost of developing and maintaining two separate runway / taxiway systems. FAA and ADOT will generally not participate in funding a crosswind runway when the primary runway has more than 95% wind coverage.

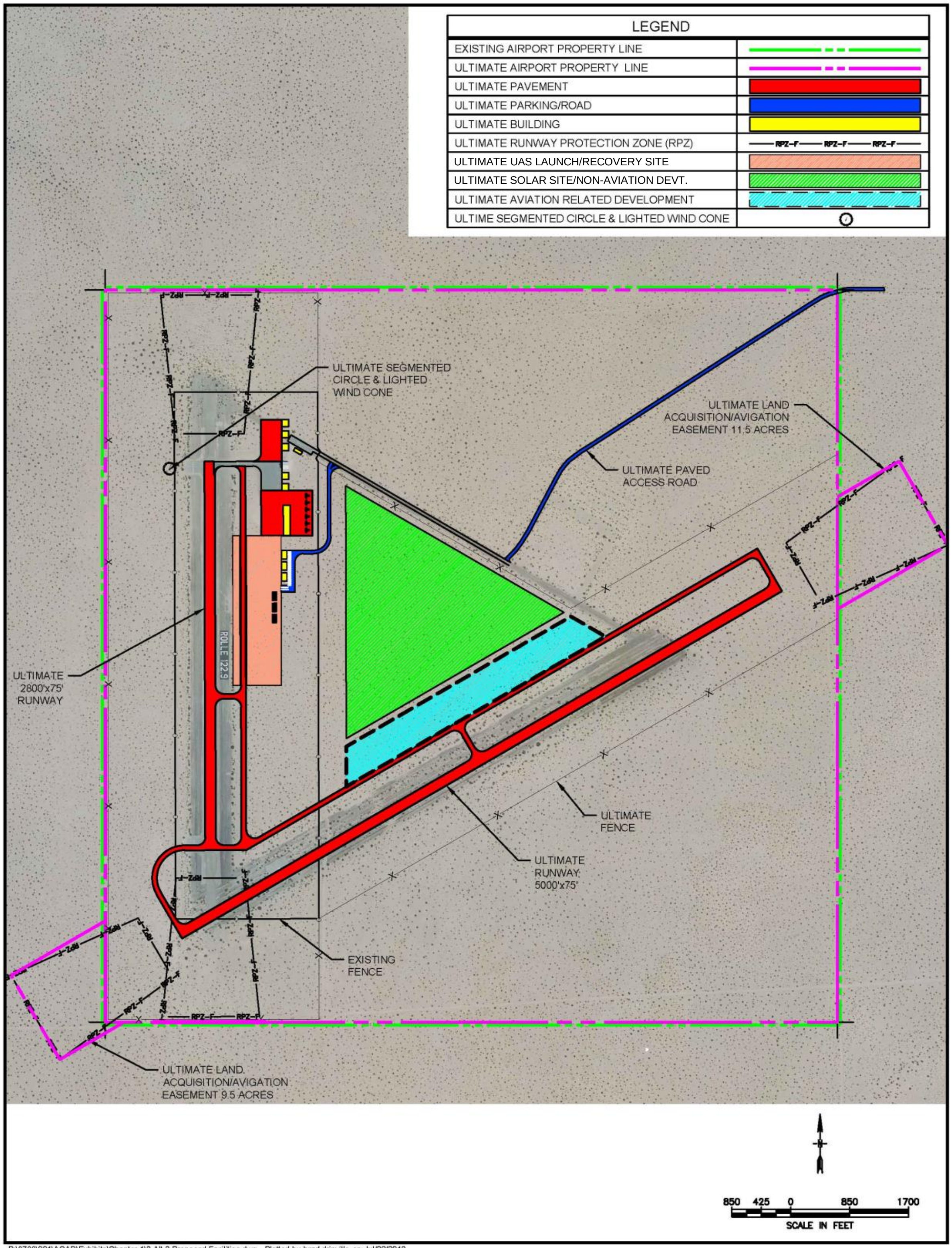
Landside

The third alternative is slightly different from the first two alternatives in that it proposes orienting the conventional hangars and T-Hangars parallel to Runway 17-35. Hangar and apron development is shown to grow both to the north and to the south along its current orientation. Like the other alternatives, the terminal/administration building is adjacent to the auto parking area. This alternative keeps the existing auto parking area more centrally located to hangar development.

UAS

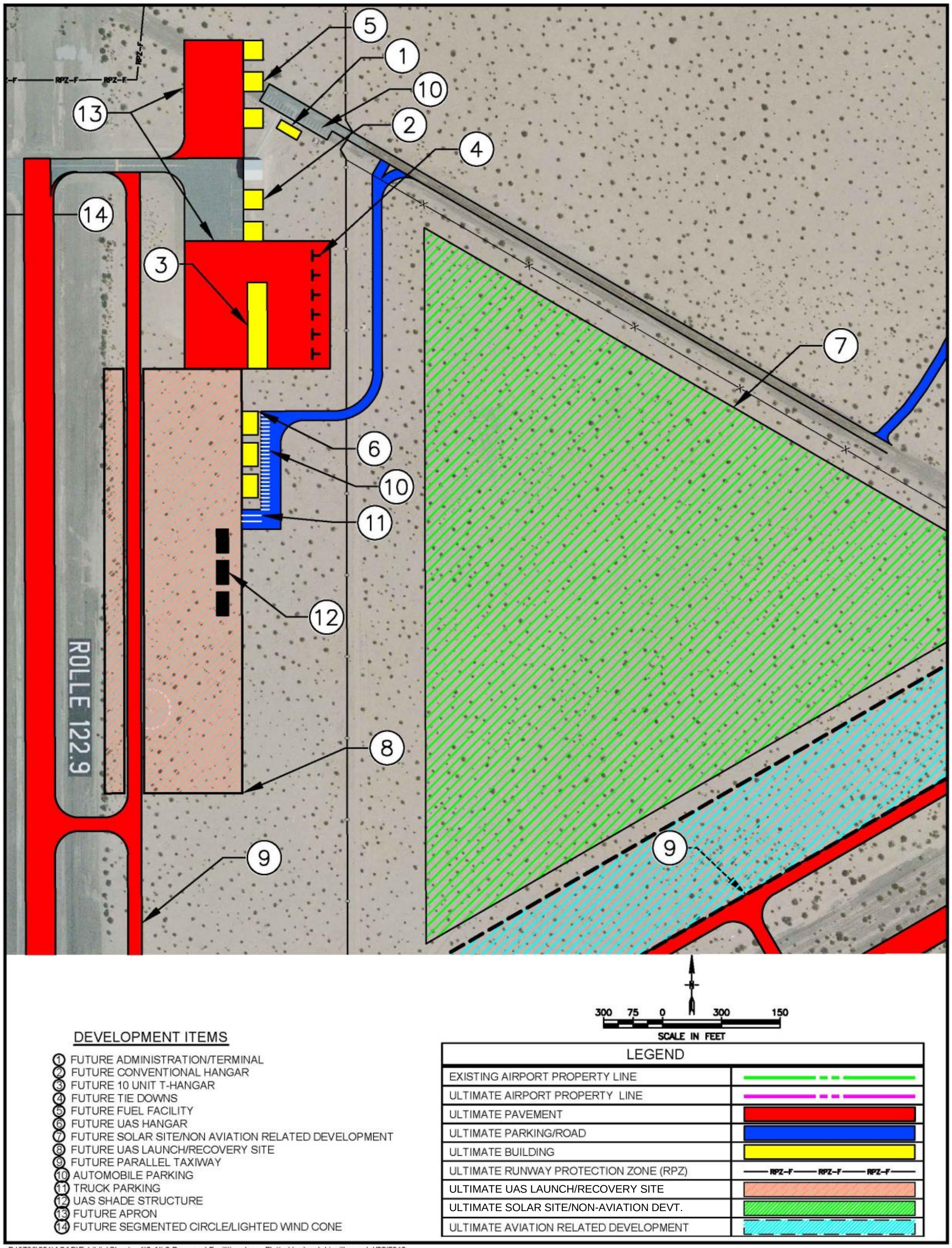
Alternative 3 shows the development of a UAS launch-recovery site adjacent to the GA development area in line with the proposed parallel taxiway. UAS storage hangars and training areas are integrated with GA storage hangars. This arrangement allows full integration of UAS and GA activity and allows flexibility should the airport develop as a fully GA or fully UAS facility.

For all three alternatives, RDC B-II standards require runway safety area (RSA) clearing and grading of 300 feet beyond each runway end. A review of the aerial photograph of Rolle Airfield reveals no desert washes located near the ends of Runway 17-35 which would be affected by this clearing and grading. This effectively negates any requirement for a Section 404 (Clean Water Act) permit prior to construction. Further airside improvements, which apply to all three airside alternatives, include the establishment of a one-mile GPS approach to Runway 17, the installation of visual glide slope indicators (PAPI-2) to both runway ends, medium intensity runway lighting (MIRL) and threshold lighting for Runway 17- 35, taxiway edge and centerline reflectors, runway/taxiway/helipad pavement markings, a lighted wind indicator/segmented circle, and supplemental wind cones near each runway end.



P:\8788\001\ACAD\Exhibits\Chapter 1\3-Alt 3 Proposed Facilities.dwg Plotted by brad drinville on Jul/22/2013

Figure 4-6: Alternative 3 Airside



P:\8788\001\ACAD\Exhibits\Chapter 1\3-Alt 3 Proposed Facilities.dwg Plotted by brad drinville on Jul/22/2013

Figure 4-7: Alternative 3 Landside

4.6 Summary

A preliminary master plan concept will be developed after the alternatives are reviewed by the Planning Advisory Committee and Yuma County Airport Authority. Once the preliminary master plan concept has been identified, cost estimates will be prepared for the individual projects, a development schedule will be outlined, and potential funding sources for recommended projects will be identified (including those projects that are eligible for federal or state funding assistance). The remaining chapters of the master plan will be used to refine a final concept through the development of detailed layouts and a phased development program. An environmental review of the proposed development will also be conducted to identify any potential environmental concerns related to future airport development.

Accommodating UAS operations at Rolle Field will highly depend on the FAA's airspace integration regulations. Check the FAA's website http://www.faa.gov/uas/ for current news on the FAA's efforts to integrate UAS regulations into the NAS.

In August, 2014 the FAA was reporting the following on their website: *Safety is the FAA's top mission, and the agency maintains the world's safest aviation system. The FAA first authorized use of unmanned aircraft in the National Airspace System (NAS) in 1990.*

Today, unmanned aircraft are flying in the NAS under very controlled conditions, performing border and port surveillance by the Department of Homeland Security, helping with scientific research and environmental monitoring by NASA and NOAA, supporting public safety by law enforcement agencies, helping state universities conduct research, and supporting various other missions for public (government) entities. Operations range from ground level to above 50,000 feet, depending on the specific type of aircraft. However, UAS operations are currently not authorized in Class B airspace, which exists over major urban areas and contains the highest density of manned aircraft in the National Airspace System.

Endnote References: Chapter IV

i Paper Presented at AUVSI's Unmanned Systems Asia-Pacific 2010, Pan Pacific Hotel in Singapore – 1 February 2010, Airspace Integration Alternatives for Unmanned Aircraft, Andrew Lacher, Andrew Zeitlin, David Maroney, Kelly Markin, Duane Ludwig, and Joe Boyd The MITRE Corporation, www.mitre.org/

ii http://www.visityuma.com/agritourism.html

iii Group Will Go High-Tech This Fall to Bust Lawbreakers Who Leave Animals to Die and More April 8, 2013; Kaitlynn Kelly 202-483-7382.

iv Federal Aviation Administration, Aeronautical Information Manual Official Guide to Basic Flight Information and ATC Procedures, February 14, 2008. Code of Federal Regulations - Title 14 Aeronautics and Space; Part 91 General operating and flight rules; Section 135 Operations in Class A airspace.

v Federal Aviation Administration Aviation Safety Unmanned Aircraft Program Office, Interim Operational Approval Guidance 08-01 – UAS Operations in the NAS, March 13, 2008.

vi Code of Federal Regulations - Title 14 Aeronautics and Space; Part 91 General operating and flight rules; Section 1.1 General definitions.

vii Federal Aviation Administration Aviation Safety Unmanned Aircraft Program Office, Interim Operational Approval Guidance 08-01 – UAS Operations in the NAS, MRDCh 13, 2008.

viii Robert Sturgell, FAA Order 1110.150, Small Unmanned Aircraft System Aviation Rulemaking Committee, 10 April 2008.

ix Small Unmanned Aircraft System Aviation Rulemaking Committee, Comprehensive Set of Recommendations for UAS Regulatory Development, 1April 2009.

x Federal Aviation Administration Aviation Safety Unmanned Aircraft Program Office, Interim Operational Approval Guidance 08-01 – UAS Operations in the NAS, MRDCh 13, 2008.

xi RTCA, Inc., DO-260B, Minimum Operational Performance Standards for 1090 MHz Extended Squitter Automatic Dependent Surveillance – Broadcast (ADS-B) and Traffic Information Services – Broadcast (TIS-B), RTCA, December 2009.; RTCA, Inc. DO-282B, Minimum Operational Performance Standards for Universal Access Transceiver (UAT) Automatic Dependent Surveillance – Broadcast, RTCA, December 2009.

xii Federal Register / Vol. 72, No. 193, Docket No. FAA–2007–29305; Notice No.07–15, Automatic Dependent Surveillance—Broadcast (ADS–B) Out Performance Requirements to Support Air Traffic Control (ATC) Service, October 5, 2007.

xiii International Civil Aviation Organization (ICAO), ANNEX 10 to the Convention on International Civil Aviation - Volume IV (Surveillance Radar and Collision Avoidance Systems), July 2007.

This page intentionally left blank.

Recommended Concept

CHAPTER FIVE:
RECOMMENDED CONCEPT

5.1 Introduction

Airfield and landside development alternatives were assessed using a process that considered short and long term needs as well as future growth potential. Safety, both in the air and on the ground, was given high priority in the analyses and current airport design standards were considered in every scenario.

The recommended development concept for Rolle Field represents a means by which the airport can grow in a balanced manner to accommodate demand over the planning period. In addition, the plan provides the flexibility to meet activity growth beyond the long range planning horizon.

Through further meetings and discussions with the Planning Advisory Committee (PAC) and the Yuma County Airport Authority (YCAA) staff, as well as the public, a recommended concept has evolved which includes elements from all three alternative scenarios. The recommended concept represents a means by which the airport can continue to effectively serve general aviation needs within the overall operation and development of the airport as well as provide direction for the development of Unmanned Aircraft Systems facilities.

5.2 Airport Design Standards

Airport design and safety standards are primarily based on the characteristics of the critical design aircraft expected to use the airport. The critical design aircraft is the most demanding aircraft or "family" of aircraft which will conduct 500 or more operations (take-offs and landings) per year at the airport. The primary reference for the design of airfield facilities is FAA Advisory Circular 150/5300-13A, Airport Design. Within this advisory circular, a coding system, referred to as the Airport Reference Code (ARC), has been established that identifies an airport's critical design aircraft. This code is a function of the critical design aircraft's approach speed and wingspan. The ARC was previously discussed in Chapter Three.

The current ARC for Rolle Field is B-I (small). This ARC is adequate for the current level of activity at Rolle Field, consisting mainly of single engine, piston-powered aircraft performing standard training exercises (i.e., touch-and-go's, etc.). However, planning forecasts suggest a potential for increased future multi-engine and turboprop activity at the Airfield in the future. Some turboprop and business jet aircraft (i.e., Cessna Citation II and Beechcraft Super King-Air) fall within the B-II Runway Reference Code (RRC) (approach speed greater than 91 knots but less than 121 knots and wingspans 49 feet up to but not including 79 feet). While ARC B-II aircraft operations currently total less than 500 annually, an increase in use from aircraft within the B-II RRC can be expected during the planning period. All airfield facilities, therefore, should comply with B-II design and safety standards. **Table 4-1**, in Chapter Four, summarizes the planning standards used in the ultimate design and layout of Rolle Airfield.

5.3 Master Plan Concept

The recommended master plan concept, as depicted on **Figure 5-1,** proposes the following elements as outlined in one, two or three of the previously proposed planning alternatives:

- Extension of Runway 17-35 to the north and south
- Addition of full length parallel Taxiway A
- GA terminal / Administration building
- Paved access road
- Apron expansion
- Additional storage hangars
- UAS support vehicle parking
- UAS Launch and Recovery Site for CAT I & II UAS
- Additional storage hangars, training and meeting rooms

The recommended master plan concept provides for anticipated aviation facility needs for the southwestern Yuma County area throughout the 20-year planning horizon. The following sections provide a brief discussion of the major improvements planned for Rolle Airfield throughout the planning period.

5.4 General Aviation Concept

5.4.1 AIR OPERATIONS AREA (AOA) AIRSIDE RECOMMENDATIONS

Airside recommendations include improvements to the runway, new taxiway construction, and airfield lighting. These improvements are as follows:

Runway 17-35: Extend runway to an ultimate (long term planning horizon) length of 4,520 feet and widen to 75 feet. After discussion of Alternatives, it was determined to be advantageous to maintain all physical improvements within the existing airport property boundary. The length of 4, 520 feet is the maximum runway length that will allow construction of a perimeter fence on existing airport property. The required runway safety area length beyond the end of the runway is maintained and the fence will not penetrate the 20:1 Runway Protection Zone Approach Surface. Ultimate runway pavement strength will be increased to a rating of 30,000 pounds DWL.

The runway extension can be accomplished in stages: however, it is recommended that the minimum short term planning period runway length be 3,660 feet (860 foot initial runway extension). The 3,660 length allows over 95% of the small aircraft (less than 12,500 pounds gross weight) with less than 10 passenger seats to operate without restriction at Rolle. The ultimate length of 4,520 feet will allow almost all the small aircraft with 10 or more passenger seats to operate without restriction.

Other minimum short term recommendations include widening the runway to 75 feet, and increasing existing pavement strength rating form 8,000 pounds SWL to 12,500 SWL.

Post study period, the Runway can be extended to the 5,000 foot length identified in Chapters 3 and 4. Extension to the north would be the preferred alternative due to the proximity of Rolle to the Mexican border and the possible development of a clean energy tower project proposed south of Rolle Field along the border.

Taxiways: The long term recommendation is for a full length parallel taxiway and related connecting stubs. These taxiways will be designed to Taxiway Design Group (TDG) 2 standards with regard to width and with a 300 foot separation to allow for future flexibility in aircraft design group. They will match the previously discussed runway pavement strength ratings of 12,500 pounds SWL for the short term planning period to 30,000 pounds DWL for the long term.

Airfield Lighting: The installation of radio controlled medium intensity runway lighting (MIRL) along with runway threshold lighting on Runway 17-35 will permit 24-hr operations. Initially, taxiways can be served by taxiway reflectors. Long term recommendations include medium intensity taxiway lighting (MITL) for the proposed full-length parallel taxiway. An airport rotating beacon will be installed at or near the proposed terminal area in order to identify a lighted airport and to facilitate nighttime operations.

Visual Approach Aids: Install PAPI-2s (precision path approach indicators) at each end of Runway 17-35.

Airfield Pavement Markings: Reapply basic centerline and numerical designations for the extended runway. Centerline and edge marking will be applied to all new taxiways. The existing helipad will be remarked with standard FAA helipad markings. Existing closed runway/taxiway markings will be reapplied as required.

Additional Airside Improvements: Relocate segmented circle/wind indicator from the east side to the west side of Runway 17-35 (includes relocation of solar powered emergency telephone). Upgrade wind cone to a lighted wind cone meeting FAA requirements. If crosswinds become an issue, supplemental lighted wind cones at or near each ultimate runway end can be installed.

5.4.2 NON-AIR OPERATION AREA AIRSIDE RECOMMENDATIONS

Non-Air Operations Areas within the Rolle Field Security Fenced Area recommendations include aircraft parking apron and tiedown area, aircraft storage hangar facilities, general aviation terminal area development, airport access roads and vehicle parking, fuel facility and extension of Rolle Field security fencing. Details of these improvements are as follows:

Aircraft Parking Apron/Tiedown Area:
Expand the apron and tiedown area at the north runway end. Tiedown positions are to be provided on the south side of the apron for both local and transient aircraft. Initial expansion may also be used to facilitate small UAS operations and UAS testing.

Aircraft Storage Hangar Facilities:
Ultimately construct a 10 unit T-Hangar facility and 9 conventional hangars on the southerly end of the proposed aircraft parking apron. Areas on the eastern edge of the aircraft parking apron should be reserved for future conventional hangars or FBO sites.

General Aviation (GA) Terminal Facility Site: Reserve GA terminal facility site (to accommodate 1560 square foot building) on the edge of the auto parking area.

Airport Access Roads and Vehicle Parking:
Construct an airfield access road providing access to the vehicle parking area which is to be constructed adjacent to the reserved GA terminal facility site discussed earlier.

Fuel Facility: Reserve a site for future fuel facility along the northern edge of proposed aircraft parking apron.

Airfield Perimeter Fencing: Extend existing Airfield security fencing to enclose the airfield in conjunction with runway extensions and construction of UAS facilities.

Water / Fire Suppression: Implement a fire suppression system with new construction in conformance with the International Fire Code and the International Building Code. Based on City of San Luis guidance and consultant review of codes, received by YCAA for the construction of the existing hangar, National Fire Protection Association 1142 may be applicable until such time as water is extended by the City of San Luis to the site. NFPA 1142 addresses water supplies for rural fire fighting where typical city water supplies and fire flow storage are not available. San Luis Building Officials and the Fire Department will need to enter into a Memorandum of Understanding with the YCAA to utilize NFPA 1142.

Fire Protection Requirements under IFC Appendix B may require fire flows of 1,500 gpm for two hours requiring storage of 180,000 gallons. NFPA 1142 would typically require about 12,000 gallons of storage for a 3,000 square foot hangar and a fire flow of 750 gpm. As additional hangars are constructed, storage requirements would increase. Complying with IFC Appendix B is considered cost prohibitive for the level of development proposed for Rolle unless property surrounding the airport develops.

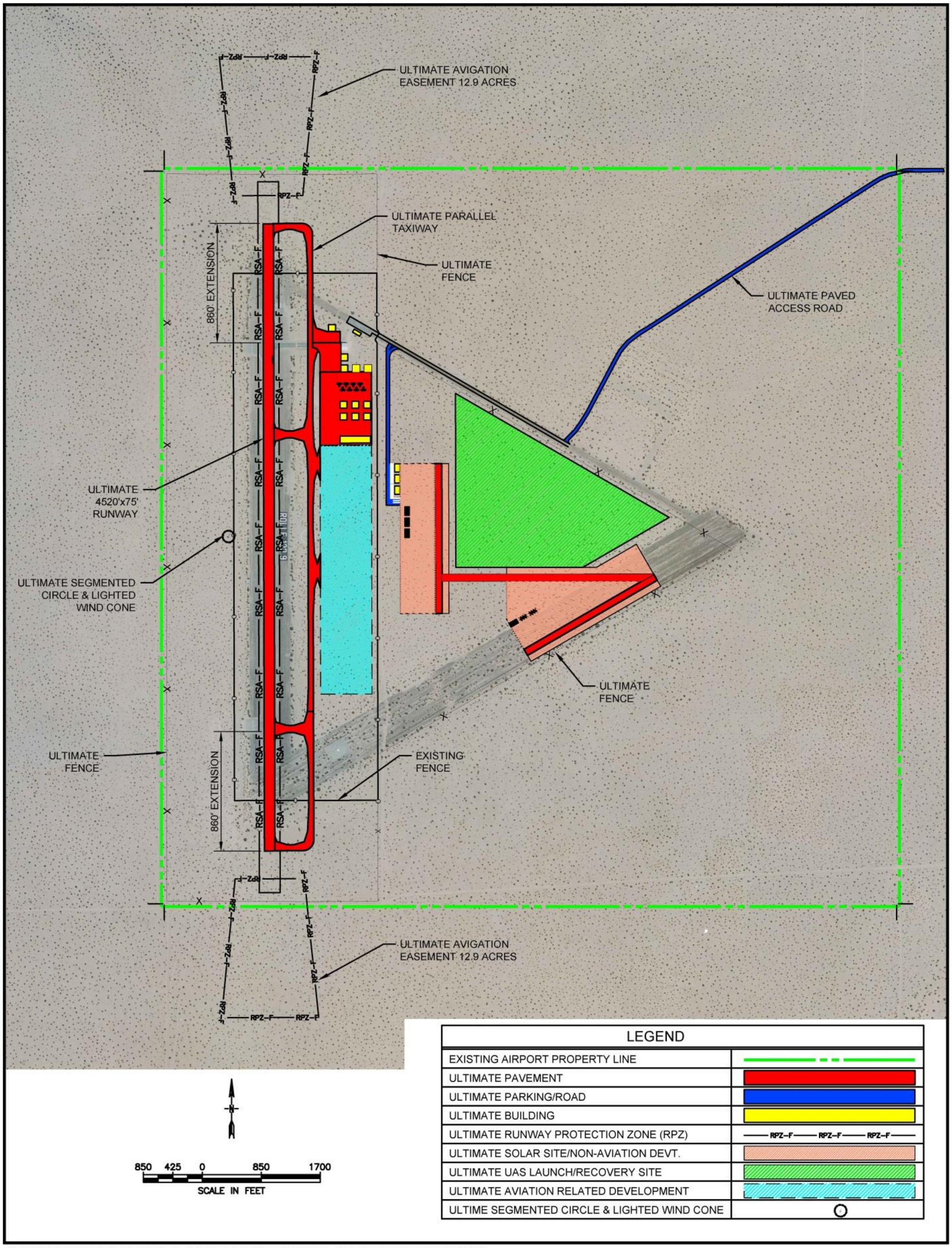
Power: Connect the airfield's electrical system to the Arizona Public Service (APS) power grid.

Telecommunications: Upgrade telecommunications service to the airfield to provide for security and data needs of Rolle Field tenants. Fiber Optics should be the ultimate goal; extension of Microwave service to Rolle Field from YCAA facilities would be an interim solution.

5.5 UAS CONCEPT

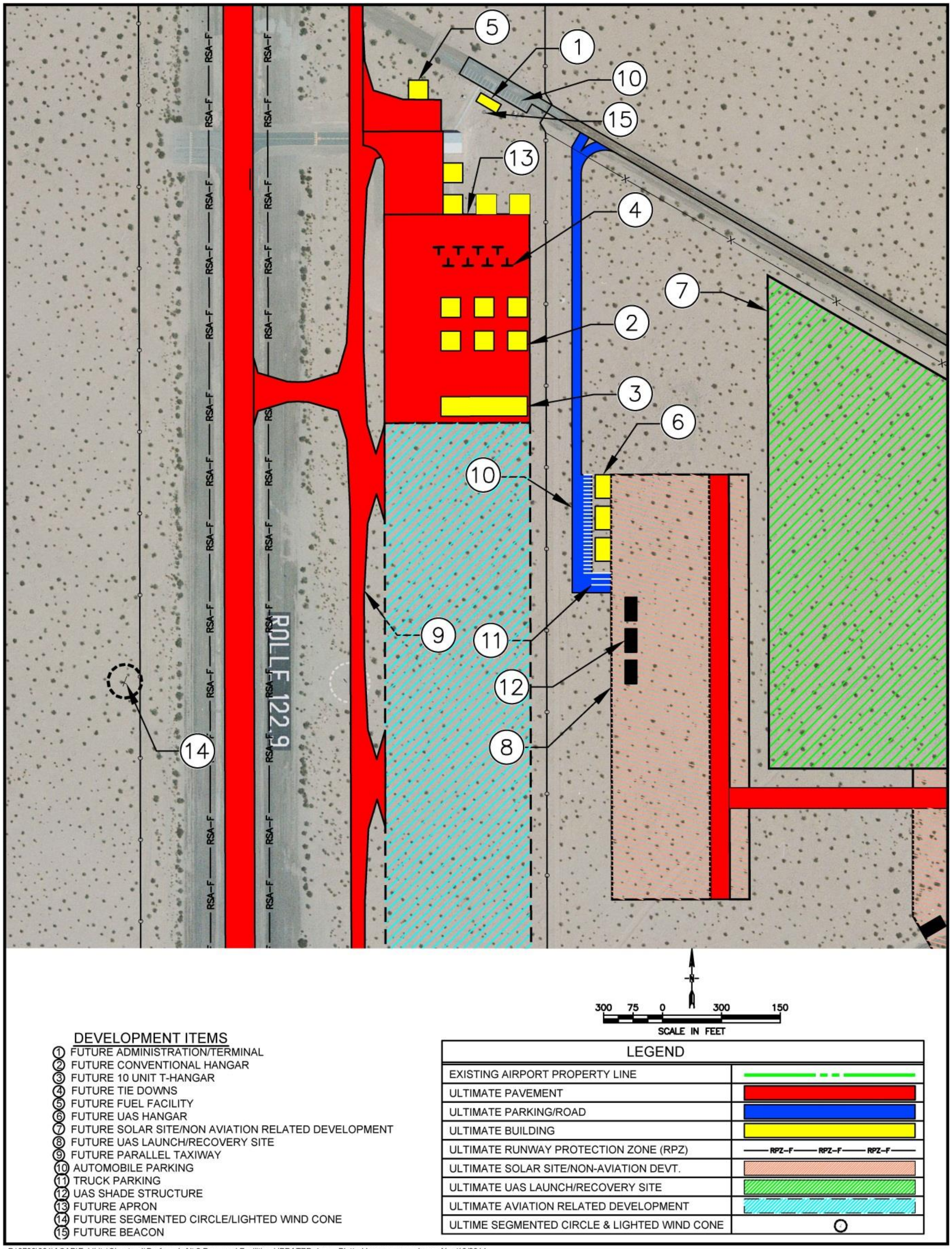
In the short and intermediate term, UAS activities and facilities can be integrated with GA facilities. Hangars and apron constructed for GA can be utilized for UAS as needed. The existing runway length, width and strength are adequate to serve the launch and recovery needs of Category I and Category II UAS. Ultimately, a separate launch and recovery site may need to be provided to separate UAS and GA activity. **Figure 5-1** shows a separated UAS launch and recovery site that is isolated from GA. The layout of this site is based on the standard launch recovery site for a Shadow 200 as depicted in Chapter 3. The UAS launch recovery site would include a separate access road, suitable for truck traffic along with truck parking. Three hangars are shown which could house UAS storage, as well as maintenance and training functions. Three shade structures are also shown on the UAS stabilized soil area. Two additional UAS launch and recovery site are shown for use in crosswind conditions.

Use of Rolle for concurrent GA and UAS operations will bring added responsibilities to YCAA operational staff. Proper Notices to Airmen (NOTAMs) will need to be issued. GA pilots and UAS will need to monitor Rolle's Unicom system, and UAS ground personal will need to act in a controller role while simultaneous operations are occurring. UAS, Military and Civil (GA and Commercial) have been integrated at several towered airports where the military and civil aviation have joint operations. The challenge at Rolle will be to develop similar communications at a non-towered GA facility.



P:\8788\001\ACAD\Exhibits\Chapter 1\Preferred Alt 2 Proposed Facilities-UPDATED.dwg Plotted by carmen parks on Nov/10/2014

Figure 5-1: Preferred Alternative Airside



P:\8788\001\ACAD\Exhibits\Chapter 1\Preferred Alt 2 Proposed Facilities-UPDATED.dwg Plotted by carmen parks on Nov/10/2014

Figure 5-2: Preferred Alternative Landside

Financial Analysis

This page intentionally left blank.

CHAPTER SIX:

FINANCIAL PROGRAM

6.1 Introduction

The analyses conducted in the previous chapters evaluated airport improvement needs based upon forecast activity changes and operational efficiency. However, the most important element of the master planning process is the application of basic economic, financial, and management rationale to each improvement item so that the feasibility of implementation can be assured. The purpose of this chapter is to provide financial management information and tools which will make the master planning recommendations achievable.

This chapter provides a financial plan and examines the economic feasibility of developing the proposed improvements at Rolle Field. The use of airport revenue, federal and state grant programs, is evaluated in considering the ability of the Yuma County Airport Authority to finance the proposed capital improvements. Implementation of the improvements will be on an "as required" basis consistent with "when demand occurs" along with the financial capability of the Yuma County Airport Authority.

6.2 Airport Improvement Schedule and Cost Summaries

With the establishment of the specific needs and improvements for the airport in Chapters 3, 4 and 5 the next step is to determine a realistic schedule and costs for implementing the plan. This section examines the overall cost of improvement and presents a development schedule. The recommended improvements are grouped into three planning horizons: short, intermediate, and long-term. **Table 6-1** summarizes the key activity milestones for each planning horizon.

Table 6-1 Planning Horizons Rolle Field

	PLANNING HORIZONS			
	2012	Short Term	Intermediate Term	Long Term
General Aviation				
Based Aircraft	0	3	4	8
Annual Operations				
Local	6,531	7,157	7,006	8,336
Itinerant	726	795	1,751	2,084
Total GA Operations	7,257	7,952	8,757	10,420
Military				
Based Aircraft	0	0	0	0
Operations	100	100	100	100
Total Airport Operations	7,357	8,052	8,857	10,520

The short-term planning horizon covers items of highest priority. These items are coordinated with ADOT on a yearly basis, when the Five (5) Year Airport Capital Improvement Program (ACIP) information is updated and potential funding sources and priorities are assigned to individual projects. Each year, the airport will need to re-examine the priorities for funding in the short-term period, bringing projects which were originally included in intermediate or long-term planning horizons, onto the FAA's or ADOT's capital programming list. While some projects will be demand-based, others will be dictated by design standards, safety, or rehabilitation needs. In putting together a listing of projects, an attempt has been made to include anticipated rehabilitation and capital replacement needs through the planning period. However, it is difficult to project with certainty the scope of such projects when looking 20 years into the future.

The airport improvement schedule is presented in **Table 6-2**. An estimate has been included with each project of federal or ADOT funding eligibility, although this amount is not guaranteed.

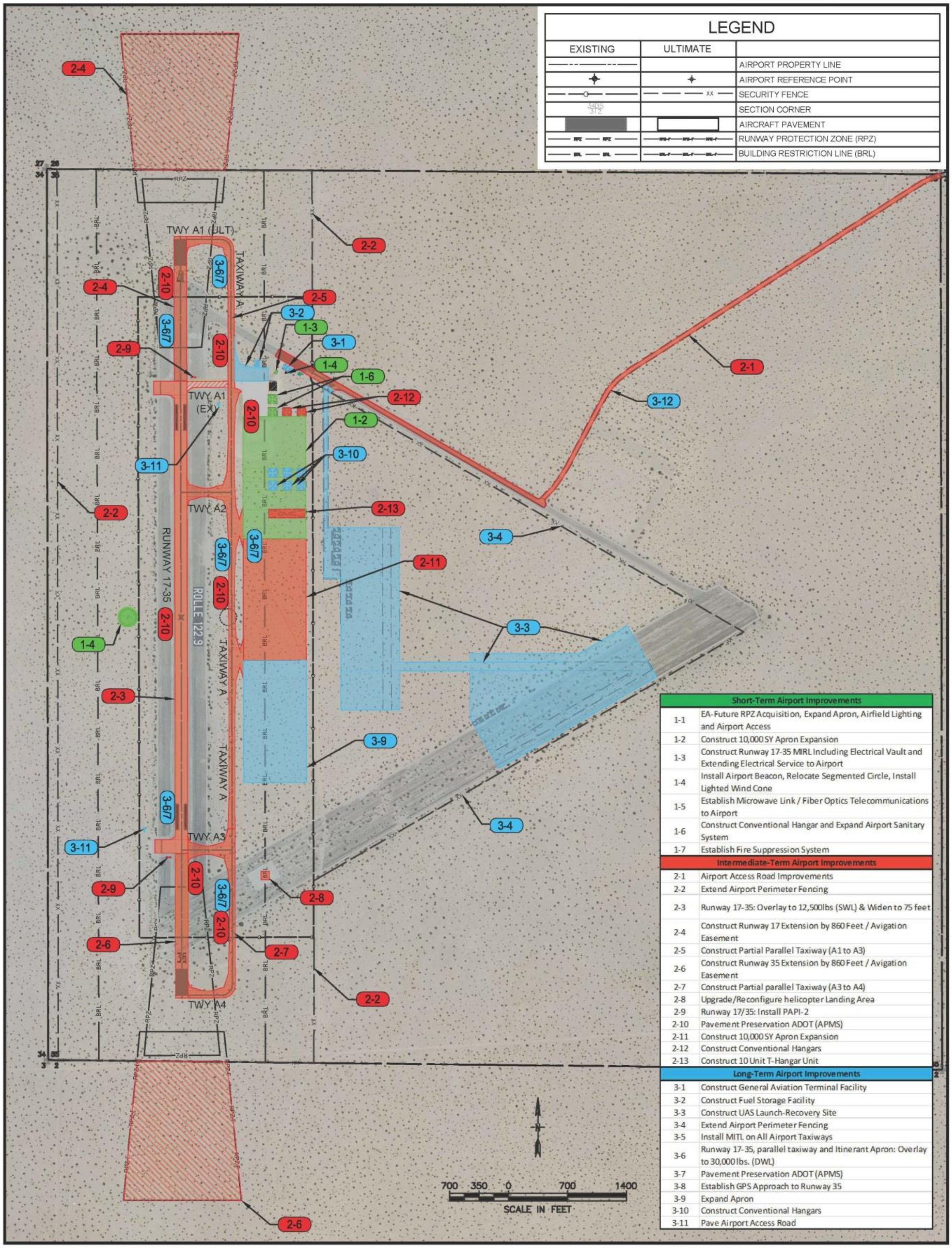
The staging of the improvement program is graphically presented on **Figure 6-1**.

As discussed in the subsequent sections, the Rolle Field Capital Improvement FAA/ADOT Grant Program will be dependent on actual demands, approval of environmental assessments and availability of Federal, State and Local funding.

Some identified short term and intermediate term needs will probably need to be deferred because of funding restraints. Federal grants will require the use of entitlement, state apportionment and discretionary funds. To qualify for AIP funding an airport must be part of the National Plan of Integrated Airport Systems (NPIAS). As discussed in Chapter One, currently, Rolle Field does not meet eligibility guidelines and is, therefore, not currently included in the NPIAS. Until Rolle Field becomes included in the NPIAS, funding will be limited primarily to ADOT and Local sources. FAA, ADOT and local shares are based on a 91.06%, 4.47%, 4.47% ratio. Currently, the FAA share in Arizona is 91.06%. ADOT matches one-half of the local share on FAA projects. On state grant projects, the local share is 10% of the eligible cost. Due to the conceptual nature of a master plan, capital projects should undergo further refinement during annual 5-yr ACIP preparation and prior to requesting funds from the FAA and ADOT. Capital costs presented in **Table 6-2** are in current (2014) dollars. Adjustments will need to be applied over time as construction costs or capital equipment costs change. Capital costs in this chapter should be viewed only as estimates subject to further refinement during the ACIP and project application process.

In **Table 6-2** it is assumed that ADOT will be the primary grant funding agency, with a 90% State and 10% YCAA local share. For Hangar and Terminal revenue projects, it is assumed that low interest loans from ADOT will be used for revenue projects throughout the study period. Some economic development grants in the past have been used for hangar and other revenue producing project, and these projects may also qualify for economic development grants in the future. Should Rolle Field become a NPIAS airport during the study period, then the YCAA share of FAA AIP eligible projects will be reduced to approximately 5% of the budget.

This provides a conservative approach to budgeting for future improvements.



P:\8788\001\ACAD\Exhibits\Chapter 6\Project Plan.dwg Plotted by carmen parks on Nov/10/2014

Figure 6-1: Capital Improvement Program

Table 6-2 Capital Improvements - FAA/ADOT Grant Program Rolle Field

	Project Description	*Total Cost	*FAA/ADOT Grant 90%	*YCAA Grant Match 10%
Short Term Airport Improvements				
1-1	EA - Future RPZ Acquisition, Expand Apron, Airfield Lighting and Airport Access	$125,000.00	$112,500.00	$12,500.00
1-2	Construct 10,000 SY Apron Expansion	$825,000.00	$742,500.00	$82,500.00
1-3	Construct Runway 17-35 MIRL including Electrical Vault and Extending Electrical Service to Airport	$2,000,000.00	$1,800,000.00	$200,000.00
1-4	Install Airport Beacon, Relocate Segmented Circle, Install Lighted Wind Cone	$200,000.00	$180,000.00	$20,000.00
1-5	Establish Microwave Link / Fiber Optics Telecommunications to Airport	$210,000.00	$0.00	$210,000.00
1-6	Construct Conventional Hangars & Expand Airport Sanitary System	$470,000.00	$0.00	$470,000.00
1-7	Construct Fire Suppression System	$250,000.00	$0.00	$250,000.00
Intermediate Term Airport Improvements				
2-1	Upgrade Airport Access Road (All-weather Gravel) From Ave B to Airport	$670,000.00	$603,000.00	$67,000.00
2-2	Extend Airport Perimeter Fencing	$225,000.00	$202,500.00	$22,500.00
2-3	Runway 17-35: Overlay to 12,500 lbs (SWL) & Widen to 75-ft	$880,000.00	$792,000.00	$88,000.00
2-4	Construct Runway 17 Extension by 860-ft	$565,000.00	$508,500.00	$56,500.00
2-5	Construct Partial Parallel Taxiway (A1 to A3)	$1,410,000.00	$1,269,000.00	$141,000.00
2-6	Construct Runway 35 Extension by 860-ft	$565,000.00	$508,500.00	$56,500.00
2-7	Construct Partial Parallel Taxiway (A3 to A4)	$375,000.00	$337,500.00	$37,500.00
2-8	Upgrade/Reconfigure Helicopter Landing Area	$100,000.00	$90,000.00	$10,000.00
2-9	Runway 17-35: Install PAPI-2	$150,000.00	$135,000.00	$15,000.00
2-10	Pavement Preservation (ADOT APMS)	$465,000.00	$418,500.00	$46,500.00
2-11	Construct 10,000 SY Apron Expansion	$825,000.00	$742,500.00	$82,500.00
2-12	Construct 2 Conventional Hangars	$330,000.00	$0.00	$330,000.00
2-13	Construct 10 Unit T-Hangar Unit	$300,000.00	$0.00	$300,000.00
Long Term Airport Improvements				
3-1	Construct General Aviation Terminal Facility (3,000 SF)	$450,000.00	$0.00	$450,000.00
3-2	Construct Fuel Storage Facility	$350,000.00	$0.00	$350,000.00
3-3	Construct UAS Launch-Recovery Site	$3,740,000.00	$0.00	$3,740,000.00
3-4	Extend Airport Perimeter Fencing	$360,000.00	$324,000.00	$36,000.00
3-5	Install MITL on All Airport Taxiways	$470,000.00	$423,000.00	$47,000.00
3-6	Runway 17-35, Parallel Taxiway and Itinerant Apron: Overlay to 30,000 lbs (DWL)	$3,450,000.00	$3,105,000.00	$345,000.00
3-7	Pavement Preservation (ADOT APMS)	$465,000.00	$418,500.00	$46,500.00
3-8	Establish GPS Approach to Runway 35 or 17	$50,000.00	$45,000.00	$5,000.00
3-9	Expand Apron	$825,000.00	$742,500.00	$825,000.00
3-10	Construct 3 Conventional Hangars	$495,000.00	$0.00	$49,500.00
3-11	Pave Airport Access Road (On Airport Property Only)	$1,060,000.00	$954,000.00	$106,000.00

* For Revenue Projects a Low Interest Rate Loan from ADOT has been assumed. YCAA Share is 100% for Loan Projects

6.3 Airport Improvement Grant Funding Sources

Financing capital improvements at the airport will not rely exclusively upon the financial resources of the Yuma County Airport Authority. Capital improvement funding is available through various grant-in-aid programs administered at the state and federal levels.

6.3.1 FEDERAL AVIATION ADMINISTRATION GRANTS

The United States Department of Transportation, through the Federal Aviation Administration, provides a portion of development costs for eligible airport projects. This program is the Airport Improvement Program (AIP).

The source for AIP funds is the Aviation Trust Fund. The Aviation Trust Fund was established in 1970 to provide funding for aviation capital investment programs (aviation development, facilities and equipment, and research and development). The Trust Fund also finances the operation of the FAA. It is funded by user fees, taxes on airline tickets, aviation fuel, and various aircraft parts. The program is subject to review and reauthorization by Congress on an approximate five year cycle.

Prior to establishment of the Trust Fund, federal aid to airports was funded from the federal general fund under the Federal Aid to Airport Projects (FAAP) program administered by the Civil Aeronautics Administration (CAA) from 1946-1958 and the FAA from 1958-1969. With the exception of short periods while the legislation was being reauthorized, there has been a federal aid to airports program since it was first authorized by Congress in 1946 for post-World War II support of civil aviation. It is expected that the federal government will continue to support airport development throughout the study period.

Under the current AIP law, eligible projects (such as airfield, apron, terminal, and access roads) can receive up to 90 percent federal participation. Projects that are undertaken for security, safety, operational efficiency, or environmental reasons are generally eligible for funding. Projects that have the potential to generate revenue or benefit a private individual or company are generally ineligible. Examples of ineligible projects include the construction of general aviation terminals, hangars and fuel farms, though there are some exceptions for revenue producing projects at General Aviation airports. AIP funds are distributed each year by the FAA under budget authorization and appropriations from Congress.

To qualify for AIP funding an airport must be part of the National Plan of Integrated Airport Systems (NPIAS). As discussed in Chapter One, currently, Rolle Airfield does not meet eligibility guidelines and is, therefore, not included in the NPIAS. The 2015-2019 NPIAS identifies more than 3,330 airports (both existing and proposed) that are important to the national air transportation system. These airports are further classified into seven Airport Type categories. To be included in the NPIAS, an airport must meet the definition of one these categories. General aviation airports are normally included if they account for enough activity (usually 10 based aircraft) and are at least 20 miles from the nearest NPIAS airport. Often times, the activity requirements may be relaxed for remote locations or other mitigating circumstances.

Starting with the FAAP program in 1946, as one of the conditions for accepting federal airport development grants, the federal government requires that all tax money collected by local governments for aviation facilities or fuel must be used for airport operations and maintenance. Airport revenue non-diversion provisions have been updated and strengthened in subsequent revisions to the federal airport development grant programs. Currently all income generated by an airport, including tax revenue is to be used for airport operation, maintenance or capital improvements.

6.3.2 FAA FACILITIES AND EQUIPMENT PROGRAM

The Airway Facilities Division of the FAA administers the Facilities and Equipment (F&E) Program. This program provides funding for the installation and maintenance of various navigational aids and equipment of the national airspace system. Under the F&E program, funding is provided for FAA airport traffic control towers, enroute navigational aids, on-airport navigational aids, and approach lighting systems.

Currently, there are not any FAA owned navigational aids programmed for Rolle Field, nor are any currently forecast during the study period. However, as activity levels and other development warrant, the Airfield may be considered by the FAA Airways Facilities Division for the installation and maintenance of navigational aids through the F&E program. Recommended improvements in this Master Plan which may be eligible for funding through the F&E program include the PAPIs for each runway end. Should the Airway Facilities Division of the FAA install these navigational aids at the airport, they would be operated and maintained by the FAA at no expense to the airport.

6.4 Arizona State Aid To Airports

In support of the state airport system, the State of Arizona also participates in airport improvement projects, through the Arizona Department of Transportation (ADOT). Taxes levied by the State on aviation fuel, flight property, aircraft registration tax, and registration fees, as well as interest on these funds is deposited in the Arizona Aviation Fund. The Transportation Board establishes the policies for distribution of these State funds. As discussed below, Rolle Field, because it is an airport that is part of the Arizona State Airport Systems Plan, is eligible for ADOT funding.

Airport Preventative Maintenance System (APMS) Program: Every three years ADOT conducts a Pavement Condition Index (PCI) Survey all of Arizona's non-air carrier hub NPIAS airports. The PCI survey is completed with no cost to the airport and serves as the basis for scheduling of routine pavement maintenance by ADOT at participating airports. The maintenance is based on the PCI of the pavement segment and could consist of crack sealing, asphalt emulsion seal coats, cape seals, thin asphalt concrete overlays and pavement marking, all dependent on the condition of the pavement.

In order to participate in the pavement maintenance projects, ADOT requires a match of 10% of the construction and construction inspection cost. ADOT pays 100% of the project design and bidding. Generally four to six airports are included each construction bid package. There is no federal participation in the APMS maintenance projects as this type of project is generally not eligible for federal assistance.

ADOT Development Grants Program: On Projects utilizing federal, state and local funds, ADOT will pay 50% of the local share on AIP projects. Application for the 50% match is made by letter when the AIP grant is received. However, in order to be eligible for the grant, consultant selection, consultant contracts and plan reviews must be completed in accordance with ADOT regulations and the Arizona Airports Best Practices Manual adopted by the FAA, ADOT and Arizona Airports Association. Much of what ADOT requires is also required by the FAA, however there are some criteria which are unique to ADOT and could put the match in jeopardy in not followed to the letter.

For projects utilizing state and local funds only, ADOT has a State Grant Program for safety and capacity enhancement, environmental, planning and land acquisition projects that meet the State Transportation Board's qualifying priority rating. This funding is also available for several airports that are in the State System Plan but not included in the NIPIAs, like Rolle Field. State grants are often used to fund design of AIP projects in order to save FAA entitlement funds for the construction project. These funds are also used for projects that are not eligible for AIP funding or have too low of a priority for AIP state apportionment or discretionary funds. The State grant is limited to $2,000,000 per project and requires a local match of 10%.

ADOT Airport Development (Low Interest Rate) Loan: To enhance the utilization of available state funds, ADOT established the Arizona Development Loan Program. The program is designed to be a flexible funding mechanism to assist eligible airport sponsors in improving the economic status of their respective airports. Eligible Projects include typical airport related construction projects such as runways, taxiways, aircraft parking ramps, aircraft storage facilities, (hangars), fueling facilities, general aviation terminal buildings or pilot lounges, utility services (power, water, sewer, etc.) to the airport, runway or taxiway lighting, approach aids (electronic or visual), ramp lighting, airport fencing, airport drainage, land acquisition, planning studies, and under certain conditions, the preparation of plans and specifications for airport construction projects.

6.5 Local Funding

The balance of project costs, after consideration has been given to grants, must be funded through local resources. For most airports, there are several alternatives for local finance options for future development at the airport, including airport revenues, bonds, and leasehold financing. There are several types of revenue bonds. In general, they are a form of municipal bond which is payable solely from the revenue derived from the operation of a facility that was constructed or acquired with the proceeds of the bonds. For example, a Lease Revenue Bond is secured with the income from a lease assigned to the repayment of the bonds. Revenue bonds have become a common form of financing airport improvements. They present the opportunity to provide those improvements without direct burden to the taxpayer. One drawback of revenue bonds is that they normally carry a higher interest rate, because they lack the guarantees of general and limited obligation bonds.

Leasehold financing refers to a developer or tenant financing improvements under a long term ground lease. The obvious advantage of such an arrangement is that it relieves the YCAA of all responsibility for raising the capital funds for improvements. However, the private development of facilities on a ground lease, particularly on property owned by a government agency, produces a unique set of problems. In particular, it is more difficult to obtain private financing because only the improvements and the right to continue the lease can be claimed in the event of a default. Ground leases normally provide for the reversion of improvements to the lessor at the end of the lease term, which reduces their potential value to a lender taking possession.

Potential Airport Income Sources: Potential on-airport income sources at Rolle Field could include:

- Fuel Sales
- Hangar Leases
- Land Leases

Fuel Revenues: Fuel sales are typically a leading revenue source for general aviation airports. At many general aviation airports, FBO services are contracted to private vendors. The airport receives revenue in the form of a fuel flowage fee which is assessed on every gallon of aviation fuel that is sold at the airport. Self-serve fueling with a credit card operating system is an option that would allow the YCAA to retain the full proceeds from fuel sales.

Hangar Leases: Hangar development costs are generally not eligible for federal funding, though under the new AIP legislation some revenue projects could be eligible. Hangars are eligible for ADOT loans. Alternately, YCAA may wish to consider proposals from private developers to construct and manage hangar facilities at the airport. Outsourcing hangar development can benefit the airport sponsor by generating land lease revenue and relieving the sponsor of operations and maintenance costs, however, financial returns are diminished. The typical term for land leases is 30-years to allow the lessee to amortize the cost of hangar construction and realize a return on his investment.

Land Leases: The airport has a valuable resource in its land holdings. While a portion of these holdings will need to be reserved for aviation-related improvements, considerable land can be developed for additional commercial/industrial uses to increase airport revenues. All leases at the airport should have Consumer Price Index (CPI) clauses allowing for periodic rate increases in line with inflation.

6.6 Plan Implementation

The successful implementation of the Rolle Field Master Plan will require sound judgment on the part of Yuma County Airport Authority management with regard to implementation of projects to meeting future activity demands, while maintaining the existing infrastructure and expanding this infrastructure to support new improvements. While the projects included in the capital program have been broken into short, intermediate, and long-term planning periods, YCAA will need to consider the scheduling of projects in a flexible manner, and add new projects from time to time to satisfy safety or design standards, or newly created demands. As new buildings or pavement is added, the as-built information should be reflected on the Airport Layout Plan drawings, and the revised drawings resubmitted to the FAA for approval.

Environmental Overview

This page intentionally left blank.

CHAPTER SEVEN:

ENVIRONMENTAL OVERVIEW

7.1 Introduction

A review of the potential environmental impacts associated with proposed airport projects is an essential consideration in the Airport Master Plan process. The primary purpose of this section is to review the proposed improvement program at Rolle Field to determine whether the proposed actions could, individually or collectively, have the potential to significantly affect the quality of the environment. Rolle Field lies within Bureau of Reclamation land commonly referred to as "5-Mile Zone Protective and Regulatory Pumping Unit (PRPU)." The 5-mile zone is a 5-mile-wide, 13-mile-long strip of land about 10 miles south of Yuma, Arizona, in the extreme southwestern part of the State. In 1944, the United States and Mexico signed a treaty (Treaty) requiring the United States to annually deliver 1.5 million acre-feet of Colorado River water to Mexico. In 2004 the Bureau of Reclamation conducted an Environmental Assessment of the Resource Management Plan (RMP) for the PRPU. The Finding of No Significant Impact for the preferred alternative was issued on March 18, 2004. The information contained in this evaluation was obtained primarily from these studies, various internet websites, and analysis by the consultant.

Construction of the improvements depicted on the Airport Layout Plan will require compliance with the *National Environmental Policy Act* (NEPA) *of 1969*, as amended, to receive federal financial assistance. For projects not "categorically excluded" under FAA Order 1050.1E, *Environmental Impacts: Policies and Procedures*, compliance with NEPA is generally satisfied through the preparation of an EA. Instances in which significant environmental impacts are expected, an Environmental Impact Statement (EIS) may be required. While this portion of the Master Plan is not designed to satisfy the NEPA requirements for a categorical exclusion, EA, or EIS, it is intended to supply a preliminary review of environmental issues that would need to be analyzed in more detail within the NEPA process. This evaluation considers all environmental categories required for the NEPA process as outlined in FAA Order 1050.1E and Order 5050.4B, *National Environmental Policy Act* (NEPA) *Implementation Instructions for Airport Actions*.

Upon preliminary evaluation, it is anticipated that many of the projects identified to occur during the planning period will be able to proceed with a Categorical Exclusion. Final determination of the extent of environmental evaluation required under NEPA will be made by the responsible federal official. The following is a list of the major projects planned for completion. The timing of these projects is described in Chapter Six.

An EA is included in the current Rolle ACIP for the purpose of identifying and evaluating future projects and to meet the requirements of both the Bureau of Reclamation and ADOT for entering into a new license agreement for the Rolle Field airport property. Under current FAA policy requirements, an EA will be triggered for new runway construction and the extension of existing runways. Increasing runway strength in order to accommodate larger aircraft can also trigger an EA.

Each Application for Federal or State Grant Assistance is accompanied by Categorical Exclusion documentation requiring approval of the funding agency before a grant can be issued for a specific project. As a practical matter, the need for an EA for specific projects is generally determined in the Annual ACIP process, with EA's for specific projects generally programmed to be started about two years prior to submission of a Project Application for the proposed improvement.

Runway and Taxiway Improvements

- Extension of runway 17-35 to 4,520 feet
- Construction of a full-length 35 foot wide parallel taxiway and connecting exit taxiways
- Install an airport rotating beacon
- Install medium intensity runway lights (MIRL), runway threshold lights, and precision approach Path indicators (PAPI-2s) on Runway 17-35.
- Reapply basic centerline and runway designation markings and holding positions.
- Apply centerline and edge markings to full length parallel taxiway
- Install medium intensity taxiway lights (MITLs) on parallel taxiway and exit taxiways.
- Implement GPS approach to Runway 17
- Install lighted supplemental wind cones near extended ends of Runway 17-35.

Apron and Terminal Area Improvements

- Expand aircraft parking apron, add conventional hangars, T-hangar positions, and aircraft tie-down positions.
- Reserve space for a general aviation / terminal facility site.
- Reserve airport property parcels for future aviation related and non-aviation related land uses.

Easements

- Obtain easements to ensure positive control of the RPZs consistent with FAA recommendations

Other Improvements

- Construct (onsite) airfield access roads
- Reserve area for future fueling facility
- Extend existing airfield security/perimeter fencing to enclose future UAS development

7.2 Environmental Analysis

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

Table 7-1 Environmental Evaluation

Environmental Resource	Potential Resource Impacts
Air Quality. The U.S. Environmental Protection Agency (EPA) has adopted air quality standards that specify the maximum permissible short-term and long-term concentrations of various air contaminants. The National Ambient Air Quality Standards (NAAQS) consist of primary and secondary standards for six criteria pollutants which include: Ozone (O_3), Carbon Monoxide (CO), Sulfur Dioxide (SO_2), Nitrogen Dioxide (NO_2),	According to the Arizona Department of Environmental Quality (ADEQ) Internet web site (www.adeq.state.az.us) Rolle Airfield is located within the Yuma PM10 Nonattainment Area. The Yuma PM10 State Implementation Plan (SIP) indicates that the two main sources of particulate pollution (dust) are agricultural tilling, and unpaved roads, accounting for nearly 75 percent of the total regional PM10 emissions. Other sources of dust emissions include paved roads, agricultural burning,

Environmental Resource	Potential Resource Impacts
Particulate matter (PM10 and PM 2.5), and Lead (Pb). Potentially significant air quality impacts, associated with an FAA project or action, would be demonstrated by the project or action exceeding one or more of the NAAQS for any of the time periods analyzed. Various levels of review apply within both NEPA and permit requirements.	cleared areas, windblown agricultural land, off road vehicles and unpaved parking lots Yuma was designated a Moderate PM10 nonattainment area by operation of law in the 1990 CAAA. A SIP revision was submitted in 1991, and a supplement was submitted in 1994 adopting a range of PM10 control measures and demonstrating attainment with the NAAQS. The U.S. EPA took no action on these plans. An exceedance of the PM10 standard occurred on August 18, 2002, which was flagged as a natural exceptional event. ADEQ developed and submitted a Natural Events Action Plan (NEAP) to the U.S. EPA on February 17, 2004, pursuant to the U.S. EPA's Natural Events Policy, in effect at that time, and submitted a NEAP Implementation Report to the U.S. EPA February 17, 2005 with a maintenance plan due 18 months thereafter. In compliance with this requirement, ADEQ developed and submitted the Yuma PM10 Maintenance Plan to the U.S. EPA. Exceptional Event Rule documentation for 2008 and 2009 exceedances is in development. According to FAA Order 5050.4B, "Environmental Desk Reference for Airport Actions", if the proposed development is in a state which does not have applicable indirect source review (ISR) requirements, as with Arizona, then projected airport activity levels are examined. Review of the handbook indicates that, air quality analysis is not required for Rolle Airfield since the Airfield has less than 180,000 annual general aviation operations, including forecast UAS operations, forecasted during the 20-year planning period and does not provide commercial passenger service. A number of projects planned at the airport could have temporary air quality impacts during construction. Emissions from the operation of construction vehicles and fugitive dust from pavement removal are common air pollutants during construction. Best management practices (BMPs) during construction will need to be implemented in order to reduce impacts to air quality during construction. Examples of BMPs include: ○ Minimization of exposed erodible earth to the extent possible ○ Stabilization of exposed earth with dust palliative, pavement or other cover as early as possible, ○ Application of water or other stabilizing agents to work and haul areas, ○ Covering, shielding, or stabilizing stockpiled materials as necessary, and ○ Use of covered haul trucks

Environmental Resource	Potential Resource Impacts
Coastal Resources. Federal activities involving or affecting coastal resources are governed by the Coastal Barriers Resource Act (CBRA), the Coastal Zone Management Act (CZMA), and E.O. 13089, Coral Reef Protection.	• No impacts. The airport is not located within a Coastal Management Zone or Coastal Barrier Area.
Compatible Land Use. The compatibility of existing and planned land uses in the vicinity of an airport is usually associated with the extent of the airport's noise impacts. Typically, significant impacts will occur over noise-sensitive areas within the 65 DNL noise contour.	No impacts. The Rolle Airfield is located approximately four nautical miles northeast of the heart of San Luis and five nautical miles south of the City of Somerton. The Airfield is located in an undeveloped area of San Luis. Land immediately around the airfield is vacant. The land surrounding Rolle Field is owned by the US Bureau of Reclamation (BOR) and is planned for "Limited Recreation and Development" by BOR. Current and forecast operations are not in conflict with Compatible future use as per the following; FAA's Environmental Desk Reference states: *"for most actions, FAA need not do a noise analysis for airport actions whose 65 DNL contour lies entirely within airport boundaries."* It also states; *"An Airport with 90,000 annual (247 average daily) operations of piston-powered aircraft operations in Approach Categories A through D (i.e., landing speed < 166 knots); or 700 annual jet powered aircraft operations <u>would</u> represent a basis for initiating an FAA study of surrounding noise impacts."* ***Forecast Conventional Fleet*** • Today Rolle Field has no based aircraft, and is only forecast to increase to 8 based aircraft over the next twenty years. • Daily operations presently average 155 a week, or approximately 22 operations a day. Most of these (97%) are small piston engine General Aviation aircraft. The additional 3% are military, mostly helicopter operations, on an infrequent basis. The conventional fleet mix is expected to remain constant over the forecast period. • Today the Rolle Field Airport does not exceed either the daily operational trigger, or the 65 LDN contours that would require a mandatory noise study. Future forecasts indicate that operations may increase to approximately 10,500 annually, or 29 daily operations. However, these parameters are still well below the required 247 daily operations and other impacts that would necessitate a formal noise impact study. ***Forecast UAS Fleet*** The development of the Unmanned Aerial System (UAS) fleet has produced many variations of large and small

Environmental Resource	Potential Resource Impacts
	unmanned aircraft. However, a common thread among all UAS types is that they are generally quieter than other conventional manned aircraft due to modern "state of the art" engineering and design applications. In turn these UAS aircraft generally leave a smaller "noise footprint" and other lesser impacts than their current conventional aircraft counterparts. However, for purposes of this study the operational counts, and perceived impacts where appropriate, will be weighed in the same fashion as conventional aircraft. • There are presently no UAS aircraft based or operating at Rolle Field today. Therefore UAS is currently "no factor" to the airports operational impacts today. • Future UAS operations forecasts indicate that activity may rise to as many as 32,000 annual operations, or 88 daily operations over a twenty year period. This forecast number remains well below the 247 daily operational numbers that would trigger a formal noise study, and the aircraft types would typically pose less of a noise impact that current conventional aircraft. ***Combined Conventional and UAS*** The combined conventional manned aircraft and UAS operational numbers total approximately 42,500 annual operations at the end of the next 20 year period. This equates to approximately 116 daily operations, or slightly less than half of the 247 operations threshold that would require a formal noise study. It is also anticipated that UAS impacts will generally be less than those of conventional aircraft, and depending on the eventual fleet mix, will likely not drive the 65 LDN off of airport property. ***Conclusion*** Currently, and over the forecast period the operations at Rolle Airfield do not approach the stated operational thresholds for either piston-powered or jet aircraft that would constitute a substantial impact or trigger a mandatory FAA study of related noise impacts.
Construction Impacts typically relate to the effects on specific impact categories, such as air quality or noise, during construction.	The use of BMPs during construction is typically a requirement of construction related permits such as a National Pollution Discharge Elimination System (NPDES) permit. Use of these measures typically alleviates potential resource impacts. Construction-related noise impacts may be experienced during development of the proposed facilities. However, these impacts typically do not arise unless construction is being undertaken during early morning, evening, or nighttime hours.

Environmental Resource	Potential Resource Impacts
Department of Transportation Act, Section 4(f). A significant impact would occur when a proposed action involves more than a minimal physical use of a Section 4(f) property, (publicly owned land from a public park, recreation area, or wildlife and waterfowl refuge of national, state, or local significance, or any land from a historic site of national, state, or local significance) or is deemed a "constructive use", substantially impairing the Section 4(f) property where mitigation measures do not reduce or eliminate the impacts. Substantial impairment would occur when impacts to Section 4(f) lands are sufficiently serious that the value of the site, in terms of its prior significance and enjoyment, is substantially reduced or lost.	No impact. No park, recreation area, federal park, state park or wildlife refuges will be affected by anticipated development. The closest Section 4(f) lands to Rolle Field are the Imperial National Wildlife Refuge, located in California, KOFA National Wildlife Refuge and Mittry Lake Wildlife Area, both located in Arizona. All of these facilities are located approximately 25 miles to the north of Rolle Field.
Farmlands. Under the *Farmland Protection Policy Act* (FPPA), federal agencies are directed to identify and take into account the adverse effects of federal programs on the preservation of farmland to consider appropriate alternative actions which could lessen adverse effects and to assure that such federal programs are, to the extent practicable, compatible with state or local government programs and policies to protect farmland. The FPPA guidelines apply to farmland classified as prime or unique, or of state or local importance as determined by the appropriate government agency, with concurrence by the Secretary of Agriculture.	No impact. According to the Soil Survey of the Natural Resources Conservation Service, the soils found at Rolle Field (Superstition sand) do not meet the soil requirements for prime or unique farmlands.
Fish, Wildlife, and Plants. The Fish and Wildlife Service (FWS) and the National Marine Fisheries Service (NMFS) determines that a significant impact will result when the proposed action would likely jeopardize the continued existence of a species in question or would result in the destruction or adverse modification of federally designated critical habitat in the area. Lesser impacts, as outlined by agencies and organizations having jurisdiction, may result in a significant impact.	The Bureau of Reclamation, in its Environmental Assessment for the 5 Mile Zone Resource Management plan, in consultation with the US Fish and Wildlife Service, produced a list of special status species, their status, and their potential to occur in Yuma County. The following special status species were identified as having a potential for occurrence in Yuma County: Plants: • Pierson's Milkvetch – BLM Sensitive Species • Blue sand Lilly – Salvage Restricted • Sand Food – Species of Concern, Arizona Native Plant Law Highly Safeguarded. • Gander's Cryptantha - Species of Concern • Dune Spurge – Species of Concern • Dune Sunflower – Species of Concern

Environmental Resource	Potential Resource Impacts
	Wildlife: • California Leaf-Nosed Bat – Species of Concern • Pale Townsend's big-eared bat – Species of Concern, Wildlife of Special Concern in Arizona • Yuma Myotis – Species of Concern • Greater Western Mastiff Bat – Species of Concern • Spotted Bat – Species of Concern, Wildlife of Special Concern in Arizona • Flat-tailed Horned Lizard – Federal Threatened • Desert Rosy Boa – Federal Species of Concern • Cowles's Fringe-Toed Lizard – Federal Species of Concern, Wildlife of Special Concern in Arizona Prior to development, for projects impacting previously undisturbed land, field investigation and consultation with the U.S. Fish and Wildlife Service will be needed to determine whether any impacts to special status species would be anticipated.
Floodplains. Significant impacts to floodplains occur when a proposed action results in notable adverse impacts on natural and beneficial 100- year floodplain values.	According to the Flood Insurance Rate Maps (FIRM) produced by the Federal Emergency Management Agency (FEMA), the airport area is designated as a Zone B Special Flood Hazard Area." Zone B is defined as "Areas between limits of the 100-year flood and 500year flood; or certain areas subject to 100-year flooding with average depths less than one (l) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood." It is recommended that the Yuma County Airport Authority review surface water management for the airfield property prior to any construction activities in this area.
Hazardous Materials, Pollution Prevention, and Solid Waste. The airport must comply with applicable pollution control statutes and requirements. Impacts may occur when changes to the quantity or type of solid waste generated, or type of disposal, differ greatly from existing conditions.	• An abandoned taxiway and runway system is still present at the Airfield. This configuration, as well as a 300-foot wide area encompassing the existing runway are oil treated areas. These oiled areas left over from the Airfield's military period should be analyzed from an engineering as well as environmental (effects on water quality) standpoint, and either stabilized or removed. • From both a conventional aircraft, and a UAS perspective, no current or future operations that would precipitate a return to the practice of oil treatments around the runways, taxiways, or other airfield infrastructure are anticipated. Additionally, UAS operations in general utilize more modern, cleaner, and generally smaller engine types than in previous years that generally result in lower operations emissions. • In accordance with Section 402(p) of the Clean Water Act, as added by Section 405 of the Water Quality Act of 1987, a National Pollution Discharge Elimination System (NPDES) General Permit is required from the Environmental Protection Agency. NPDES requirements apply to industrial facilities, including airports and all construction projects that disturb five or more acres of land.

Environmental Resource	Potential Resource Impacts
	• A Storm water Pollution Prevention Plan (SWPPP) will be required to address storm-water runoff during construction. Temporary barriers, (silt fenced, hay bales, etc.) should be placed around the perimeter of construction areas to prevent silt and sediment due to construction from leaving the project site. • As a result of increased operations at the airport, solid waste output may slightly increase; however, these increases are not anticipated to be significant. The Airfield currently does not have fuel storage or aircraft fueling facilities. As growth in aviation activity occurs, fuel storage facilities will become necessary. The recommended fuel storage tank capacity for an airport with the potential number of based aircraft and forecast operation levels at Rolle Airfield is 12,000 gallons. Fuel storage facilities must be designed constructed and maintained in compliance with Federal, State and local regulations, and must be registered with ADEQ. These regulations include standards for underground storage tank construction materials, the installation of leak or spill detection devices, and regulations for storm water discharge.
Historical, Architectural, Archaeological, and Cultural Resources. Impacts may occur when the proposed project causes an adverse effect on a property which has been identified (or is unearthed during construction) as having historical, architectural, archaeological, or cultural significance.	• Rolle Field's property's proximity to the Colorado River land lends to its potential for disturbing sites of cultural and historical significance. However, the airport operation has been present since the 1940's. Various improvement projects over the years have disturbed the land within the airport boundary including the area proposed for the future airfield improvements including runway extension, and expansion of the general aviation apron and terminal area. • Prior to development activities that would disturb previously undisturbed land at the airfield, a survey of the site should be conducted to determine whether any significant resources are present, and whether any mitigation measures are necessary prior to implementation. It is further recommended that local tribal entities be contacted before any ground-disturbing activity at the airfield. Following the survey and clearances to proceed with the proposed improvements, should archaeologic resources be encountered during preconstruction or construction activities, work should cease in the area of the discovery and the SHPO be notified immediately, pursuant to 36 CFR 800.11.
Light Emissions and Visual Impacts. Impacts occur when lighting associated with an action will create an annoyance among people in the vicinity or interfere with their normal activities. Aesthetic impacts relate to the extent that the development contrasts with the existing environment and whether the jurisdictional agency considers this contrast objectionable.	• Light emissions are assessed on the basis of creating an annoyance among residents in the vicinity of the proposed facilities. • The continued operation of the existing airport will not increase the impact of light emissions. • Installation of MIRLS, PAPI-2s and MITLs may occur in the future. • The installation of these lights does not have any potential to create annoyance because no residences are located near the runway ends.

<table>
<tr><th>Environmental Resource</th><th>Potential Resource Impacts</th></tr>
<tr><td></td><td>• Lighting associated with apron is not anticipated to create annoyance since the residential areas are several miles away.</td></tr>
<tr><td>Natural Resources and Energy Supply. In instances of major proposed actions, power companies or other suppliers of energy will need to be contacted to determine if the proposed project demands can be met by existing or planned facilities.</td><td>• Increased use of energy and natural resources are anticipated as the operations at the airport grow. However, none of the planned development projects covered within this study are anticipated to result in significant increases in energy consumption.</td></tr>
<tr><td>Noise. The Yearly Day-Night Average Sound Level (DNL) is used in this study to assess aircraft noise. DNL is the metric currently accepted by the FAA, EPA, and Department of Housing and Urban Development (HUD) as an appropriate measure of cumulative noise exposure. These three federal agencies have each identified the 65 DNL noise contour as the threshold of incompatibility. The threshold of significance for noise, as indicated in FAA Order 5050.4B, is when an action, compared to the no action alternative for the same timeframe, would cause noise sensitive areas located at or above DNL 65 dB to experience a noise increase of at least DNL 1.5 dB.</td><td>FAA's Environmental Desk Reference states: "for most actions, FAA need not do a noise analysis for airport actions whose 65 DNL contour lies entirely within airport boundaries."

It also states; "An Airport with 90,000 annual (247 average daily) operations of piston-powered aircraft operations in Approach Categories A through D (i.e., landing speed < 166 knots); or 700 annual jet powered aircraft operations <u>would</u> represent a basis for initiating an FAA study of surrounding noise impacts."

Noise Impacts - Conventional Aircraft Fleet

• Today Rolle Field has no based aircraft, and is only forecast to increase to 16 based aircraft over the next twenty years.

• Daily operations presently average 141 a week, or approximately 20 operations a day. Most of these (97%) are small piston engine General Aviation aircraft. The additional 3% are military, mostly helicopter operations, on an infrequent basis. The conventional fleet mix is expected to remain constant over the forecast period.

• Today the Rolle Field Airport does not exceed either the daily operational trigger, or the 65 LDN contours that would require a mandatory noise study. Future forecasts indicate that operations may increase to approximately 10,500 annually, or 29 daily operations. However, these parameters are still well below the required 247 daily operations and other impacts that would necessitate a formal noise impact study.

Noise Impacts - Forecast UAS Fleet

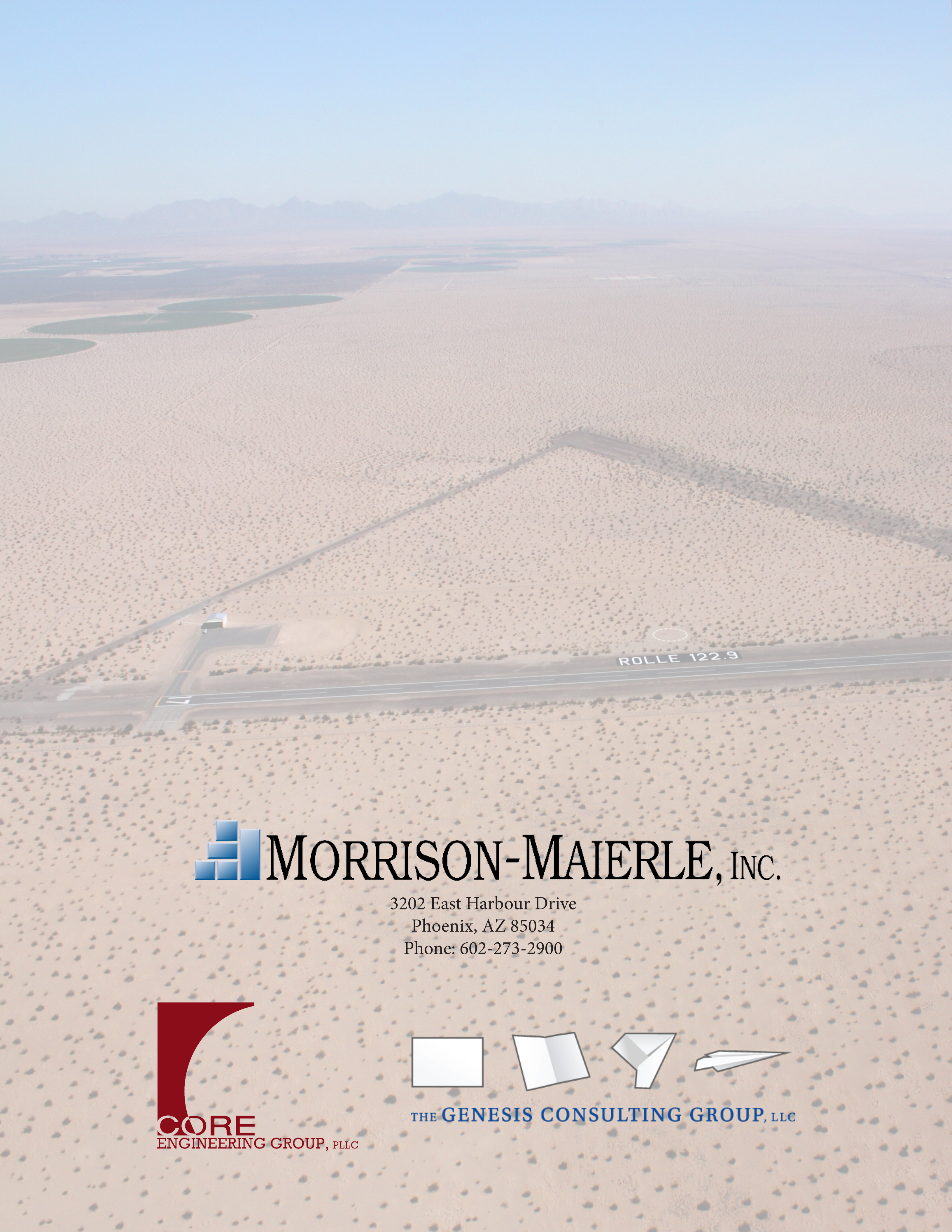
The development of the Unmanned Aerial System (UAS) fleet has produced many variations of large and small unmanned aircraft. However, a common thread among all UAS types is that they are generally quieter than other conventional manned aircraft due to modern "state of the art" engineering and design applications. In turn these</td></tr>
</table>

Environmental Resource	Potential Resource Impacts
	UAS aircraft generally leave a smaller “noise footprint” and other lesser impacts than their current conventional aircraft counterparts. However, for purposes of this study the operational counts, and perceived impacts where appropriate, will be weighed in the same fashion as conventional aircraft. • There are presently no UAS aircraft based or operating at Rolle Field today. Therefore UAS is currently “no factor” to the airports operational or noise impacts today. • Future UAS operations forecasts indicate that activity may rise to as many as 32,000 annual operations, or 88 daily operations over a twenty year period. This forecast number remains well below the 247 daily operational numbers that would trigger a formal noise study, and the aircraft types would typically pose less of a noise impact that current conventional aircraft. ***Combined Impacts of Conventional and UAS*** The combined conventional manned aircraft and UAS operational numbers total approximately 42,500 annual operations at the end of the next 20 year period. This equates to approximately 116 daily operations, or slightly less than half of the 247 operations threshold that would require a formal noise study. It is also anticipated that UAS impacts will generally be less than those of conventional aircraft, and depending on the eventual fleet mix, will likely not drive the 65 LDN off of airport property. ***Conclusion*** Currently, and over the forecast period Rolle Airfield does not anticipate any actions or development that would exceed the DNL 65 dB threshold, or cause noise sensitive areas located at or above DNL 65 dB to experience a noise increase of at least DNL 1.5 dB.
Secondary (Induced) Impacts. These impacts address those secondary impacts to surrounding communities resulting from the proposed development, including shifts in patterns of population growth, public service demands, and changes in business and economic activity to the extent influenced by airport development.	• Significant shifts in patterns of population movement or growth or public service demands are not anticipated as a result of the proposed development. It could be expected, however, that the proposed development would potentially induce positive socioeconomic impacts for the community over a period of years. The airport, with expanded facilities and services, would be expected to attract additional users, not only from regional General Aviation, but also from the emerging industries associated with UAS. As UAS is a relatively new factor in the regional economy it can be expected to contribute to the local job base, and new dollars in the regional economy. It is also expected to encourage tourism, industry, and trade, and to enhance the future growth and expansion of the community’s economic base. Future socioeconomic impacts resulting from the

Environmental Resource	Potential Resource Impacts
	proposed development are anticipated to be primarily positive in nature.
Socioeconomic Impacts, Environmental Justice, and Children's Environmental Health and Safety Risks. Impacts occur when disproportionately high and adverse human health or environmental effects occur to minority and low-income populations; disproportionate health and safety risks occur to children; and extensive relocation of residents, businesses, and disruptive traffic patterns are experienced.	• The proposed projects will not result in proportionately high or adverse impacts to human health, nor will it result in disproportionate health and safety risks to children. • Rolle Field is located approximately four nautical miles northeast of the heart of San Luis and five nautical miles south of the City of Somerton. The Airfield is located in an undeveloped area of San Luis, and land immediately around the airfield is currently vacant, and planned low intensity by BOR for future development. At this time forecast operations over the next twenty year period do not indicate a potential for adverse environmental effects, or health effects to population. All potential noise impacts are forecast significantly below the regulatory trigger that requires noise studies or actions. Forecast flight operations of both conventional aircraft and UAS are not of sufficient numbers or types to produce other adverse air quality or environmental impacts, and little to no human population currently exists in the immediate vicinity of the airport, so no potential for relocation or traffic pattern disruption currently exist.
Water Quality. Water quality concerns associated with airport expansion most often relate to domestic sewage disposal, increased surface runoff and soil erosion, and the storage and handling of fuel, petroleum, solvents, etc.	• A Stormwater Pollution Prevention Plan (SWPPP) will be required to address storm-water runoff during construction. Temporary barriers, (silt fenced, hay bales, etc.) should be placed around the perimeter of construction areas to prevent silt and sediment due to construction from leaving the project site. • Storm water retention basins to limit airport runoff from impervious (paved) areas to that which existed before the airport was constructed are in place.
Wetlands. Wetlands are defined by Executive Order 11990*, Protection of Wetlands*, as those areas that are inundated by surface or groundwater with a frequency sufficient to support, and under normal circumstances, does or would support a prevalence of vegetation or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction.	• A review of USFWS National Wetlands Inventory (NWI) maps, US Natural Resources Conservation Service soil maps, and aerial photography of the airport indicated that there are no areas designated as wetlands within the airport boundaries. • There are no anticipated impacts to wetlands associated with airport improvements.
Wild and Scenic Rivers. Wild and scenic rivers (WSR) are designated by the Wild and Scenic River Act. A National Rivers Inventory (NRI) is maintained to identify those river segments which are protected under this act.	• There are no currently designated wild and scenic rivers in the immediate vicinity of Rolle Field. While the Verde River is a designated Wild and Scenic River its location over 130 miles to the north is not expected to be impacted by Rolle Field Airport operations.

This page intentionally left blank.

This page intentionally left blank.



MORRISON-MAIERLE, INC.
3202 East Harbour Drive
Phoenix, AZ 85034
Phone: 602-273-2900

CORE ENGINEERING GROUP, PLLC

THE GENESIS CONSULTING GROUP, LLC