SMITHVILLE
TEXAS

SMITHVILLE CRAWFORD MUNICIPAL AIRPORT

DEVELOPMENT PLAN

December 2016

Smithville-Crawford Municipal Airport

Airport Development Plan

DRAFT FINAL REPORT
September 2016

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1.0 Facility Inventory

As the foundation for the planning process, the inventory is the initial step in an Airport Development Plan. Information compiled for this chapter is necessary to provide an understanding of the past and present airport conditions at Smithville-Crawford Municipal Airport. As a basis for airport development recommendations, a comprehensive inventory provides the framework for the proceeding analysis included in the Airport Development Plan.

Starting with an overview of the location and history of the Smithville-Crawford Municipal Airport and surrounding community, this chapter also contains the following information:

- Current Airport Activity
- Existing airside and landside facilities
- Airspace and land use considerations

Information included in the inventory was compiled via on-site inspection, historic airport documents, secondary airport research, federal, state, and local documents, and meetings with the airport sponsor and tenants.

Note: Information found in this initial section is current as of December 2016 and subsequent chapters may include updated information.

1.1 Airport Background

Smithville-Crawford Municipal Airport is owned and operated by the City of Smithville. Per City of Smithville ordinance, the role of airport manager is appointed by, or carried out by, the City Manager with city council approval. The Airport Advisory Board is made up of Smithville citizens that provide feedback with the purpose of helping the Airport balance the needs of tenants and aeronautical users while being a good neighbor to the surrounding community.

City of Smithville

The City of Smithville is located in a rural area within Bastrop County along the Colorado River. With immediate access to the Highway 71 corridor, Smithville is just an hour drive from Austin and less than a two hour drive from Houston, San Marcos, San Antonio, and College Station. Its location between high density population areas makes Smithville an attractive area for commuters as well as businesses. A map of the City of Smithville location is shown in Figure 1.1.

Smithville boasts a variety of recreational activities and attractions. Two Texas state parks: Buescher and Bastrop are located just outside of Smithville and attract visitors to the City. Veterans Memorial Park boasts a children's water recreation area, a memorial space and a monument to honor soldiers who have served the United States armed forces. Inspiration for the park came in 2010 as Bastrop County lost more soldiers to date during the war on terror than any other community in the United States.

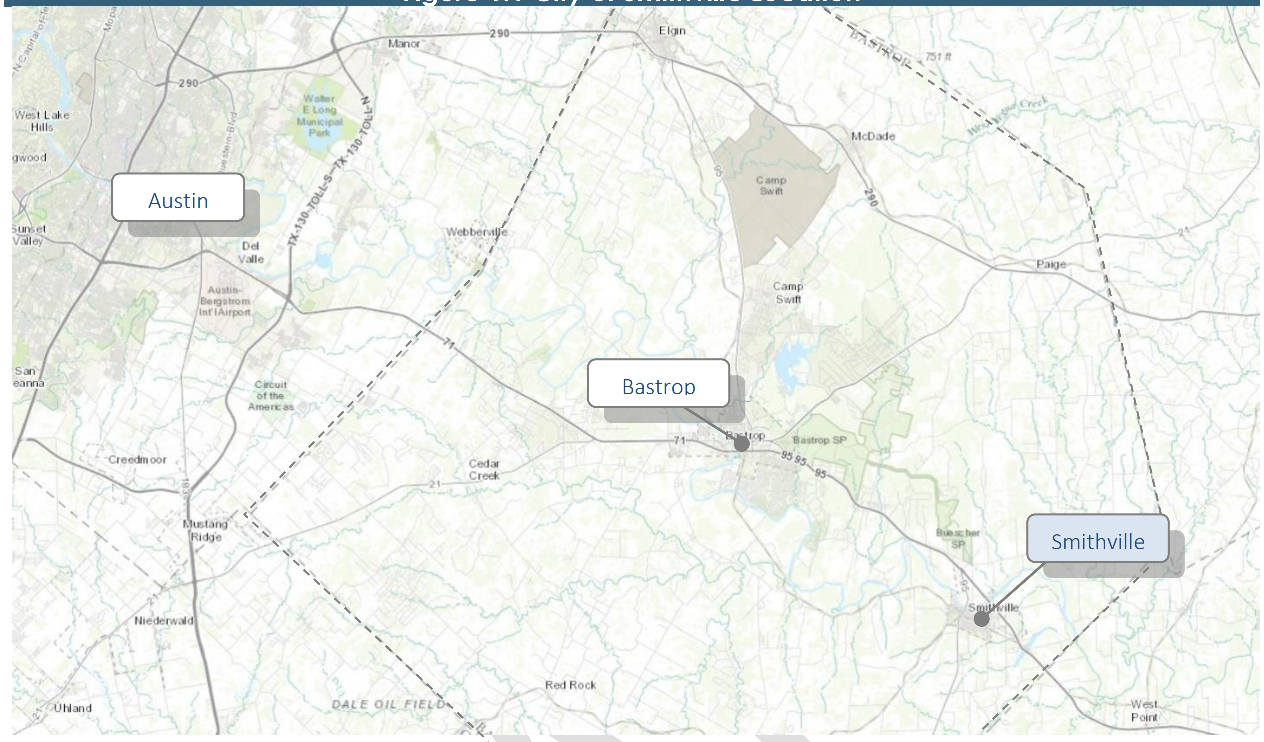
Taylor, Bastrop, and Houston railroad was the first to start a depot in the location of Smithville around 1887. Very quickly the town flourished with new railroad workers, followed by commerce and service industries that supported the town's incoming residents. Today, the railroad is still a very important part of the City of Smithville's history.

Additionally, more recently history is the influence of movie and film locations. Numerous movies have been filmed on location in the city and the Smithville Film Commission (SFC) was created in 2008 shortly after filming wrapped for "Tree of Life". Years earlier however, the city was more famously known for the movie filming of "Hope Floats" in 1997. In January 2008, only five days after the introduction of the state program, Smithville was named the first Film Friendly Community in Texas by the Texas Film Commission.

FILM FRIENDLY TEXAS COMMUNITY
TEXAS FILM COMMISSION CERTIFIED

Smithville organizations host a multitude of cultural events, especially in the downtown area and at Riverbend Park. People flock to the many long-standing events, such as springtime Smithville Jamboree (which started in 1956) and the December Festival of Lights (which started in 1987). Visitors and residents alike are coming in growing numbers to newer traditions, such as the 8th annual Gingerbread Man 5K/3-mile Fun Run/Walk, which takes advantage of Smithville's 2006 Guinness Book of World Records World's Largest Gingerbread Man title and is held in conjunction with the Festival of Lights. The beautiful "Airing of the Quilts," which began in 2009, draws people to the downtown area and historic residential district each fall. The annual Smithville Empty Bowl Project, which is intended to help the community become more aware of the food insecurity in this area, has enjoyed great community support since it began in 2011 -- the Smithville Food Pantry, the Smithville Community Gardens and the Lost Pines Artisans Alliance as well as the art students in Smithville schools who create the bowls work together to ensure that the event continues to be a great success.

Figure 1.1 City of Smithville Location



Source: KSA, ESRI

Smithville Comprehensive Plan 2011-2012

The City of Smithville adopted a comprehensive plan in 2012 as an update to the comprehensive plan published in 2007. The plan focuses on capturing growth from Bastrop County while maintaining the small-town feel that is cherished by its residents. The plan identifies short and long term community development ideas that will increase the quality of life for citizens and attract businesses to the city. The document was written with ideas, concerns, and other input from the citizens of Smithville.

The main concern the plan addresses is the rapid growth in other areas of Bastrop County that have not been noticed in Smithville. This is partly due to Smithville's further proximity to Austin, as other cities in Bastrop County house citizens commuting to Austin for work. The City of Smithville hopes that the development strategies laid out in the comprehensive plan will bring job opportunities to the city in order to attract some of the growth being experienced in Bastrop County.

While the Smithville Comprehensive Plan 2011-2012 update does not mention the Smithville-Crawford Municipal Airport, the previous plan in 2007 mentions the idea of building high-end homes with airport access as an amenity. This affords residents the luxury of personal air travel at a moment's notice while maintaining a small-city lifestyle.

Wildfires

Since 2008, hundreds of wildfires have plagued Bastrop County during periods of irregular dry spells. The most destructive fire in Bastrop County, nicknamed the Bastrop County Complex Fire, started in September of 2011 after 10 months of the driest weather Texas had seen in over a century. During the same week, 179 fires burned in Texas as a result of dry conditions and strong winds caused by Tropical Storm Lee. The fires destroyed over 1,700 homes and inflicted over $300 million in estimated property damage.

Wildfire occurrences and intensity have increased throughout Texas and Bastrop County. According to the TFS, other notable years for wildfires include 2006, 2008 and 2015. In 2008, 28 fires burned throughout Bastrop County. In October, 2015 the Hidden Pines fire claimed 60 homes and burned over 4,000 acres near Smithville, TX. The community and county have rebounded wonderfully from these disasters; however it is an important part of emergency management and wildfire preparedness that influences the entire county.

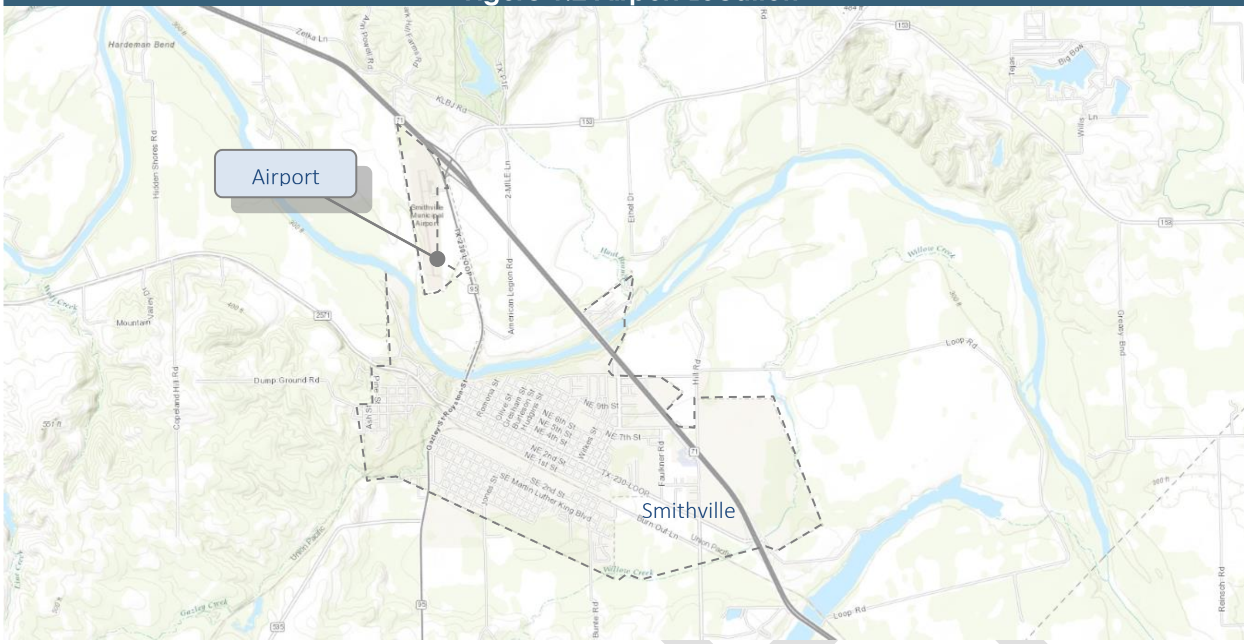
Airport History

Lending his name to the airport, Albert Crawford was the City of Smithville Mayor in 1975, the year the 62-acre tract was purchased that is now the Smithville-Crawford Municipal Airport. As a bicentennial project the City of Smithville and Texas Aeronautics Commission (now Texas Department of Transportation), Smithville-Crawford Municipal Airport was dedicated in 1976. The City of Smithville, with FAA funding, conducted its first master plan study in 1989. In 2001, Runway 17-35 was relocated and constructed to its current length along with the existing partial parallel taxiway. The runway project, funded through local, state, and federal grants to the amount of $2 million, included an apron expansion (5,000 square yards), drainage improvement, striping and marking (28,637 square feet), MIRL installation, lighted wind cone installation, Runway 17-35 centerline reflector installation, LCRA power line relocation, perimeter fencing installation, and Runway 17-35 markings. Runway 17-35 was rehabilitated with state and local grants in 2011. Also in 2011, new markings were painted and the Runway 35 turnaround was rehabilitated. All 2011 projects were funded through state and local grants.

Airport Location

Smithville-Crawford Municipal Airport (84R), shown in **Figure 1.2**, is located within the City of Smithville two miles north of city center with easy access from Highway 71. The Colorado River flowing to the south and west of the airport provides a natural barrier to city expansion leading to encroachment of 84R. 84R, being the only airport in Bastrop County, has potential to capture users from throughout the region. It is important that development matches the needs of the Bastrop County and general aviation in order to take full advantage of the only airport in the area. The City of Smithville may consider an extension of Runway 17/35 to 5,000 feet in order to accommodate larger and faster aircraft. This may increase operations at 84R and may result in a significant increase in revenue for the City of Smithville.

Figure 1.2 Airport Location



Source: KSA, ESRI

Airport Users

Smithville-Crawford Municipal Airport hosts a variety of unique users. The general aviation activity at the airport is very diverse and one of the most critical functions includes staging and firefighting missions as during natural disasters like the Bastrop County Complex Fire and Hidden Pines Fire. The services provided by the following users are vital to the local community and surrounding Bastrop County:

- **Texas A&M Forest Service (TFS)** - Provides fire and disaster mitigation, suppression, and rescue services for the State of Texas. TFS has used 84R for staging during wildfire fighting missions.
- **Parks and Wildlife** - Mission is to manage and conserve the natural resources in Texas. Provides hunting, fishing and outdoor recreation opportunities.
- **Texas Department of Public Safety (DPS)** - Public safety initiatives include combating crime and terrorism, enhancing highways, improving statewide emergency management, and enhancing licensing and regulatory service regarding public safety.
- **Air Ambulance -** A variety of companies provide aircraft and helicopter charter transportation for patients and family members.
- **Air National Guard –** Training and emergency staging including some rotorcraft/helo operations.
- **United States Air Force and Navy –** Training operations from nearby military installations.
- **Aerial Applicators (Crop Dusting) –** A critical aeronautical activity, aerial applications of pesticides, herbicides, and other airborne control substances are used.
- **Oil and Gas Pipeline Flights –** These flights are predominately used to inspect oil pipelines from the air across the state.

- **Recreational and Flight Instruction –** All types of general aviation users such as recreational flying and flight instruction use the airport.

Previous Studies

The following studies were obtained online through relevant government websites. These documents were reviewed thoroughly in order to obtain airport data and city/county historical insight.

- General Aviation Airports: A National Asset. Department of Transportation Federal Aviation Administration, May 2012.
- Report to Congress: National Plan of Integrated Airport Systems (NPIAS) (2015-2019), Federal Aviation Administration, 2015.
- Texas Airport System Plan Update, Texas Department of Transportation, March 2010
- 2011-2012 City of Smithville Complete Comprehensive Plan (Updated from 2007 Plan)
- TxDOT Airport Layout Plan Update (2014)

1.2 Primary Airport Data

Table 1.1 below provides a summary of significant airport data for Smithville-Crawford Municipal Airport. The information presented in the table will be discussed in greater detail in the proceeding sections of this Airport Development Plan.

Table 1.1 Primary Airport Data

Airport Name	Smithville-Crawford Municipal Airport
FAA Designation	84R
Associated Town	Smithville, TX
Airport Owner	City of Smithville, TX
Airport Sponsor	City of Smithville, TX
Airport Roles	FAA NPIAS: General Aviation
	FAA Asset Study: Local
	Texas Airport System Plan: Community Service
Commercial Air Service	None
Airport Elevation	323 Feet Above Sea Level

Source: Airport Layout Plan (ALP), FAA Airport Master Record (Form 5010), FAA National Plan of Integrated Airport Systems (NPIAS), and FAA General Aviation Asset Study

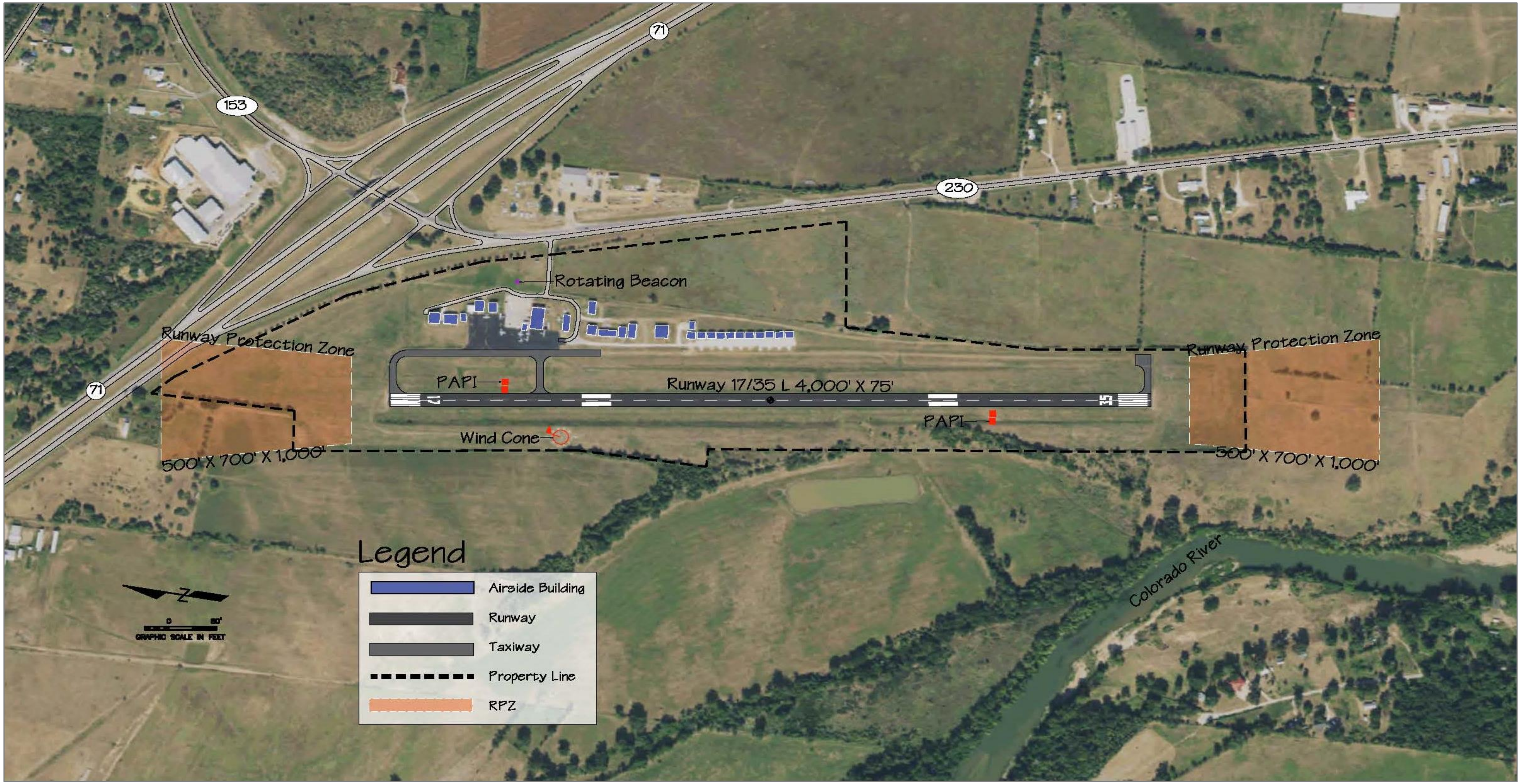


Figure 1.3
Existing Facilities

Aeronautical Roles

Airports can serve a variety of roles at the local or national level. Factors associated with the type of role an airport serves include, services, infrastructure, airport tenants, surrounding community, and cliental that use the airport. Each classification is important to note as it relates to the varying levels of categorization.

National Plan of Integrated Airport Systems (NPIAS): The NPIAS identifies airports with a significant role in the national aviation system. Airports in the NPIAS are eligible for Federal Aviation Administration (FAA) Airport Improvement Program (AIP) funding so long as established grant assurances are met. There are different categories that classify the specific role the airport serves. The 2015-2019 NPIAS classifies Smithville-Crawford Municipal Airport as a General Aviation Airport. *FAA General Aviation Airport Asset Study:* This 2012 study identifies 2,952 general aviation airports, selected to be part of the NPIAS that contribute to U.S. economy and support activity that is not feasible at most commercial service airport due to capacity constraints. Smithville-Crawford Municipal Airport is categorized as a General Aviation-Local Airport defined in the Asset Study as it, "supplements local communities by providing access to local and regional markets." Local airports can serve flight activity and community needs through a variety of different activities.

Texas Airport System Plan (TASP): The *2010 Texas Airport System Plan Update* identifies airports and heliports that are a necessity to the economic and social development of Texas. There are five main service levels defined in the TASP: Primary and Non-Primary Commercial Service airports, Relievers, General Aviation airports, and heliports. Each service level is then broken down in to more specific roles shown in **Table 1.2** below. Smithville-Crawford Municipal Airport is classified under the TASP as a General Aviation- Community Service.

As the only airport in Bastrop County, the facility plays a vital local role for the entire area. The Cities of Bastrop, Smithville, Elgin, Upton and others rely on its ability to serve general aviation. This is most notably the ability to host wildfire fighting capabilities for the county.

Airport Activity

84R serves mainly local and itinerant general aviation (GA) operations. An operation is described as either a landing or takeoff. Local operations are defined as flights that originate and terminate at the same airport, while itinerant operations are defined as any flight activity not classified as local. Aviation activity and based aircraft information is provided in **Table 1.3**.

Table 1.2 TASP Service Level and Classification		
Service Level	**Airport Role**	**Description**
Primary Commercial Service	Commercial Service	Supports scheduled passenger service by large and medium transport aircraft; enplanes at least 10,000 passengers annually.
Non-Primary Commercial Service	Commercial Service	Supports scheduled passenger service by smaller transport aircraft; enplanes fewer than 10,000 but more than 2,500 passengers annually.
Reliever	Reliever	Relieves congestion at Commercial Service airports by providing alternative general aviation facilities.
General Aviation	Business/Corporate	Provides community access by business jets.
General Aviation	Community Service	Provides community access by single and light twin-engine aircraft, and a limited number of business jets.
General Aviation	Basic Service	Provides air access for communities less than a 30-minute drive from Commercial Service, Reliever, Business/Corporate, and Community Service airports; and/or supports essential but low level activity.
General Aviation	Heliport	Accommodates helicopters used by individuals, corporations and helicopter air taxi services. Scheduled passenger service may be available if sufficient demand exists.

Source: Texas Department of Transportation 2010

Table 1.3 Airport Activity			
Based Aircraft		**Airport Activity Type**	
Single-engine	37	Commercial Airlines	0.0%
Multi-engine	2	Air Taxi	0.0%
Jet	0	Military	0.0%
Total Based Aircraft	39	General Aviation-Local	75.0%
Ultra-light	5	General Aviation-Itinerant	25.0%
Helicopters	1	Total	100%

Source: Airport Records, Form 5010

Figure 1.4 General Aviation Airport Services

Emergency Preparedness and Response	Aeromedical Flights Law Enforcement/National Security/Border Security Emergency Response Aerial Fire Fighting Support	Emergency Diversionary Airport Disaster Relief and Search and Rescue Critical Federal Functions
Critical Community Access	Remote Population/Island Access Air Taxi/Charter Services	Essential Scheduled Air Services Cargo
Other Aviation Specific Functions	Self-Piloted Business Flights Corporate Flight Instructions Personal Flying Charter Passenger Services	Aircraft/Avionics Manufacturing/Maintenance Aircraft Storage Aerospace Engineering/Research
Commercial Industrial and Economic Activities	Agricultural Support Aerial Surveying and Observation Low-Orbit Space Launch and Landing Oil and Mineral Exploration/Survey Utility/Pipeline Control and Inspection Business Execution Flight Service	Manufacturing and Distribution Express Delivery Service Air Cargo
Destination and Special Events	Tourism and Success to Special Events Intermodal Connections (rail/ship)	Special Aeronautical (skydiving/airshows)

Runways

84R has single runway alignment of 17/35 which is 4,000 feet long by 75 feet wide, constructed of asphalt, and in good condition. The runway, apron, and taxiway system were rehabilitated in 2012. Runway 17/35 details are presented in **Table 1.4**.

Table 1.4 Runway Data

Runway 17/35		
Dimensions	4,000 x 75 ft. / 1,219 x 23 m.	
Surface	Asphalt, Good Condition	
Runway Edge Lighting	Medium Intensity	
Weight Bearing Capacity	Single Wheel	12,500 lbs.
	Runway 17	**Runway 35**
Latitude	30-02-01.1505N	30-01-21.9525N
Longitude	097-10-04.5436W	097-09-58.1313W
Elevation	323.2 ft.	322.2 ft.
Traffic Pattern	Left	Left
Runway Heading	165 magnetic, 172 true	345 magnetic, 352 true
Markings	Non-precision, Good Condition	Non-precision, Good Condition
Visual Slope Indicator	2-light PAPI on Left (4.00 Degrees Glide path)	2-light PAPI on Left (3.00 Degrees Glide path)
Runway End Identifier Lights	No	No
Touchdown Point	Yes, No Lights	Yes, No Lights

Source: Airport Records, Form 5010

Taxiways, Apron and Hangar Facilities

84R has a partial parallel taxiway that provides access from hangar facilities to the approach end of Runway 17 and a stub taxiway connecting the apron directly with Runway 17/35. The taxiways are paved at the north end along the main apron starting at the front of Building 8. There is no paved taxiway providing access to the south hangars. A back-taxi maneuver is required to takeoff from the approach end of Runway 35. There is one paved apron at 84R. The apron area is approximately 65,000 square feet and contains 8 aircraft tie-downs. On days with a high volume of aircraft activity the ramp space does not accommodate demand.

Currently, there are nineteen general aviation hangars located at 84R that range in size to hold single or multiple aircraft. About half the hangars are in fair to poor condition while the other half remain in good condition. The City of Smithville is currently under lease agreements with hangar tenants, however, would consider a buy-back of all hangars in favor of a rental policy that may increase revenue. The City of Smithville does not maintain a hangar waiting list. **Table 1.5** and **Figure 1.5** provide information for each individual hangar at 84R.

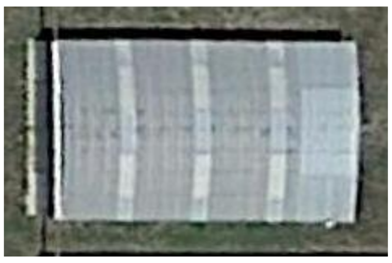
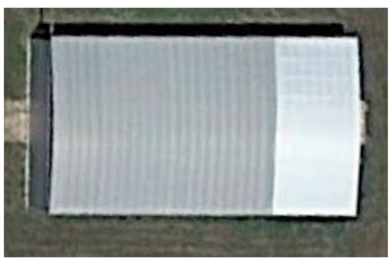
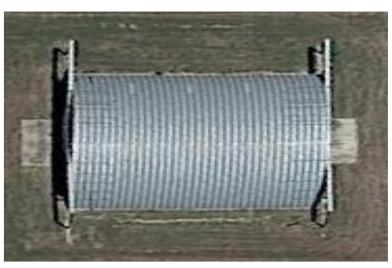
Building Number	Description	Sq Ft.
1a	FBO/Office	1,060
1b	FBO Hangar	8,230
2	Hangar	3,400
3	Hangar	3,600
4	Hangar	1,230
5	Hangar	3,000
6	Hangar	2,270
7	Hangar	2,800
8	Hangar	2,640
9	Hangar	3,370
10	Hangar	2,450
11	Hangar	3,600
12	Hangar	4,960
13A	Hangar	1,780
13B	Hangar	1,340
14	Hangar	1,570
15	Hangar	1,570
16	Hangar	1,570
17	Hangar	1,570
18	Hangar	1,570
19	Hangar	1,570
20	Hangar	1,570
21	Hangar	1,570
22	Hangar	1,570
23	Hangar	1,570
24	Hangar	3,800

Figure 1.5
Terminal Area Facilities

1.3 Building Inventory

Table 1.5 Building Inventory

Picture	Building Number	Description	Sq Ft.	Condition	Ownership
	1a	FBO/Office	1060	Fair	City Owned
	1b	FBO Hangar	8230	Fair	City Owned
	2	Hangar	3400	Poor	Ground Lease
	3	Hangar	3600	Good	Ground Lease
	4	Hangar	1230	Fair	Ground Lease
	5	Hangar	3000	Good	Ground Lease
	6	Hangar	2270	Good	Ground Lease
	7	Hangar	2800	Fair	Ground lease
	8	Hangar	2640	Fair	Ground Lease

	9	Hangar	3370	Fair	Ground Lease
	10	Hangar	2450	Fair	Ground Lease
	11	Hangar	3600	Fair	Ground Lease
	12	Hangar	4960	Fair	Ground Lease
	13A	Hangar	1780	Good	Ground Lease
	13B	Hangar	1340	Good	Ground Lease
	14	Hangar	1570	Good	Ground Lease
	15	Hangar	1570	Good	Ground Lease
	16	Hangar	1570	Good	Ground Lease
	17	Hangar	1570	Good	Ground Lease

	18	Hangar	1570	Good	Ground Lease
	19	Hangar	1570	Good	Ground Lease
	20	Hangar	1570	Good	Ground Lease
	21	Hangar	1570	Good	Ground Lease
	22	Hangar	1570	Good	Ground Lease
	23	Hangar	1570	Good	Ground Lease
	24	Hangar	3800	Good	Ground Lease

Source: Google Earth, Airport Records

Fixed-Base Operator (FBO)

The FBO at 84R is owned and operated by the City of Smithville and provides a variety of services for general aviation aircraft including, major airframe and power plant repairs. The FBO building offers a pilot lounge as well as a flight planning room with vending machines, a kitchen and cable TV. A courtesy car is also available for flight crew upon request. The FBO is open from 0800-1700 Monday through Saturday.

Figure 1.6 FBO Pilot Lounge

Fuel Facilities

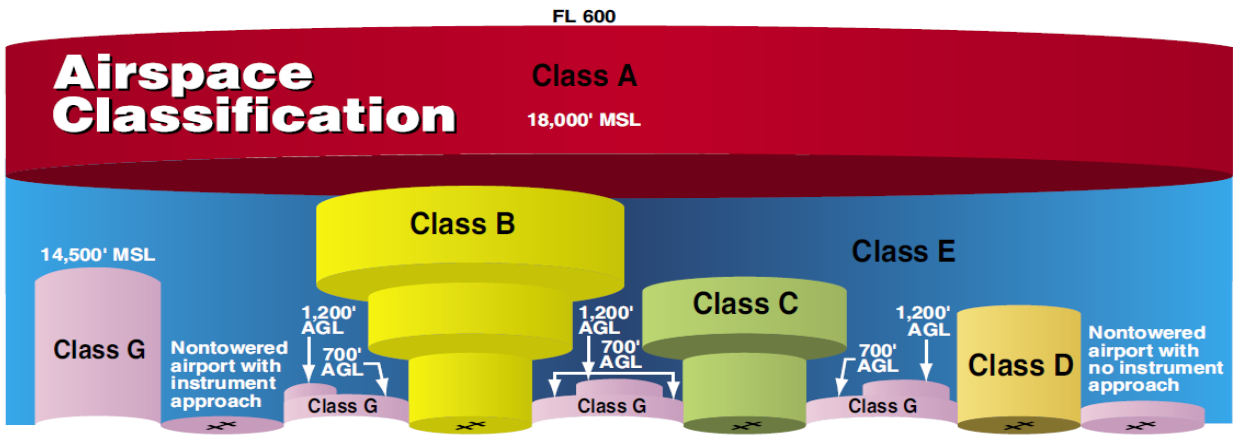
Smithville-Crawford Municipal airport offers self-serve general aviation low lead fuel (100LL). Fuel facilities include one fuel pump and a one thousand gallon storage capacity tank. Both facilities are leased to a Fayette Aero LLC; however, the lease agreement expires in 2016. It is important to note that the current fuel price at 84R for 100LL is $1 more per gallon than Taylor Municipal Airport. The City of Smithville may consider taking over the fuel facilities to better manage the price of fuel and compete with other airports in the region. Images of the fuel facilities at 84R are shown below in **Figure 1.7.**

Figure 1.7 Fuel Facilities

1.4 National Airspace System (NAS)

To ensure a safe and efficient airspace environment for all aspects of aviation, the FAA has established an airspace structure through the Federal Aviation Regulations (FAR) that regulates and establishes procedures for aircraft that use the NAS. This airspace structure essentially provides for two basic categories of airspace: controlled (classified as Class A, B, C, D, and E) and uncontrolled (classified as Class G). **Figure 1.8** below illustrates each airspace type.

Figure 1.8 Airspace Classification Chart



Source: Federal Aviation Administration

FAR Part 71 and FAR Part 73 establish these classifications of airspace with the following characteristics defined in **Table 1.6**:

TABLE 1.6 AIRSPACE CLASS DEFINITIONS

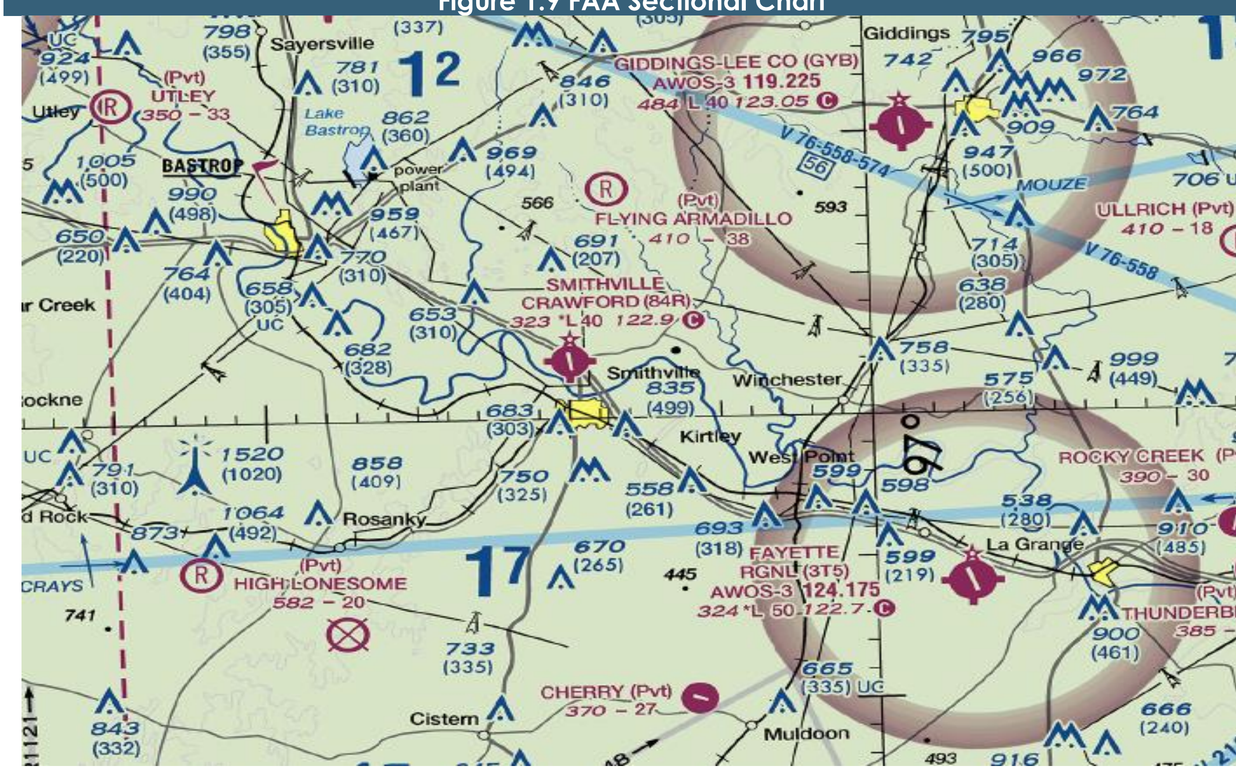
Class	Definition
A	Generally the airspace from 18,000 feet mean sea level (MSL) up to Flight Level 600 (approximately 60,000 feet MSL). Unless otherwise authorized, all operation in Class A airspace is conducted under instrument flight rules (IFR).
B	Generally airspace from the surface to 10,000 feet MSL surrounding the nation's busiest airports in terms of airport operations or passenger enplanements. An ATC clearance is required for all aircraft to operate in the area, and all aircraft that are so cleared receive separation services within the airspace.
C	Generally airspace from the surface to 4,000 feet above the airport elevation (charted in MSL) surrounding those airports that have an operational control tower are serviced by a radar approach control and have a certain number of IFR operations or passenger enplanements. Each aircraft must establish two-way radio communications with the ATC facility providing air traffic services prior to entering the airspace and, thereafter, maintain those communications while within the airspace.

D	Generally airspace from the surface to 2,500 feet above the airport elevation (charted in MSL) surrounding those airports that have an operational control tower. Unless otherwise authorized, each aircraft must establish two-way radio communications with the ATC facility providing air traffic services prior to entering the airspace and thereafter maintain those communications while in the airspace.
E	If the airspace is not Class A, B, C, or D, and is controlled airspace, then it is Class E airspace. Class E airspace extends upward from either the surface or a designated altitude to the overlying or adjacent controlled airspace. Only aircraft operating under IFR are required to be in contact with air traffic control when operating within Class E airspace.
G	Uncontrolled airspace is the portion of the airspace that has not been designated with any of the above classifications. It extends from the surface to the base of the overlying Class E airspace. Although ATC has no authority or responsibility to control air traffic, pilots must still abide by visual flight rules (VFR) minimums in Class G airspace.

Source: FAA Pilot's Handbook of Aeronautical Knowledge

As outlined in **Table 1.6**, 84R is located within Class G airspace. All airspace that is not considered controlled and under 60,000 feet above sea level (MSL) is classified as Class G airspace. Class G airspace is completely uncontrolled for pilots flying under visual flight rules (VFR) and instrument flight rules (IFR). The Class G airspace surrounding 84R is established at the ground and continues up to a ceiling of 1,200 feet above ground level (AGL). **Figure 1.9** shows a portion of the sectional chart published by the FAA's National Aeronautical Charting office for the regional airspace surrounding 84R.

Figure 1.9 FAA Sectional Chart



Source: FAA

Instrument Approach Procedures

In 2003, the FAA implemented Wide Area Augmentation Systems (WAAS) availability to public airports. Pilots are now benefiting from the large number of Area Navigation (RNAV) Global Positioning System (GPS) approaches and lower minimums provided by WAAS-enabled systems. These systems are greatly more abundant than instrument landing systems (ILS) and other ground-based systems from the 20th Century. As of June 2015, there are 3,554 Wide Area Augmentation System (WAAS) Localizer Performance with Vertical guidance (LPV) approach procedures serving 1,732 airports. 989 of these airports are Non-ILS airports. Currently, there are also 594 Localizer Performance (LP) approach procedures in the U.S. serving 429 airports.

There are no published instrument procedures at Smithville-Crawford Municipal Airport; however, acquiring one may attract more users while allowing for airport activity to take place during poor weather conditions. The following airports are within a 30-nautical mile radius of 84R with instrument procedures:

- Giddings-Lee County Airport (GYB)
- Fayette Regional Air Center Airport (3T5)
- Lockhart Municipal Airport (50R)
- Austin Executive Airport (EDC)

Part 77 Surfaces

FAR Part 77, Objects Affecting Navigable Airspace, is a tool used to protect the airspace over/around a given airport and each of its runway approaches from potential obstructions to air navigation. It is important to note that as a federal regulation, all airports included in the NAS are subject to the requirements of Part 77. To determine whether an object is an obstruction to air navigation, Part 77 establishes several imaginary airspace surfaces in relation to an airport and each runway end. The dimensions and slopes of these surfaces depend on the configuration and approach categories of each airport's runway system. The size of the imaginary surfaces depends largely upon the type of approach to the runway in question. A graphic representation of the part 77 surfaces is shown in **Figure 1.10**.

Primary Surface: Longitudinally centered on the runway at the same elevation as the nearest point on the runway centerline.

Horizontal Surface: Located 150 feet above the established airport elevation, the perimeter of which is established by swinging arcs of specified radii from the center of each the primary surface end and connected via tangent lines.

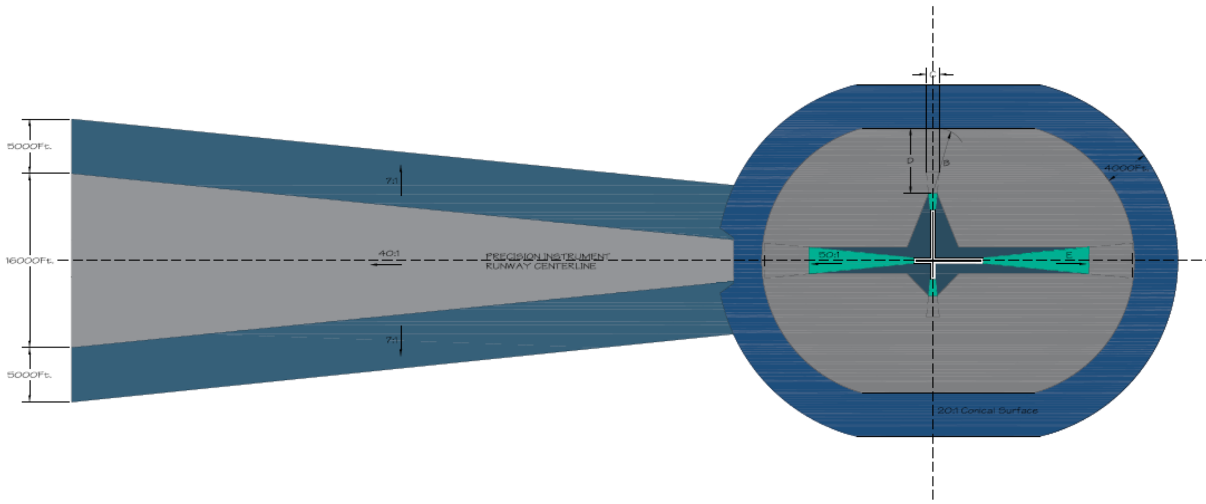
Conical Surface: Extends outward and upward from the periphery of the horizontal surface at a slope of 20:1 for a horizontal distance of 4,000 feet.

Approach Surface: Longitudinally centered on the extended centerline, and extending outward and upward from each runway end at a designated slope (e.g. 20:1, 34:1, 40:1, and 50:1) based on the runway approach.

Transitional Surface: Extends outward and upward at a right angle to the runway centerline at a slope of 7:1 up to the horizontal surface.

Since 84R has no published instrument procedures, the approach slope on each runway end is 20:1 and does not extend beyond the transition surface. If future non-precision approach procedures are developed for the airport, a 34:1 approach slope would be applied and may result in greater potential obstructions. The need for enhanced approaches at 84R and the analysis of existing and potential airspace obstructions will be reviewed later in this study.

Figure 1.10 Part 77 Graphic Representation



Source: FAA

1.5 Airport Land Use

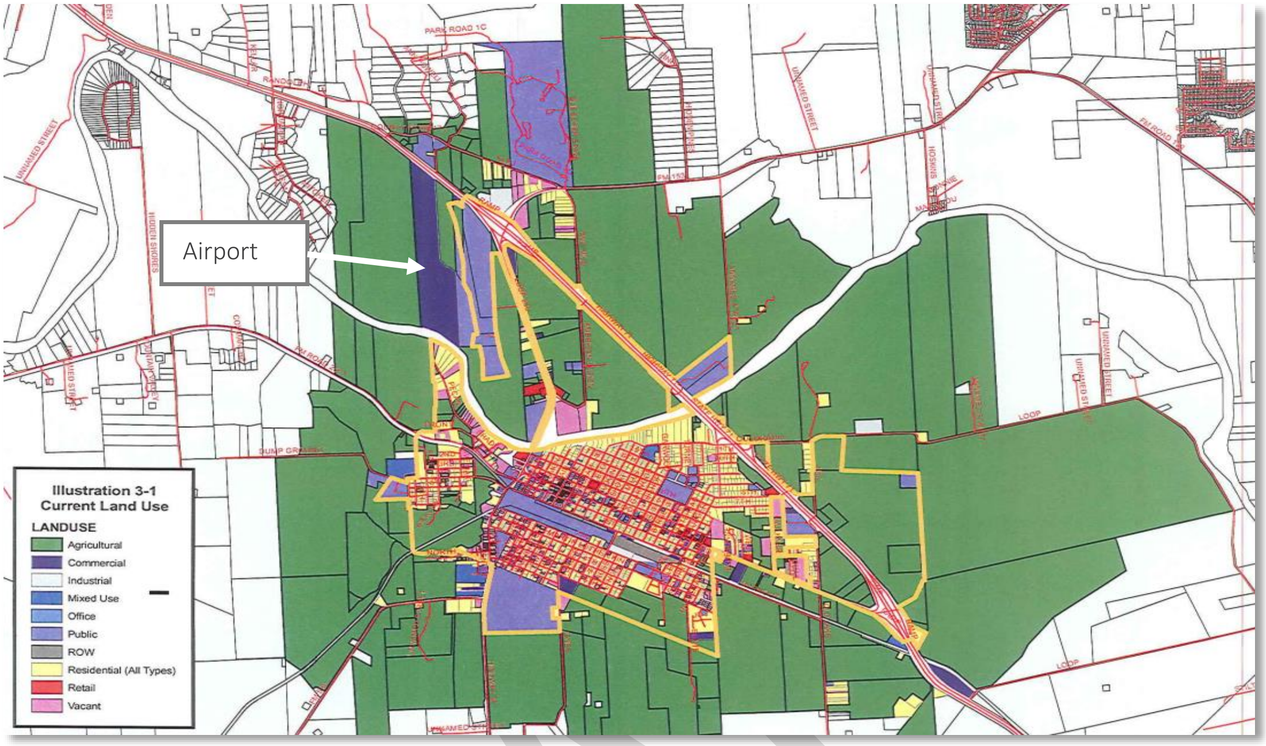
Smithville-Crawford Municipal Airport is located within the city boundary in the northwestern limits of the City of Smithville. Inside airport property boundary and area just west of the airport are zoned as public tracks. The north, south, and east sides are zoned as agriculture tracks with a sliver of land to the northeast zoned as industrial tracks. A zoning map for the City of Smithville is shown in **Figure 1.11.**

Height Hazard Zoning

The State of Texas recognizes that airspace above and in the vicinity of airports warrants special zoning to mitigate hazards that may diminish the airport's usefulness. Through the Airport Zoning Act (AZA), municipalities can adopt airport compatible land use and hazard zoning regulations. Airport compatible land use protects property and its occupants adjacent to the airport from injury, damages, and excessive noise from the operation of aircraft. Airport hazard zoning protects the airspace from structures or objects of natural growth that could obstruct the flight path of an aircraft.

Specific standards are not identified in the AZA, however, preferred standards for clearing possible airport obstructions can be found in the Federal Aviation Regulations (FAR) Part 77. The City of Smithville should reference FAR Part 77 and the Airport Zoning Act, Texas Local Government Code, §§241.001 et seq. in the development of airport hazard zoning.

Figure 1.11 City of Smithville Zoning Map



Source: City of Smithville

2.0 Forecast of Aviation Demand

Projecting future aviation demand is a critical element in the overall planning process. The activity forecasts developed in this chapter will be used in conjunction with other planning tasks to determine the characteristics of future airside and landside facility development.

This chapter discusses the background, methodologies and findings used to project aviation demand at Smithville-Crawford Municipal Airport (84R). It must be recognized that there are always short-term fluctuations in an airport's activity due to a variety of factors that cannot be anticipated. The forecasts developed in this Development Plan provide a meaningful framework to guide the analysis of future airport development needs and alternatives.

The projections of aviation demand developed for 84R are documented in the following sections:

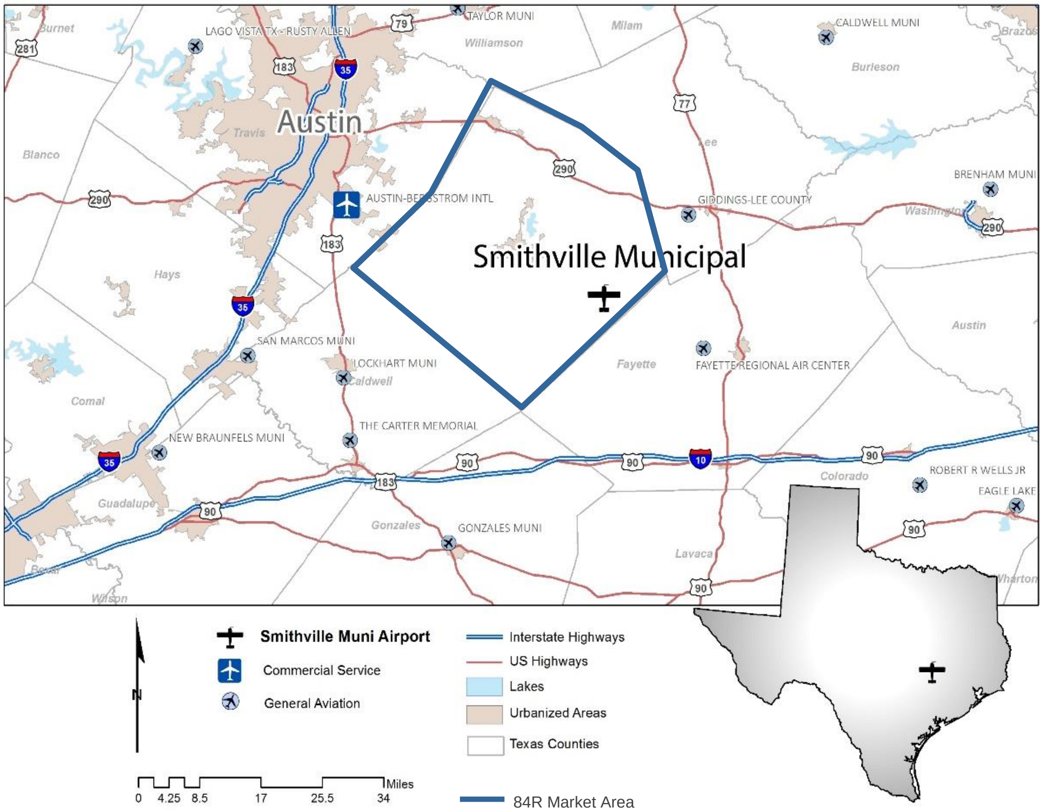
- Regional Demographics
- Historical Aviation Activity
- National General Aviation Trends – FAA Aerospace Forecasts
- Texas Aviation and Local Influences
- Projections of Aviation Demand
    - Based Aircraft Projections
    - Aircraft Operations Projections
- Critical Aircraft
- Summary

This forecast analysis includes methodologies that consider historical aviation trends at 84R and throughout the nation. Local historical operations data were collected from FAA Terminal Area Forecast (TAF) records, airport records, and the FAA Traffic Flow Management System Counts (TFMSC) database. In addition, demographic data for Bastrop County were used to track local trends and conditions that can impact general aviation demand levels. Projections of aviation activity for the Airport were prepared for the near-term (2020), mid-term (2025), and long-term (2030 and 2035) timeframes. These projections are generally unconstrained and assume the airport will be able to develop the various facilities necessary to accommodate future based aircraft and operations.

2.1 Regional Demographics

The area that an airport typically serves, and from which most aviation demands originate, is generally referred to as the airport's "Market Area". For airports like 84R, the market area typically encompasses a 30-minute drive time around the airport. This represents the amount of time most airport users are willing to commute to the airport on a regular basis. Upon examining the 30-minute drive time from 84R and the fact that Smithville-Crawford Municipal Airport is the only airport within Bastrop County, for the purposes of this study, the market area for 84R is considered to be Bastrop County. Figure 2.1 shows the airport location as it relates to the county boundary, other cities/counties and proximity to Austin.

Figure 2.1 84R Market Area



Source: KSA

Regional population and employment data can be used in the planning process to relate future aviation activity levels at 84R to area demographic trends. This analysis examined the historical trends and future projections of the region's population, employment and earnings. Several reliable data sources were utilized: historic and projected future population data was obtained from the U.S. Census Bureau; and employment and earnings data was compiled from Woods & Poole Economics, Inc. as well as the U.S. Bureaus of Labor Statistics and Economic Analysis. **Table 2.1** summarizes population growth trends experienced in Bastrop County and compares them to trends in the Austin metro area, Texas, and the United States between 2000 and 2014.

Table 2.1
Population Trends

	2000	2010	2014	CAGR[1]
Market Area				
Bastrop County	57,733	74,171	78,069	2.2%
Austin Metropolitan Area	1,249,763	1,716,289	1,943,299	3.2%
State of Texas	20,851,820	25,145,561	26,956,958	1.9%
United States	281,421,926	308,745,538	318,857,056	0.9%

Source: U.S. Census Bureau
[1] *CAGR = Compounded Annual Growth Rate 2000-2014*

Given the growth rates shown in **Table 2.1**, it is clear that Bastrop County's growth is consistent with growth and expansion of the Austin region. In addition to population growth patterns, regional economic trends also can significantly impact aviation demand. These regional economic trends have been identified through an examination of employment and earnings data. **Table 2.2** presents historic employment and personal income data for the market area and compares them to the state and nation.

Table 2.2
Economic Trends

Year	Market Area Employment	Market Area Personal Income ($000's)
2000	19,380	$ 1,317,744
2010	26,497	2,034,474
2013	28,254	2,224,385
Market Area CAGR		
2000 – 2010	3.2%	4.4%
2010 – 2013	2.2%	3.0%
2000 – 2013	2.9%	4.1%
Texas CAGR		
2000 – 2010	1.6%	4.9%
2010 – 2013	2.8%	6.5%
2000 – 2013	1.9%	5.3%
U.S. CAGR		
2000 – 2010	0.5%	3.7%
2010 – 2013	1.7%	4.5%
2000 – 2013	0.8%	3.9%

Source: U.S. Bureau of Economic Analysis

Data presented in the previous table reveals that in the 84R market area the compounded annual growth rate (CAGR) of employment was 2.9 percent annually from 2000 to 2013. This is higher than the state growth average of 1.9 percent and over three times the national growth average of 0.8 percent. When focused on personal income, the market area showed levels more consistent with the national growth averages and below the Texas growth rates. Most notable, however, is that recent (2010 – 2013) trends in employment and personal income growth within the market area have slowed while they have increased on the state and national level. This may be a sign of a mature local employment market or limited higher-paying jobs within the region.

The regional population and economic growth experienced in the market area could influence aviation activity at 84R. The growth in these areas indicate a stable economy and greater regional potential. Projections of population, employment, and personal income for the market area were identified and compiled. **Table 2.3** summarizes the projections of population, employment, and personal income for the region. The data indicate continued growth in these three key demographic indicators. The growth rates projected for the market area are within .5% of the projected state and national growth rates.

Table 2.3
Market Area Demographic Projections

Year	Population	Employment	Personal Income ($000s)
Recent[1]	78,069	28,254	$ 2,224,385
Projected			
2020	88,000	32,000	2,706,000
2025	95,000	35,000	3,175,000
2030	103,000	39,000	3,727,000
2035	111,000	43,000	4,425,000
CAGR[2]	1.7%	1.9%	3.2%

Source: U.S. Census Bureau, U.S. Bureau of Economic Analysis, Woods & Poole Economics, Inc.
[1] Most recent (Population - 2014), (Employment/Income - 2013)
[2] Compound Average Growth Rate from Recent to 2035
Projections rounded to nearest thousand

Note that the projected growth rates are more conservative than recent historical trends. All three categories show positive average annual growth rates indicating the potential for growth in aviation activity.

As explained earlier, Bastrop County was included in this analysis based on the assumption that the market area of 84R is primarily contained within the county border. It is understandable, however, that some airport users may occasionally come from outside the county as well as some county residents may use airports other than 84R. Trends impacting cities and towns beyond Bastrop County may impact 84R forecasting efforts. Primary influences to 84R from outside the county will likely have more to do with the actions of other airports in neighboring counties. These impacts are difficult to quantify and may affect the demand for facilities at 84R. The later sections highlighting local aviation trends and nearby competing airports will undercover possible influences from outside the market area.

2.2 Historical Aviation Activity

The airport is a general aviation facility consisting of a mixture of recreational, business, local agency/authority, and flight training/proficiency activities. This section evaluates those local and regional trends that are directly related to aviation growth including those in the previous section. Additionally, the mix of aircraft types and their operational natures found at the airport will be reviewed to develop a forecast which encompasses regional influences as well as characteristics unique to 84R.

Historic based aircraft and operations data for 84R provides the baseline from which future activity at the airport can be projected. While historic trends are not always reflective of future periods, historic data does provide insight into how local, regional, and national demographic and aviation-related trends may be tied to the airport. Historic activity data for 84R has been compiled from several sources including: airport records, FAA Form 5010 Master Record data as well as the FAA's TAF and TFMSC database. For the purposes of this analysis, a "based aircraft" is generally defined as an aircraft that is permanently stored at the Airport.

It should also be noted that the TAF is intended to present information obtained during the annual airport inspection as detailed on the FAA Form 5010. Through discussion with airport management, however, it was revealed that FAA records differ from airport records. Being that airport records are based on actual counts and likely the most accurate, they will be used for this study. Airport records determined that 84R shows 45 based aircraft including: 42 single-engine (including 5 ultra-lights), 2 multi-engine and 1 helicopter. **Table 2.4** reflects the historical based aircraft as presented by airport management.

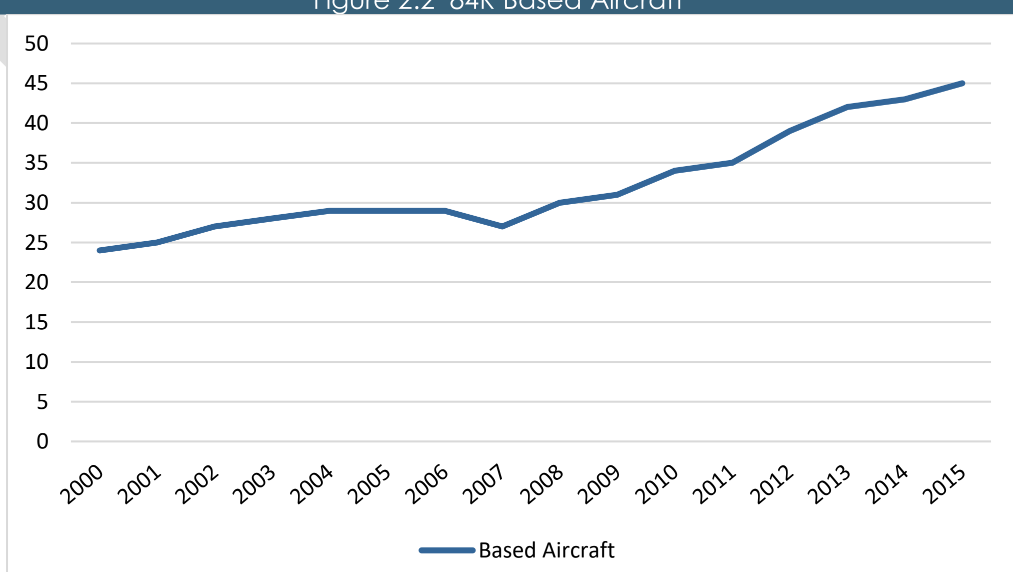
Table 2.4
Historical Based Aircraft

Year	Based Aircraft	Year	Based Aircraft
2000	24	2008	30
2001	25	2009	31
2002	27	2010	34
2003	28	2011	35
2004	29	2012	39
2005	29	2013	42
2006	29	2014	43
2007	27	2015	45
CAGR			4.3%

Source: Airport Records, February 2016

The total number of based aircraft at 84R has almost doubled since 2000. With periods of no growth or slight decline from 2004 to 2007, most of the past 15 years has seen steady growth in based aircraft. Much of this growth was likely caused by the development of new hangars at the airport and the subsequent relocation of users from other area airports. **Figure 2.2** shows the historical number of based aircraft at 84R.

Figure 2.2 84R Based Aircraft



Source: Airport Records, February 2016

Periods of slow growth or slight decline in general aviation throughout the nation and at airports like 84R during the 2000-2007 can be explained by several factors impacting the industry:

- The increase in fuel and operating costs associated with aircraft ownership may have reduced the number of privately-owned aircraft.
- A regional increase in airport competition for based aircraft combined with cost sensitivities in aircraft storage, fuel, and maintenance costs due to economic conditions have resulted in aircraft relocating to other airports.
- Advances in telecommunications technology have reduced the overall need for travel.
- The recessionary economy experienced during the latter half of the first decade of the 21st century. Many claim that this recession and its impact on general aviation has been lessening since 2010, and the number of based aircraft at airports like 84R are rebounding as a result.

Annual operations represent the number of aircraft takeoffs and landings occurring at an airport during a calendar year. Historic operations data for 84R includes operations conducted by based aircraft as well as those conducted by itinerant aircraft stored at other airports, using 84R for a variety of reasons including maintenance, business, recreation, emergency services or flight training purposes. Historic aircraft operations data for 84R are summarized in **Table 2.5**. A single "aircraft operation" at a given airport represents either an individual aircraft landing or takeoff; hence, an aircraft takeoff and a landing would count as a total of two operations.

Table 2.5
84R Operations

Year	Itinerant Operations	Local Operations	Total Operations
2000	2,650	3,400	6,050
2001	2,650	3,400	6,050
2002	1,850	3,400	5,250
2003	2,650	3,400	6,050
2004	2,650	3,400	6,050
2005	3,100	6,200	9,300
2006	3,100	6,200	9,300
2007	3,100	6,200	9,300
2008	3,100	6,200	9,300
2009	3,100	6,200	9,300
2010	3,100	6,200	9,300
2011	3,100	6,200	9,300
2012	3,100	6,200	9,300
2013	3,100	6,200	9,300
2014	2,900	8,700	11,600
CAGR	0.6%	6.9%	4.8%

Source: FAA Terminal Area Forecast, January 2015

Data collected from the FAA TAF shows that operations from 2005 to 2013 at 84R have remained flat 9,300. The latest year in reported activity shows an increase to 11,600. This is an indication that the airport does not likely record operations activity on a daily level. Without an air traffic control tower and other means to record operations as they occur, it is difficult and costly for airports like 84R to maintain accurate records of the flights in and out of the facility. Therefore, the records shown in Table 2.5 are likely a best guess. The 11,600 operations reported for 2014 will be the base level of operations used in the development of activity forecasts presented in this chapter.

Itinerant operations represent one-quarter of total operations, while local operations are the remaining three-quarters of the activity. Throughout the history of this airport, general aviation has been the only consistent component of activity. From 2000 to 2004, however, the airport reported roughly 800 military flights per year, but they have not been quantified since. As mentioned earlier, the airport frequently accommodates local emergency, forest service, game, law enforcement, and medical flights throughout the year. These are counted as part of the civilian general aviation operations listed above in Table 2.5. It is expected that 84R will remain dedicated to general aviation within the 20-year planning period.

As part of this study, instrument flight plan data for operations at 84R were gathered from the FAA Traffic Flow Management System Counts (TFMSC) database. The review of this data provides an understanding of the volume and type of aircraft operating at 84R on instrument flight plans filed with the FAA. This data not only helps validate forecast assumptions, it provides an understanding on the demands for instrument approach facilities and instrumentation at 84R. **Table 2.6** shows historic operations by type of aircraft filing instrument flight plans at 84R and recorded in the TFMSC database from 2012 to 2014.

Table 2.6 84R
Instrument Flight Plans

Year	Piston	Turbine	Jet	Total
2012	172	85	0	257
2013	384	166	14	564
2014	217	155	22	394

Source: FAA Traffic Flow Management System Count (TFMSC) database

The data above shows that instrument flights represent as much as 6 percent of total operations and, of those, as much as 5 percent are classified as jet aircraft. Although instrument operations at 84R represent a relatively small share of operations, the trend of operations that fly under instrument flight plans at 84R is growing. In addition, it is important to note that the TFMSC database may not capture all flight plan activity at an airport and this is not a measure of the frequency of instrument conditions experienced at an airport.

Business/corporate flight operators typically file instrument flight plans whereas recreational and training operators typically do not. The growth of instrument flight plans filed by turbine and jet aircraft indicates a trend of increasing business and corporate activity in Smithville and may influence the decision to increase instrument capabilities at the Airport. Based on this and feedback from airport management and tenants, it may be reasonable for 84R to consider the implementation of instrument flight procedures and related facilities.

The type of aircraft that operate at 84R are likely as important as the number of operations. Confirmed by the table above, the majority of aircraft operating at 84R are light, single-engine piston aircraft. Most turbine operations are performed by the Beechcraft T-6 Texan II and King Air 350 aircraft. Most jet operations are performed by the Hawker 400. This information will be considered when determining the airport's critical aircraft and establishing future facility and design requirements.

In addition, it is important to note the critical role 84R serves in the area of emergency services and preparedness. This aspect of the airport's operation cannot be overstated as it serves a critical and potentially life-saving role. Over the past decade, the airport has frequently served as a base for aerial firefighting and rescue operations within the region. A full range of firefighting aircraft, including fixed-wing turbine and helicopters, have used 84R as a staging area during emergencies. With rapid coordination and advanced preparation, the airport could potentially provide fueling services for these aircraft rather than them having to refuel at a more distant airport.

2.3 National General Aviation Trends – FAA Aerospace Forecast

The aviation industry has experienced significant changes over the last 20 years. At the national level, fluctuating trends regarding general aviation usage and economic upturns/downturns resulting from the nation's business cycle all impact general aviation demand levels. This section provides an overview of those general aviation trends as well as some of the various factors that influenced those trends in the U.S. and Texas. These are important in the development of projections of aviation demand.

With respect to national trends that can provide insight into the future potentials of aviation activity and anticipated facility needs, various data sources were examined and used to support this analysis. Note that historic and anticipated trends related to general aviation will be important considerations in developing forecasts of demand for 84R. The sources utilized in this effort included the following:

- Regional Demographics
- Federal Aviation Administration (FAA), FAA Aerospace Forecasts, 2015-2035
- General Aviation Manufacturers Association (GAMA), 2014 Databook & Industry Outlook
- National Business Aircraft Association (NBAA), Aviation Fact Book, 2015
- Honeywell, Global Business Aviation Outlook, 2015

Data from these sources indicating trends in general aviation are summarized in the following sections:

- General Aviation Overview
- General Aviation Industry
- Business Use of General Aviation
- Summary of National General Aviation Trends

General Aviation Overview

As defined by the FAA, general aviation activities are divided into six use categories: Personal, Instructional, Corporate, Business, Air Taxi, and Other. The FAA reports that there are more than 18,300 public and private airports located throughout the United States, of which more than 3,300 are included in the National Plan of Integrated Airport Systems (NPIAS). Inclusion in the NPIAS indicates their eligibility to receive federal funding assistance. Of that total, commercial service airports represent a relatively small portion (538 or roughly 16%) of the airports included in the NPIAS. Conversely, general aviation airports comprise more than 2,800 facilities. The remaining 15,000 other airports, both private and public use, supplement those airports included in the NPIAS. As a comparison, Texas has an airport system of 292 airports, of which 27 provide scheduled commercial passenger air service.

General Aviation Industry

A pronounced decline in the general aviation industry began in 1978, and lasted throughout most of the 1980s and into the mid-1990s. This decline lead to the loss of over 100,000 manufacturing jobs and a drop in aircraft production from about 18,000 aircraft annually to only 928 aircraft in 1994. Contributing to the decline in general aviation during this period was the increasing number of liability claims against aircraft manufacturers, the loss of Veterans Administration (VA) benefits that covered many costs associated with student pilot training, and the recessionary economy. Manufacturers reported that product liability claims contributed to approximately 30 percent of the cost of a new aircraft. Enactment of the General Aviation Revitalization Act (GARA) of 1994 provided significant relief to the aviation industry. This Act established an 18-year Statute of Repose on liability related to the manufacture of all general aviation aircraft and their components where no time limit was previously established. GARA spurred manufacturers including Cessna and Piper Aircraft to resume production of single-engine piston general aviation aircraft. While enactment of GARA stimulated production of single-engine piston aircraft, the cost of these aircraft has continued to increase. The relatively high cost of new general aviation aircraft has contributed to significantly lower levels of aircraft production from those experienced during the 1960s and 1970s when the annual number of new aircraft manufactured was commonly between 10,000 and 18,000 per year.

Some positive impacts the GARA Act has had on the general aviation industry are reflected in recent national statistics. Since 1994, statistics indicate an increase in general aviation activity, an increase in the active general aviation aircraft fleet, and an increase in shipments of fixed-wing general aviation aircraft.

More recently, however, the terrorist attacks of September 11, 2001, and the national recessionary economy have had a dampening impact on these positive general aviation industry trends. Significant restrictions were placed on general aviation flying following September 11, which resulted in severe limitations being placed on general aviation activity in many areas of the country. Most of these restrictions have now been lifted and business and corporate general aviation have experienced some positive gains due, in part, to new security measures implemented at commercial service airports where travel times have increased.

Business Use of Aviation

Business aviation is one of the fastest growing facets of general aviation. Companies and individuals use aircraft as a tool to improve their businesses efficiency and productivity. The terms business and corporate aircraft are often interchanged as they both refer to aircraft used to support a business enterprise.

The FAA defines business use as “any use of an aircraft (not for compensation or hire) by an individual for transportation required by the business in which the individual is engaged.” The FAA estimates that business aircraft operations contribute slightly more than 11 percent of all aviation activity. The FAA defines corporate/executive transportation as “any use of an aircraft by a corporation, company, or other organization (not for compensation or hire) for the purposes of transporting its employees and/or property, and employing professional pilots for the operation of the aircraft.” An additional 12 percent of the nation’s general aviation activity is considered corporate. Regardless of the terminology used, the business/corporate component of general aviation is one that has experienced significant recent growth. Increased personnel productivity is one of the most important benefits of business aircraft. Companies flying general aviation aircraft for business can better control their travel. Itineraries can be changed and the aircraft can fly into destinations not served by scheduled airlines. Business aircraft usage provides:

- Employee time savings
- Increased enroute productivity
- Minimized time away from home
- Enhanced industrial security
- Enhanced personal safety
- Management control over scheduling

Many of the nation's employers who use general aviation are members of the National Business Aircraft Association (NBAA). The NBAA indicates that approximately 75 percent of all Fortune 500 businesses and 92 of the Fortune 100 companies operate general aviation aircraft. Business use of general aviation aircraft ranges from small, single-engine aircraft rentals to multiple aircraft corporate fleets supported by dedicated flight crews and mechanics.

General aviation aircraft use allows employers to transport personnel and air cargo efficiently. Businesses often use aircraft to link office locations and reach customers. Aircraft use by smaller companies has escalated as various chartering, leasing, time-sharing, interchange agreements, partnerships, and management contracts have emerged. A growing option for business aircraft operators is fractional ownership in which companies or individuals own a fraction of an aircraft and receive management/pilot services associated with the aircraft’s operation.

Fractional ownership allows companies that have never before used aircraft to experience the many advantages business aviation provides quickly and without many of the startup costs/considerations typically associated with traditional aircraft ownership. Executive Jet Aviation (NetJets), which began its fractional program in 1986, and was followed by Bombardiers's Business Jet Solutions (FlexJet) has promoted the concept of fractional ownership the longest. Others, including Flight Options and CitationShares (now CitationAir), entered the marketplace and experienced substantial growth. Fractional ownership continues to be a major contributor to the growth of business aviation because it extends the benefits of business flying to new customers. Fractional aircraft programs have grown dramatically in less than 20 years. In 1986, there were three owners of fractionally held aircraft. By 1993, there were 110. From 2000 to 2004, the number of companies and individuals using fractional ownership grew by 62 percent from 3,834 to 6,217 shares. Newer industry entrants, such as Jet Suite and Wheels Up, are offering variations on the original fractional model.

Other new, growing segments of the business aircraft fleet mix include business liners and ultralight jets. Business liners are large business jets, such as the Boeing Business Jet and Airbus ACJ, which are reconfigured passenger aircraft flown by commercial airlines. Very light jets (VLJ) are a relatively new category of aircraft that includes the Eclipse 500, Safire S-26, and Cessna Mustang. These are small, six-seat jets that cost substantially less than typical business jet aircraft and have been labeled as "personal jets." VLJ aircraft represent a significant departure from the cost of previously available jet aircraft. The *Honeywell Business Aviation Outlook* projects that almost 10,000 new business aircraft valued at over $280 billion will be delivered between 2014 and 2024, excluding business liners and very light jets. The anticipated changes in the nation's active general aviation fleet, including growth in the number of active jet aircraft and use of fractional ownership arrangements, are likely to have an impact on aviation activity at 84R over the 20-year study period. Recent general aviation trends and projected changes to the nation's active general aviation fleet may be reflected in the projections of aviation demand developed for the Airport. It is important to note, however, that Smithville Airport is considered a small general aviation airport in a suburban location. While the airport may see additional jet traffic in future years, through the growth of the Austin Metroplex and development of more versatile aircraft, their use of 84R will likely continue to be limited as long as the airport's runway remains 4,000 feet long.

FAA Aerospace Forecasts

Annually, the FAA publishes forecasts that anticipate trends in civil aviation. Many factors are considered in the FAA's forecasts, some of the most important of which are U.S. and international economic growth and anticipated trends in fuel costs. FAA forecasts provide detailed analyses of historic and forecasted aviation trends and provide the framework for examining future levels of activity. Examples of general aviation activity that are monitored and forecasted by the FAA include active pilots, active aircraft fleet, and active hours flown. Historic and projected activity in each of these categories are examined in **Table 2.7**, contained in *FAA Aerospace Forecasts, Fiscal Years 2015-2035*.

Table 2.7
FAA Aerospace Forecast-Active Aircraft, Hours Flown, Active Pilots

Year	Total Active GA Aircraft	Percent Growth	Total Hours Flown (000's)	Percent Growth	Total Active Pilots	Percent Growth
Historic						
2001	211,446		27,016		619,963	
2007	231,606		27,852		590,349	
2008	228,664	-1.3%	26,009	-6.6%	613,746	4.0%
2009	223,876	-2.1%	23,763	-8.6%	594,285	-3.2%
2010	223,370	-0.2%	24,802	4.4%	627,588	5.6%
2011E	220,453	-1.3%	24,570	-0.9%	617,128	-1.7%
2012	209,034	-5.2%	24,404	-0.7%	610,576	-1.1%
2013	199,927	-4.4%	22,876	-6.3%	599,086	-1.9%
2014E	198,860	-0.5%	23,060	0.8%	593,499	0.9%
Forecast						
2015	198,780	0.0%	23,566	2.2%	591,690	-0.3%
2016	198,740	0.0%	23,689	0.5%	593,190	0.3%
2017	198,855	0.1%	23,830	0.6%	593,955	0.1%
2018	198,940	0.0%	23,961	0.5%	593,970	0.0%
2019	199,105	0.1%	24,131	0.7%	593,725	0.0%
2020	199,410	0.2%	24,355	0.9%	594,225	0.1%
2021	199,790	0.2%	24,618	1.1%	595,300	0.2%
2022	200,255	0.2%	24,919	1.2%	596,655	0.2%
2023	200,740	0.2%	25,237	1.3%	597,790	0.2%
2024	201,310	0.3%	25,545	1.2%	598,770	0.2%
2025	201,970	0.3%	25,874	1.3%	600,130	0.2%
2026	202,730	0.4%	26,215	1.3%	601,585	0.2%
2027	203,610	0.4%	26,580	1.4%	603,300	0.3%
2028	204,540	0.5%	26,974	1.5%	604,830	0.3%
2029	205,353	0.5%	27,405	1.6%	606,495	0.3%
2030	206,680	0.6%	27,869	1.7%	608,250	0.3%
2031	207,905	0.6%	28,354	1.7%	609,940	0.3%
2032	209,280	0.7%	28,858	1.8%	611,530	0.3%
2033	210,770	0.7%	29,409	1.9%	613,485	0.3%
2034	212,435	0.8%	29,999	2.0%	615,450	0.3%
2035	214,260	0.9%	30,626	2.1%	617,000	0.3%
Avg Annual Growth						
2001-14		- 0.5%		-1.2%		-0.3%
2014-15		0.0%		2.2%		-0.3%
2014-24		0.1%		1.0%		0.1%
2014-35		0.4%		1.4%		0.2%

Source: FAA Aerospace Forecast 2015-2035 E = Estimate

The FAA annually tracks the number of active general aviation aircraft in the United States. Active aircraft are those aircraft that are currently registered and fly at least one hour during the year. By tracking this information, the FAA is able to identify trends in the total number of active aircraft as well as the types of aircraft operating in the active fleet. Any changes in the number of active aircraft in the national fleet are generally anticipated to be reflected in similar changes to based aircraft in local fleets throughout the country. As shown in Table 2.7, the total active aircraft fleet is forecasted to experience an average annual growth rate of 0.4 percent between 2014 and 2035. The FAA's short-term forecast for active GA aircraft growth is conservative, given projected long-term growth rates. Over the next 10 years, the number of aircraft throughout the country are expected to increase only 0.1 percent on average per year. Growth in second half of the 20-year planning period is expected to be much higher, ranging from 0.3 to 0.9 percent per year, resulting in an overall 0.4 percent average annual growth rate.

Active general aviation aircraft declined slowly from 2001 to 2014 at a rate of -0.5 percent per year. One of the most important trends identified by the FAA in these forecasts is the relatively strong growth that is anticipated to occur in active general aviation jet aircraft. This trend illustrates a movement in the general aviation community toward higher-performing, more demanding aircraft.

The number of general aviation jet aircraft grew by 3.2 percent annually from 2001 to 2014 and is expected to outpace growth in all other segments of the general aviation aircraft fleet with an annual growth rate of 2.8 percent through 2035. As discussed earlier, one of the reasons for this growth is due to the continued development of small and very light jets as well as the proliferation of fractional ownership. It should also be noted that although jets are projected to increase significantly in number, they remain outnumbered nearly 20 to one by single-engine piston aircraft. As such, growth in jets will offset declines in other aircraft types only enough to produce marginal gains in the overall general aviation fleet.

A second important note is the increase in general aviation aircraft from 2001 to 2007 which can be largely attributed to the newest category of aircraft. Light Sport Aircraft (LSA) are expected continue the increase in the number of pilots and those flying. The Experimental Aircraft Association (EAA) worked with the FAA to introduce this new category that was ultimately implemented in September 2004.

The FAA also records the total hours flown by type of aircraft in the active general aviation fleet. As shown in Table 2.7, the total hours flown declined an average of 1.2 percent from 2001 to 2014. This decrease occurred primarily in the segments of single and multi-engine piston aircraft. Increases in jet hours flown, while steady, could not offset the decreases in single and multi-engine piston hours flown. As a sign of the anticipated economic turnaround, the total hours flown are forecasted by the FAA to experience an average annual growth rate of 1.4 percent between 2014 and 2035.

The overall trend in the number of pilots has shown mixed periods of growth and decline for several years. Recent declines in the number of active pilots started after 2010, with the preceding year seeing a significant increase of 5.6 percent. The dramatic increase in 2010 is due to the FAA issuing a rule that increased the duration of validity for student pilot certificates for pilots under 40 years old from 36 to 60 months. This resulted in the increase in active student pilots to 119,119 from 72,280 at the end of 2009. The FAA estimates that the pilot population will grow conservatively over the next 20 years.

Summary of National General Aviation Trends

The cyclical nature of general aviation activity is illustrated in the historic data presented in this analysis. While general aviation activity experienced rebounded growth during the mid and late-1990s, the terrorist attacks of 2001 and the subsequent economic downturn and recession dampened activity during the mid- to late 2000s. FAA projections of general aviation activity, including active pilots, active aircraft, and hours flown, all show varied growth through the forecast horizon. Following stalled growth and some declines during the late 2000s and early 2010s, most components of general aviation activity are projected to rebound. FAA general aviation metrics discussed above, however, are not expected to reach their 2000 levels until later in the planning period, i.e., in the 2029 timeframe and beyond.

An important national trend that may impact general aviation activity at Smithville-Crawford Municipal Airport is the growing proportion of jet aircraft in the active general aviation fleet. The ability of 84R to accommodate increasing activity by general aviation jet aircraft will be an important consideration in the development of the airport.

2.4 Texas Aviation and Local Influences

Aviation activity at the state level is not only impacted by national economic and aviation trends, but it is also directly linked to the health of the Texas economy. Many factors influence the use of aircraft by Texas residents and businesses. These local factors may result in Texas aviation trends that are divergent from trends identified on the national level. Since trends affecting aviation specific to Texas will be an important consideration in developing the regional projections of demand for 84R, the Texas Airport System Plan (TASP), completed by the Texas Department of Transportation (TxDOT), as well as input from airport/city management was examined. In addition, an important consideration in this review is based on an understanding of the greater Austin aviation market and how it may influence activity in Smithville.

Texas Aviation Economics

Airports in Texas support the air travel needs of Texas residents, businesses, and visitors through 292 public-use airports. They act as economic engines for regional economies and promote the growth of communities in which they serve. Based on the 2011 Texas Aviation Economic Impact Study, general aviation airports throughout the state were responsible for the creation of over 56,000 jobs and over $14.6 billion in total economic output.

Of those totals, it is estimated that Smithville-Crawford Municipal Airport employs approximately 10-15 people (public and private businesses) and contributes over $268,000 to the state's overall aviation output. With the growth of the regional economy and its dependence on general aviation, it is expected that the economic impact of 84R on the state will increase during the planning period.

Noteworthy characteristics and benefits about the airport include the following:

- The airport is an important part of the community and is included in the economic development strategic plan.
- The facility is used as a business recruitment tool and to attract tourism to the area.
- The airport is an important amenity for residents and businesses in the area, enhancing quality of life and regional competitiveness.
- Approximately 50% of operations at Smithville-Crawford Municipal Airport are classified as recreational flying. A variety of other activities compose the remaining operations, including corporate/business activity, agricultural spraying, Civil Air Patrol, and other agency interaction.

Texas Aviation Trends

Smithville-Crawford Municipal Airport is categorized by the TxDOT as a General Aviation – Community Service airport – which provides community access by single and light twin-engine aircraft, and a limited number of business jets. The 2010 Texas Aviation System Plan forecasts that the number of general aviation aircraft are expected to grow 1.0 percent each year over the next 20 years.

Texas is nationally recognized as a state heavily invested in its airports. Texas is one of a few states in the country that is part of the FAA's State Block Grant Program. Under this program, states assume responsibility for administering Airport Improvement Program (AIP) grants at airports classified as "other than primary" airports — that is, non-primary commercial service, reliever, and general aviation airports. Therefore, the TxDOT Aviation Division is responsible for determining which locations will receive funds for ongoing project administration. Although Texas does not have a traditional Aviation Trust Fund, which many other states have, airports are well-funded and maintained with money from the Highway Fund. In FY2013, the state aviation investment was $10.8 million.

Local Influence

The Austin region is one of the fastest growing regions in the U.S. To accommodate growth, residences and businesses are expanding out of urban areas and closer to suburban communities like Smithville. Trends in population and business growth typically go hand-in-hand with expansion of aviation. As airports closer to Austin's downtown area become busier and expand to accommodate larger commercial and corporate aircraft traffic, small general aviation piston, turboprop and jet aircraft will seek to base their operations at smaller, less congested airports. This represents an opportunity for Smithville, to accommodate users seeking to avoid congestion at busier airports while remaining in close proximity to Austin with convenient roadway access.

2.5 Projections of Aviation Demand

Projections of aviation demand at Smithville-Crawford Municipal Airport for the 20-year planning period are presented in the following sections:

- Based Aircraft Projections
- Aircraft Operations Projections

Various methodologies were examined and used to develop projections of based aircraft and aircraft operations at 84R. The results of these different methodologies are presented and compared, resulting in the identification of a preferred projection. The latest aircraft activity figures provided by FAA 5010 Airport Master Record were used as base-year data for 84R forecasting.

Based Aircraft Projections

Based aircraft projections for 84R were established using several factors discussed earlier in this chapter; FAA general aviation aircraft, Texas Aviation System Plan general aviation aircraft, and market area population growth projections. For 84R, the FAA TAF predicts no growth in the number of based aircraft over the next 20 years. Because of this and the overall trend of based aircraft at 84R that resulted in significant growth since 2000, the TAF is not considered in these projections. Given the conservative projections for demographic and socioeconomic drivers as well as the conservative nature of overall trends in general aviation, projections for future based aircraft at 84R are lower than the historical trend. Correlating the predicted growth of these categories, the resulting methodologies represent low, mid, and high-growth forecasts of total based aircraft at Smithville Crawford Municipal Airport. **Table 2.8** summarizes the results of the three based aircraft projection scenarios utilized in this analysis.

Table 2.8
84R Based Aircraft Projection Methodologies

Year	Low FAA GA Aircraft	Mid TASP GA Aircraft	High Population
2015	45	45	45
Projected			
2020	46	47	49
2025	47	50	53
2030	48	52	58
2035	49	55	63
CAGR	0.4%	1.0%	1.7%

Source: FAA Aerospace Forecast, Texas Aviation System Plan, Woods & Poole Economics, Inc.

The preferred based aircraft projection for 84R is based on the TASP general aviation aircraft growth methodology. Several parallels can be drawn between this methodology and other demographic and economic indicators discussed earlier in this chapter. The following similarities exist between the chosen methodology, which employs a 1.0 percent CAGR, and other factors:

- This methodology growth rate falls within an acceptable range of other FAA forecast categories – hours flown and active pilots.
- This methodology is consistent with the growth of itinerant operations experienced at 84R over the past 15 years.
- While conservative, the methodology shows positive growth even though trends of based aircraft at 84R have shown more aggressive growth over the past 15 years.
- This methodology is within acceptable tolerance from the FAA TAF showing no growth. Based on discussions with airport management regarding the interest of people wanting to use the airport, a no-growth scenario seems unreasonable.
- Based on local economic opportunity and proximity to Austin, this methodology represents growth of the number of based aircraft at 84R, some of which may come from other, more congested airports.

Through use of the preferred based aircraft projection, the total based aircraft for 84R over the planning period were allocated to five distinct aircraft categories – ultra-lights, single-engine, multi-engine, helicopter, and jet aircraft. Fleet mix projections were developed based on the fleet mix percentages exhibited at the Airport in 2015 with consideration given to aircraft ownership trends throughout the region and nation. The existing based aircraft fleet mix at 84R is summarized as follows:

- Ultra-lights – 11 percent of total based aircraft
- Single engine piston aircraft – 82 percent of total based aircraft
- Multi-engine piston aircraft – 4 percent of total based aircraft
- Helicopter – 2 percent of total based aircraft
- Jet aircraft – 0 percent of total based aircraft

Using the percentages above, with the exception of jet aircraft, the preferred based aircraft fleet mix projections are presented in **Table 2.9**. With expected growth in jet aircraft throughout the country, it is reasonable to expect some based jet aircraft at 84R in future years. Future growth of jet aircraft was increased to ultimately represent 1 based jet aircraft while the share of single- and multi-engine aircraft was reduced slightly.

Table 2.9
84R Based Aircraft Fleet Mix Projection

Year	Ultra-light	Single-Engine	Multi-Engine	Helicopter	Jet
2015	5	37	2	1	0
Projected					
2020	5	39	2	1	0
2025	6	41	2	1	0
2030	6	43	2	1	0
2035	6	45	2	1	1

Source: Airport Records, KSA

Aircraft Operations Projections

Annual operations represent the number of aircraft takeoffs and landings occurring at an airport during a calendar year. Historic operations data for 84R includes operations conducted by based aircraft as well as those conducted by itinerant aircraft stored at other airports arriving at 84R for a variety of reasons including maintenance, business, recreation, or flight training purposes. Historic aircraft operations data for 84R were summarized earlier in Table 2.5.

Data collected from the FAA TAF shows that operations over most of the past 10 years at 84R have remained flat at 9,300 annual operations. The Airport's 5010 Master Record, however, reports that operations in 2014 have increased to 11,600 annually. Having only this as the most recent formal record of operations at the airport, the 11,600 operations reported for 2014 will be the base level of operations used in the development of an operations forecast.

Many different factors can influence the number of aircraft operations at an airport, including but not limited to, total based aircraft, area demographics, activity and policies at neighboring airports, and national aviation trends. These factors are considered in the application of three methodologies used to develop projections of future aircraft operations at Smithville-Crawford Municipal Airport through the planning period.

Projections of future operations at 84R were created using factors derived from the application of Operations per Based Aircraft (OPBA), FAA Hours Flown Methodology, and the trend of activity from the past 15 years. The results of the different aircraft operations projection scenarios examined in this analysis are summarized and compared in **Table 2.10**. The OPBA methodology derives a ratio of the current level of operations from the number of based aircraft. In 2015, there have been 207 flights for every based aircraft at 84R. Applying that ratio to the preferred based aircraft methodology results in an acceptable projection for annual operations. The other methodologies apply an average annual growth rate to the existing operations in order to forecast future activity.

Table 2.10
84R Operations Projection Methodologies

Year	Low OPBA	Mid FAA Hours Flown	High Historical Trend
2015	11,600	11,600	11,600
Projected			
2020	12,192	12,435	14,664
2025	12,814	13,330	18,538
2030	13,467	14,290	23,436
2035	14,154	15,319	29,627
CAGR	1.0%	1.4%	4.8%

Source: 5010 Airport Master Record, Texas Aviation System Plan, Woods & Poole Economics, Inc.

The OPBA forecast methodology was selected as the preferred projection of aircraft operations for 84R. This methodology results in a reasonable 1.0 percent CAGR and is consistent with the industry outlook and use described at 84R as an airport whose operations are made up of a strong share of based aircraft. The TAF projects no growth in operations through 2035, which can be viewed as unrealistic for most airports, especially 84R, when considering the growth anticipated for the region as stated in the projections for population and employment growth. Additionally, this growth is similar to the 1.0 percent growth rate expected for based aircraft.

An important consideration when examining historic and projected airport operations at an airport is whether they are local or itinerant. Local operations are those operations conducted by aircraft remaining in the airport's traffic pattern. Itinerant operations are those conducted by aircraft coming from outside the traffic pattern or nearby airports. At 84R, operations average 75 percent local and 25 percent itinerant. These percentages have remained relatively steady over the past 15 years. Because the nature of operations at 84R are not expected to change in the coming years, these percentages will be used to project the itinerant/local split of operations in future planning years. **Table 2.11** shows a summary of the projections described above along with the expected level of itinerant and local operations for the planning period.

Table 2.11
84R Forecast Summary

Year	Based Aircraft	Local Operations	Itinerant Operations	Total Operations
2015	45	8,700	2,900	11,600
Projected				
2020	47	9,144	3,048	12,192
2025	50	9,610	3,204	12,814
2030	52	10,100	3,367	13,467
2035	55	10,615	3,539	14,154
CAGR	1.0%	1.0%	1.0%	1.0%

Source: FAA, KSA

2.6 Critical Aircraft

The development of airport facilities is impacted by both the demand for those facilities, typically represented by total based aircraft and operations at an airport, and the type of aircraft that will use those facilities. In general, airport infrastructure components are designed to accommodate the most demanding aircraft, referred to as the critical aircraft, which will utilize the infrastructure on a regular basis. The factors used to determine an airport's critical aircraft are the approach speed and wing span/tail height of the most demanding class of aircraft that is anticipated to perform at least 500 annual operations at the airport during the planning period.

The FAA groups aircraft into Aircraft Categories and Design Groups based on their approach speed and wingspan/tail height, respectively. The criteria for these categories are presented in **Table 2.12**. Along with identifying an airport's critical aircraft, it is possible to determine the facility's Airport Reference Code (ARC). The ARC is a coding system that relates airport design criteria to the operational and physical characteristics of the airplanes that are intended to operate at an airport. An airport's ARC is a composite designation based on the Aircraft Category and Airplane Design Group of that airport's critical aircraft.

Table 2.12
Airport Reference Code

Aircraft Approach Category	
Approach Category	Approach Speed
A	< 91 knots
B	91 knots to < 121 knots
C	121 knots to < 141 knots
D	141 knots to < 166 knots
E	166 knots or more

Aircraft Design Group		
Design Group	Tail Height	Wingspan
I	<20 feet	< 49 feet
II	20 feet to < 30 feet	49 feet to < 79 feet
III	30 feet to < 45 feet	79 feet to < 118 feet
IV	45 feet to < 60 feet	118 feet to < 171 feet
V	60 feet to < 66 feet	171 feet to < 214 feet
VI	66 feet to < 80 feet	214 feet to < 262 feet

Source: FAA Advisory Circular 150/5300-13A Change 1

The current Airport Layout Drawing (ALD) for 84R (completed by TxDOT in 2013) establishes the ARC for Runway 17-35 as B-II which represents a Beechcraft King Air B200 as the critical aircraft with an approach speed of 91 to 121 knots and having a wingspan between 49 and 79 feet as well as a tail height between 20 and 30 feet. The Texas Aviation System Plan also defines the ARC for 84R as B-II.

As mentioned earlier in this chapter, historical flight plan activity was obtained from the FAA's TFMSC database and can be used to help identify the appropriate design aircraft and resulting ARC. In evaluating the data, aircraft falling into the B approach speed category of 91 knots or more, frequently use 84R. Similarly, many aircraft that meet the design group II designation use the airport on a routine basis. Some aircraft that use 84R, including the King Air B200 and Hawker 400, fall within the B-II classification. Based on forecasted operations, however, it is not expected that those aircraft will fly to 84R more than 500 times annually within the planning period. While most aircraft that use 84R do not fall within the B-II ARC classification, a composite rating meeting these criteria is reasonable in this case and accepted by the FAA. Therefore, it is recommended that Smithville-Crawford Municipal Airport maintain the B-II ARC classification with the Beechcraft King Air B200 as the critical aircraft throughout the planning period.

Summary

It is anticipated that the number of based aircraft and operations at 84R will grow during the 20-year planning period. Market area demographic trends indicate that the region will grow and aviation in the area will continue to be in demand. Based aircraft are expected to increase from 45 aircraft to 55 aircraft by 2035. By the end of the planning period, over 14,000 operations could be expected. It is important to note that this is an unconstrained projection, which stipulates that all facilities necessary to accommodate growth will be constructed and that nothing will limit it.

The projections of operational activity presented in this chapter will be referenced in later chapters to help identify areas of the airport that are or may be constrained in future years and assist in the recommendation of future facility requirements. Additionally, it is important to note that economic development incentives established by the city to attract additional aircraft or business to the airport were not considered in this forecast. Additional sections of this study will explore the facility implications of accommodating the projected demand.

3.0 Facility Requirements

An important step in the Airport Development Planning process is to assess what facility requirements need to be met in order to match existing conditions and forecasted activity over the short, medium, and long term planning period. This chapter of the Smithville-Crawford Municipal Airport (84R) Development Plan identifies facility requirements for the airport through 2036. The basis for existing and future facility requirements is grounded in the development initiatives of the airport and on forecasts detailed in chapter two of this development plan. Recommended existing and future facility requirements are identified in the following sections of this chapter:

- Airfield Demand-Capacity
- Airside Facility Requirements
- Landside Facility Requirements
- Facility Requirements Summary

The Federal Aviation Administration (FAA) guidance on planning and design of airport facilities is located in Advisory Circulars (ACs) intended to promote airport safety, economic prosperity, efficiency, and sustainability. Many of the facility requirement standards are detailed in AC 150/5300-13A, Airport Design. Other FAA AC's referenced in this chapter are cited accordingly.

3.1 Airfield Demand-Capacity

FAA guidance for airfield capacity is contained in AC 150/5060-5, Airport Capacity and Delay. According to the FAA, airfield capacity is generally defined as the number of aircraft operations that can be safely accommodated on both the runway and taxiway system at a given point in time before an unacceptable level of delay is experienced. The method of analysis for determining airside capacity is Annual Service Level (ASV). The ASV identifies the maximum number of annual operations that can be accommodated at the airport without excessive delay. In order to determine ASV, the following determinates specific to 84R need to be identified:

- Predominant meteorological conditions
- Runway use configuration
- Aircraft mix (based on existing aircraft group demand)
- Percentage of arrival operations
- Touch and go operations
- Number and location of exit taxiways

Annual Service Volume (ASV)

Using guidance from the FAA AC 150/5060-5, the ASV for existing conditions at 84R was calculated to be approximately 230,000 operations. For the base year 2014, operations at 84R are estimated to be 11,600. The highest number of forecasted operations in year 2035, according to the historical trends projections, is 29,627. This number accounts for only 13 percent of the current ASV. Based on the current level and forecasted level of demand at 84R, no capacity enhancement projects will be needed during the planning period of this airport Development Plan.

3.2 Airfield Requirements

The design, or critical, aircraft is defined as the largest aircraft family or single aircraft anticipated to utilize an airport on a regular basis. A "regular basis" is defined by the FAA as conducting at least 500 annual itinerant operations. The selection of the design aircraft allows for the identification of the Airport Reference Code (ARC).

Airport Reference Code (ARC)

The ARC, as defined in FAA AC 150/5300-13A, is a coding system used to relate airport design criteria to the operational and physical characteristics of the types of aircraft intended to operate at an airport. The ARC has two components related to an airport's design aircraft. The first component, depicted by a letter, designates the aircraft approach category (AAC) and relates to the aircraft approach speed. The second component, depicted by a Roman numeral, specifies the aircraft design group (ADG) and relates to the aircraft wingspan and tail height. **Table 3.1** shows the aircraft approach categories and aircraft design groups that make up the airport reference coding system. As stated in the previous chapter, the composite rating for 84R is reasonable enough to fall within the **B-II ARC** classification.

Table 3.1
Airport Reference Code

Aircraft Approach Category (AAC)	
Approach Category	**Approach Speed**
A	< 91 knots
B	91 knots - < 121 knots
C	121 knots - < 141 knots
D	141 knots - < 166 knots
E	166 knots or more

Aircraft between 12,500 and 60,000 pounds		
Design Group	**Wingspan**	**Tail Height**
I	< 49 feet	< 20 feet
II	49 feet - < 79 feet	20 feet - < 30 feet
III	79 feet - < 118 feet	30 feet - < 45 feet
IV	118 feet - < 171 feet	45 feet - < 60 feet
V	171 feet - < 214 feet	60 feet - < 66 feet
VI	214 feet - < 262 feet	66 feet - < 80 feet

Source: FAA Advisory Circular 150/5300-13A

Runway Orientation

The runway/taxiway configuration is the physical layout of the airfield system, including the number of runways, orientation, and their locations relative to each other and to the landside activities. Each runway/ taxiway configuration has a different capacity due to operational limitations and restrictions. 84R has one runway. Runway 17/35 is 4,000 feet long by 75 feet wide. As mentioned previously in this chapter, the single runway configuration accommodates substantially more operations than current and forecasted demand.

Wind Analysis

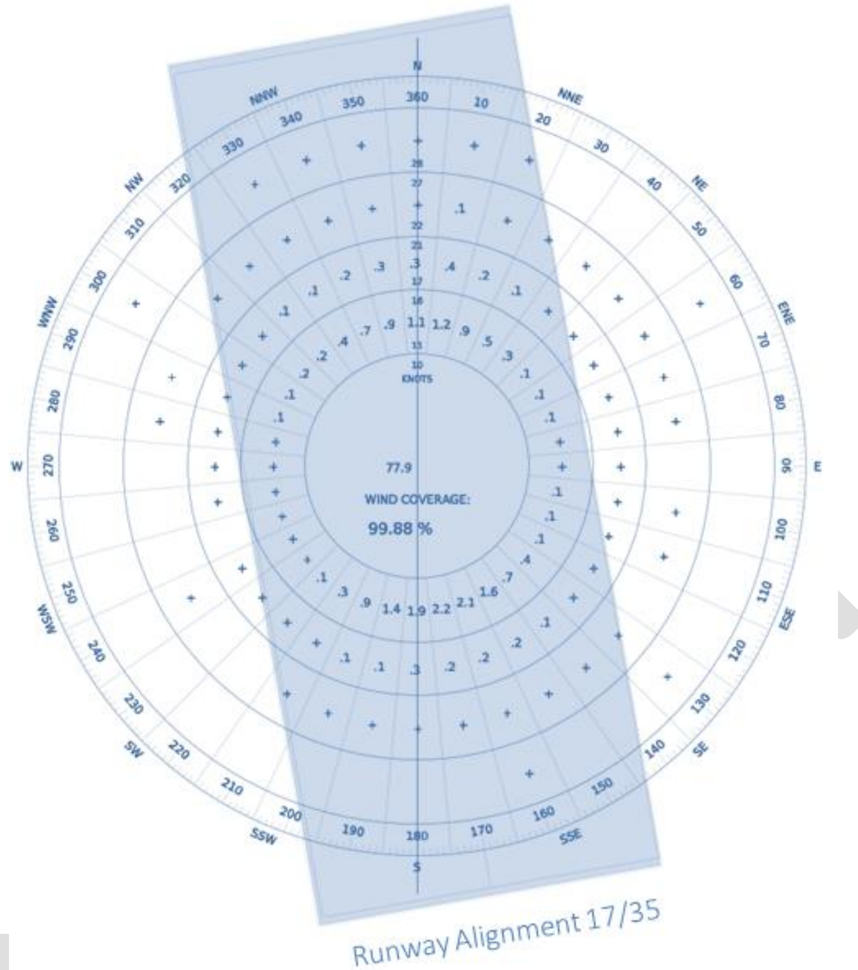
One of the most fundamental impacts on runway orientation is wind. The number of runways and alignment depend largely on prevailing winds and their impact on specific types of aircraft operating at the airport. As aircraft are required to take off and land into the wind, any direct crosswind to a certain runway alignment may have major affects on certain size aircraft. Crosswinds are quantified by a specific component of velocity based on resultant vector from a right angle to the runway. These components are the basis for allowable operations for aircraft. In general, the smaller the aircraft, the smaller the allowable crosswind component for safe operations.

In order to determine if a certain runway (or group of runways) is adequate for these crosswind components, a wind analysis must be undertaken. FAA AC 150/5300-13, Change 5, Airport Design, recommends that at least 95 percent crosswind coverage be provided by the runway system (one or more runways) at any airport. This means for planning purposes the airport and its resulting runway(s) must accommodate aircraft operating in 95% of the existing wind conditions without exceeding operation limitations.

As wind direction changes constantly, it must be quantified over a period of time to create average velocities, direction, and duration for wind at a given airport location to determine the likelihood the runway alignments cover a majority of the conditions. Data is pulled from the National Climate Data Center for the last 10 years to be put in the FAA's Wind Analysis tool that summarizes wind data by velocity and direction. This is then overlaid with the runway configuration to determine coverage percentage by crosswind component. Typical crosswind components for consideration in FAA analysis include *10.5 knots*, *13 knots*, and *16 knots*. With *10.5 knots* being able to accommodate a large portion of the general aviation aircraft fleet (predominately single engine aircraft).

Figure 3.1 shows the all-weather wind rose diagram results for Smithville-Crawford Municipal Airport taken from the FAA's Airports Geographical Information Systems (Airports GIS) wind analysis tool. The wind rose indicates that the airport's current runway configuration is adequate to meet the wind coverage demands. The FAA recommends that an airport's runway configuration provides wind coverage during 95 percent of all possible weather conditions based on the airport's design aircraft. The wind coverage provided by the runway ranges from 98.51 percent to 99.88 percent, depending on the wind speed and direction.

Figure 3.1 84R Wind Rose



Source: FAA AGIS Wind Analysis Tool, National Climate Data Center (NCDC)
Note: Wind Rose shown is for current runway configuration at 16 knots crosswind component

Table 3.2
Wind Rose Crosswind Component

10.5 Knots	13 Knots	16 Knots
98.51%	99.47%	99.88%

Source: FAA AGIS Wind Analysis Tool, National Climate Data Center (NCDC)

Runway Length

As outlined in FAA AC 150/5325-4B, Runway Length Requirements for Airport Design,
General Aviation piston aircraft that make up the majority of the operations at the Smithville-Crawford Municipal Airport are adequately served by the current runway length of 4,000 feet. However, the airport the potential to serve turboprop and small jet aircraft and local interest has suggested the possibility of a based jet aircraft. However, currently the airport lacks jet fuel and hangar space to support this. As short and medium-term development and support facilities are built, the airport may be able to adequately provide the required services for based jet aircraft. Additionally, the close proximity of the airport to Austin Bergstrom International Airport (AUS) and population growth pushing towards the eastern part of Austin may attract jet growth at 84R. Thus, additional runway length may be needed in the long-term planning period.

A 5,000 foot runway is generally recognized as the minimum length requirements based on the safety standards set by insurance companies and corporate flight departments. FAA establishes runway length requirements based on mean daily temperature and runway elevation. Considering these factors, a 5,000 foot runway would accommodate the majority of jet aircraft operations projected at Smithville-Crawford Municipal Airport. Alternatives should be evaluated that consider this runway extension.

Runway Width

The required width of a runway is determined by the critical aircraft and the instrumentation available for the airport. Runway 17/35 is not equipped with an instrument approach; however, the existing runway width of 75 feet could accommodate an instrument approach with visibility minimums of not less than ¾ mile. No change to runway width is recommended during the 20-year planning period.

Pavement Strength

Runway pavement strength is typically expressed by common landing gear configurations. Example aircraft for each type of gear configuration are as follows:

- **Single-wheel**: each landing gear unit has a single tire; example aircraft include light aircraft and some business jet aircraft
- **Dual-wheel**: each landing gear unit has two tires; example aircraft are the Boeing 737, Boeing 727, MD-80, CRJ 200, and the Dash 8. .
- **Dual-tandem**: main landing gear unit has four tires arranged in the shape of a square; example aircraft are the Boeing 707 and KC135.

The aircraft gear type and configuration dictates how aircraft weight is distributed to the pavement and determines pavement response to loading. Runway 17/35 is constructed of asphalt and supports aircraft with a single wheel configuration of up to 12,500 pounds. At present, the pavement is in good condition and the current strengths can accommodate the current critical aircraft. When the runway is ultimately extended to accommodate more demanding aircraft, it is recommended that the runway pavement strength be tested.

Taxiways

There is one 35 foot wide partial parallel taxiway providing access from the main apron to the approach end of Runway 17. There is also a 35-foot wide connector taxiway leading from Runway 17/35 to the ramp. It is recommended, per FAA AC 150/5300-13A, that the connector taxiway be relocated to the south of the ramp area to avoid direct runway access from an apron area that can lead to pilot confusion and ultimately a runway incursion.
It is also recommended that the existing taxiway be extended to a full parallel. Currently, aircraft have to back-taxi down the runway in order to takeoff or taxi from the approach end of Runway 35. This presents a hazard for incidents and incursions, especially in low visibility conditions. Additionally, the FAA, per AC 150/5300-13A, requires that a full length parallel for runways configured with instrument approach procedures with visibility minimums below one mile and recommended for all other conditions. Thus, the installation of instrument approach procedures at 84R during this planning period would require a full length parallel taxiway. A taxiway extension would also accommodate the airport hangars south of the apron with a paved surface to access the runway.

3.3 Navigational Aids (NAVAIDS)

Navigational aids (NAVAIDS) are any visual or electronic devices, airborne or on the ground, that provide point-to-point guidance information or position data to aircraft in flight. Airport NAVAIDs provide guidance to a specific runway end or to an airport.

Visual Landing Aids

Visual landing aids provide aircraft guidance to and alignment with a specific runway end, once the airport is within a pilot's sight.

Runway 17/35 is equipped with Medium Intensity Runway Lighting (MIRL). Both ends of Runway 17/35 are also equipped with precision approach path indicators (PAPIs) which help guide the aircraft to the intended approach angle during landing. A rotating beacon assists the pilot in identifying the airport during nighttime and low visibility operations. The airport is also equipped with a windsock and segmented circle that identifies wind direction and strength to the pilot as well as appropriate traffic patterns for each runway end.

Instrument NAVAIDS

This category of NAVAID provides assistance to aircraft performing instrument approach procedures to an airport. An instrument approach procedure is defined as a series of predetermined maneuvers for guiding an aircraft under instrument flight conditions from the beginning of the initial approach to a landing, or to a point from which a landing may be made visually.

There are two types of instrument approaches; precision and non-precision. Precision instrument approaches utilize the two ground based aids; a localizer for horizontal guidance and glide slope antenna for vertical guidance. A non-precision approach only utilizes the localizer, thus, only indicates horizontal guidance to the aircraft.

Currently, 84R does not have any precision or non-precision approaches. In order to support airport activity during poor visibility, it is recommended that the airport have a non-precision instrument approach with not less than one mile visibility minimums within the planning period. Additionally, the forecasted increase in turbine and jet activity indicates that more business/corporate aircraft will utilize the airport. This type of traffic relies heavily on ease of access to the region by air even in poor weather conditions. This further justifies the need for instrument capabilities at 84R. The latest in GPS approaches will allow the airport to achieve a non-precision approach without the installation of ground-based equipment.

In order to commission a runway GPS approach, the FAA will conduct a thorough airspace analysis around 84R. This study will identify penetrating obstructions or land use issues that may impact the intended approach procedure. As part of this study, a controlling obstruction with 14:1 slope was identified near Runway 17. Mitigation of all obstructions will be required as part of the FAA airspace study.

3.4 Dimensional Standards

Dimensional standards include measurements that account for physical runway and taxiway characteristics as well as safety related areas. These standards, contained in FAA AC 150/5300-13A, are shown in **Table 3.3** as they pertain to 84R. **Table 3.3** also presents the FAA design criteria for Runway 17/35 based on its respective ARC during the planning period.

Taxiway requirements are established by the Taxiway Design Group (TDG) through FAA AC 150/5300-13A as well, but based on the overall Main Gear Width (MGW) and the Cockpit to Main Gear (CMG) distance of the critical or design aircraft. As established in previous sections, the design aircraft is considered to be a family within the ARC B-II group category for Runway 17/35.

Table 3.3
FAA Design Criteria

Criteria	Runway 17/35 (ARC B-II) Requirements
Runway Width	75 Feet
Runway Centerline to:	
Taxiway Centerline	240 Feet
A/C Parking Area	250 Feet
Runway Object Free Area:	
Width	500 Feet
Length Beyond Runway End	300 Feet
Runway Safety Area:	
Width	150 Feet
Length beyond Runway End	300 Feet
Taxiway Width	35 Feet
Taxiway Centerline to:	
Fixed or Movable Object	65.5 Feet
Taxiway Object Free Area (Width)	131 Feet
Taxiway Safety Area (Width)	79 Feet

Source: FAA AC 150/5300-13A
Taxiway Design Group (TDG) for taxiways serving Runway 17/35 is TDI-2

The following dimensional standards are important to the design of the runway and taxiway system at 84R as well as the safety of the aircraft using them.

Obstacle Free Zones

The **Obstacle Free Zone (OFZ)** is a three-dimensional volume of airspace that supports the transition of ground-to-airborne operations (or vice versa). The OFZ clearing standards prohibit taxiing and parked airplanes and other objects, except frangible NAVAIDs or fixed-function objects, from penetrating this zone. The OFZ consists of a volume of airspace below 150 feet above the established airport elevation and is centered on the runway and extended runway centerline.

The **Runway Obstacle Free Zone (ROFZ)** consists of a volume of airspace centered above the runway centerline, above a surface whose elevation at any point is the same as the elevation of the nearest point on the runway centerline. The ROFZ extends 200 feet beyond each end of the runway and has a width that varies with approach visibility minimums and the size of aircraft using the runway.

Runway Protection Zones

A Runway Protection Zone (RPZ) is an area off the runway end intended to enhance the protection of people and property on the ground. RPZ size is a function of critical aircraft and the visibility minimums established for the approach to the runway. Visual runways have smaller RPZs because the landing minimums are higher and the runway is not used during periods of reduced visibility. Precision navigational aids are used to guide aircraft to runways equipped with advanced instrumentation during periods of reduced visibility; thus allowing the airport to remain open and increasing its utility. These precision approaches are required to be protected by the larger runway protection zones.

The **Runway Object Free Area (OFA)** is a two-dimensional ground area surrounding the runway that prohibits parked aircraft and objects, except NAVAIDs and objects with locations fixed by function, from locating there. According to FAA design guidelines, OFA for ARC B-II runways should extend 300 feet beyond each runway end and have a width of 500 feet.

The **Controlled Activity Area** is the portion of the RPZ beyond and to the sides of the runway OFA. It is recommended that an airport control, in fee, this activity area. The controlled activity area should be free of land uses that create glare and smoke. Also, the construction of residences, fuel-handling facilities, churches, schools, and offices is not recommended in the RPZ's controlled activity area. Roads are typically not recommended in the RPZ. **Table 3.4** shows the existing RPZ dimensions and Part 77 approach slopes for each runway end at 84R. Recommended RPZs to coincide with improved approach capabilities will be illustrated on the airport layout drawing as part of this master plan.

Table 3.4
Summary of Runway Protection Zone Requirements

Runway	Type of Approach	Approach Visibility Minimums	Inner Width	*Outer Width*	*Length*	*Part 77 Approach Slope*
17	Visual	Visual	500'	700'	1000'	20:01
35	Visual	Visual	500'	700'	1000'	20:01

Source: FAA Form 5010; FAA AC 150/5300-13A

Runway Safety Areas

The Runway Safety Area (RSA) serves as a safety area if an aircraft overruns the paved runway surface. According to the FAA's definition and dimensional standards illustrated in **Table 3.4**, the RSA should be cleared and graded and have no potentially hazardous ruts or surface variations.

For Runway 17/35, B-II runway standards dictate that the RSA is required to be 150 feet wide and extend 300 feet beyond the departure end of the runway.

3.5 Landside Requirements

This section describes the landside requirements needed to accommodate 84R's general aviation activity throughout the planning period. Areas of particular focus include the hangars, aprons and tie-down areas, automobile parking, as well as the various associated support facilities.

Hangars

Hangars are the preferred method for based aircraft storage at 84R to protect aircraft from high temperatures and sun exposure, as evidenced by the amount of requests the airport receives for hangar space. Currently, there are 25 conventional box hangars at 84R. Mentioned in chapter one, hangar #2 is in poor condition and should be replaced to accommodate existing and future based aircraft.

Practically all based aircraft (100%) at 84R are stored in hangars. This same rate is assumed for the future based aircraft at 84R and used in determining the demand for additional hangars. The aircraft type influences the type of storage required for based aircraft. Taking this into consideration, the projected based aircraft fleet mix was used to identify the number of additional hangars by type projected over each phase of the planning period.

Of the 45 aircraft based at 84R, 37 are single engine, two are multi-engine, five are ultra-light, and one is a helicopter. As previously identified in Chapter Two: *Forecasts of Aviation Activity*, and based on the Airport's existing fleet mix, single-engine aircraft are expected to remain as the largest segment of the fleet at 84R. Given the high-range forecast, one jet aircraft and one helicopter are anticipated to be present by 2035. The addition of eight new single-engine aircraft is also projected at the Airport by the end of the planning period.

The anticipated number of hangars needed over the planning period was estimated by accounting for each aircraft and hangar type expected to be used at 84R over the next 20 years. During the 20-year planning period, the forecast suggest that a deficit of eight hangar spaces will exist due to the increase in single-engine based aircraft. This can be accommodated by the construction of eight singe box hangars or a set of T-Hangars. In addition, a corporate hangar will be required in order to accommodate at least one jet aircraft that is forecasted to be based at 84R by the end of the planning period.

Apron and Tiedown Areas

There is one paved apron at 84R. The apron area is approximately 65,000 square feet and contains eight aircraft tie-downs. Since all based aircraft at the airport are located in hangars, these tie-downs are currently used only for transient aircraft. On days with a high volume of aircraft activity, the ramp space does not accommodate demand. Expansion of the apron is not required to meet based aircraft or transient needs, however, it should be expanded and/or connected to any new hangar development, as required to facilitate aircraft movement.

Automobile parking

Automobile parking is available north of the FBO and in hangar space areas. The main paved lot has approximately 50 parking spaces. Some tenants park next to hangars areas that are neither paved nor marked. Automobile parking at the FBO, even with the recommended development initiatives outlined in this chapter, is adequate within the planning period. The layout and use of the automobile parking area may, however, be altered through the development of additional hangars and associated taxilanes to access them.

Automated Weather

Automated weather information is a crucial tool used by pilots to make informed safety decisions before operating in the vicinity of or landing at an airport. The closest weather reporting facility is 13 miles northeast of the airport. At this distance, wind, temperature, and pressure can fluctuate greatly affecting the accuracy of reported information is used at 84R.

It is recommended that 84R install an Automated Weather Reporting Station (AWOS). An AWOS provides pilots with a computer-generated voice message which is broadcast via radio frequency in the vicinity of an airport. The message contains pertinent weather information including wind speed and direction, visibility, temperature, dew point, and cloud ceiling heights.

According to AC 150/5220-16D, the AWOS must be installed within a defined area located between 500-1000 feet away from the runway centerline and between 1000-3000 feet from either runway threshold.

3.6 Fuel Storage Facilities

The airport's fuel storage tank is located next to Building #2. It holds 1,000 gallons of general aviation low lead fuel (100LL). There is one self serve fuel pump located at the south end of the main ramp. The fuel pump is currently in poor condition and outdated. It is recommended that 84R upgrade the pump during this planning period and consider the relocation of the fuel tank. It is also recommended that the airport install fuel facilities capable of containing jet fuel (Jet-A). The addition of Jet-A service is key in attracting jet and turbine aircraft that may otherwise use alternative airports. The City of Smithville should insure Jet-A availability, especially to coincide with the recommended runway extension. The fuel facilities are currently leased to Fayette Aero LLC. The lease expiration date is in 2016 and the airport should consider all options when considering future fueling leases and operations.

3.7 Airport Comparison

Table 3.5 lists several airports in the vicinity of 84R. While 84R is the only airport in the county, it is important to understand competition in the region and the services offered at similar size airports. As stated earlier in this chapter, installation of a non-precision approach is recommended at 84R. This is further justified by the fact that 84R is the only NPIAS categorized GA-Local airport in the area without an instrument approach. A basic assumption is that during low visibility days, pilots will either decide not to fly into the area at all, or they will fly into a competing airport in the area with instrument approach capabilities.

Table 3.5
Airport Facility Comparison

Airport	ID	Acreage	Longest Runway (ft.)	Based Aircraft (Jets)	Total Operations	Approach Capability	ATC	Jet A	Transient Storage	Minor/Major Aircraft Maintenance	NPIAS/ASSET Role	Texas Airport System Plan
Smithville- Crawford Municipal	**84R**	**63**	**4,000**	**39 (0)**	**11,600**	**Visual**	**No**	**No**	HGR, TIE	**Major**	**General Aviation - Local**	**Community Service**
Fayette Regional Air Center	3T5	195	5,000	25 (3)	14,400	Non-Precision	No	Yes	HGR, TIE	Minor	General Aviation - Local	Basic Service
Austin Bergstrom International	AUS	4,242	9,000	181 (34)	183, 316	Precision	Yes	Yes	HGR, TIE	Minor	Primary - Medium Hub	Commercial Service
Giddings-Lee County	GYB	84	4,000	11 (0)	5,800	Non-Precision	No	Yes	HGR, TIE	Major	General Aviation - Basic	Community service
Taylor Municipal	T74	106	4,000	55 (0)	22,000	Non-Precision	No	Yes	TIE	Major	General Aviation - Basic	Community Service
Austin Executive	EDC	585	6,025	93 (14)	18,000	Non-Precision	No	Yes	HGR, TIE	Major	-	Business Corporate
Lago Vista-Rusty Allen	RYW	50	3,808	15 (2)	5,100	Non-Precision	No	No	TIE	Major	General Aviation - Local	Community Service
Lockhart Municipal	50R	65	4,001	34 (0)	17,700	Non-Precision	No	No	HGR, TIE	-	General Aviation - Local	Commercial Service
New Braunfels Regional	BAZ	1,200	6,503	114 (2)	43, 080	Non-Precision	Yes	Yes	HGR, TIE	Major	General Aviation- Regional	Business Corporate
Carter Memorial	T91	56	2,790	4 (0)	1,200	Visual	No	No	TIE	-	-	Basic Service
San Marcos Regional	HYI	1,303	6,330	91 (2)	56,487	Precision	Yes	Yes	HGR, TIE	Major	General Aviation - Regional	Reliever

3.8 SEAT Base Requirements

The Smithville-Crawford Municipal Airport may seek grant money from FEMA to support the Texas Fire Service (TFS) by establishing facilities for a SEAT base. Single Engine Airtankers (SEATs) are small, fixed-wing aircraft (Air Tractor AT-802) that can carry up to 800 gallons of fire retardant to support firefighters. SEATs based at 84R will be responsible for supporting wildfires within a 200-mile radius of the airport. The SEAT base facilities will need to be sufficient to support up to six Air Tractors. Full details including cost estimates are included in **Appendix A**.

Water

Current water sources at 84R are not adequate to support the SEAT base requirements of 250 gallons per minute. At present, 84R uses a well system that does not provide sufficient flow to support the requirements of SEAT aircraft. As part of this development plan, options are being studies to evaluate the most feasible options to bring sufficient water supply to the airport. The options being evaluated include connecting the airport to a private system from Aquanet, connecting the airport to the City of Smithville Water system, and improving the current well pump at 84R to supply the required water flow.

Apron space will be needed to accommodate a water filling area and possible water storage tanks. The area will need to provide access for water trucks, if storage tanks are used for water supply, as well as apron access for SEATs.

Aprons

Apron area will need to be increased to support a SEAT base at 84R. The additional based aircraft need to be parked on paved tie-down spaces with quick access to both water and the airfield. As referenced in AC 150/5300-13A, the recommended apron space needed to park six based aircraft is 1,800 square yards (300 sq. yards per aircraft). Additionally, a taxilane will need to be built in order to access the SEAT parking area. Apron space will also need to accommodate water filling access and water support facilities. Up to six tiedown spaces will need to be painted on the apron.

Hangar Storage

Hangar storage space for SEAT aircraft and fire retardant is recommended for protection during inclement weather. Restroom and office facilities may also be required to support crew members during firefighting missions.

Fuel Facilities

In order to accommodate the Air Tractor AT-802, Jet fuel (JET A) will need to be supplied at the airport. In addition, the existing 100LL self-service dispenser needs to be replaced. It is recommended that the 100LL and Jet A storage tanks be collocated to provide one fueling area on the airport. This will require the relocation of the existing fuel storage tank.

The Development Alternatives chapter of this study will identify multiple areas to locate additional ramp space, apron storage, and fuel to support the SEAT base.

3.9 Facility Requirements Summary

Smithville-Crawford Municipal Airport is an aging facility that was build previous to many new FAA airport design standards. This chapter describes the facility developments needed in order to meet those standards as well as accommodate forecasted operations and based aircraft in the next 20-years. **Tables 3.6** and **3.7** summarize these requirements.

Table 3.6 Summary of Facility Requirements

Facility	*Planning Period Requirements*	*Justification*
Runway 17/35	It is recommended this runway be extended by 1,000 feet.	This will accommodate faster business jet aircraft.
Taxiway	It is recommended this taxiway be extended to become a full parallel Taxiway .	This will eliminate the need for aircraft to back-taxi on the runway. Improves safety and capacity.
Taxiway Connectors	Per FAA design standards, it is recommended this taxiway connector be removed and replaced south of the main apron area. Additionally, it is recommended that new connector taxiway be build at the south end of Runway 17/35.	This will eliminate direct runway access from the apron. This meets FAA design criteria for a standard taxiway configuration
Apron	Current apron area must be increased by at least 16,000 square feet.	This will accommodate SEAT tiedown parking. Additional apron pavement will be needed for access to new hangar and facilities.
Single-Engine Aircraft Storage	A variety of hangars may be necessary during the period. This will vary in size by aircraft but will need to accommodate at least eight new single engine aircraft	This will accommodate the forecasted based aircraft number. If demand exceeds the forecasted numbers, additional hangars should be built as needed for future tenants.
Conventional Hangar	At least one 3,000 foot hangar will need to be constructed within the planning period. .	Forecast period will need to accommodate one new jet aircraft.
Weather Reporting	It is recommended that an AWOS be installed.	Currently, no weather reporting exists at the airport. These capabilities will provide pilots with the most accurate and current information.
Parking	Parking is adequate in existing areas but may be relocated to accommodate facility development	As new conventional hangars are built, parking should be accommodated for the new tenant.
NAVAIDS	The addition of an RNAV (GPS) approach	Currently, there is no instrument

	with not less than one mile visibility minimums is recommended.	approached at the airport. These capabilities are necessary to operate at the airport during inclement weather.
Fuel	It is recommended that jet fuel (Jet A) be acquired at the airport. Additionally, the aging fuel pump and credit card reader must be replaced. All fuel facilities, including the existing 100LL storage tank, should collocate to one area of the airport.	Jet fuel is necessary for the operation of Air Tractor AT-802's. Fuel facilities should be located in the same area with adequate space for fuel truck delivery access.
SEAT Storage	One 4,500 hangar should be constructed to support the SEAT operation.	This space will accommodate storage of up to four SEATs, fire retardant, and other support utilities for crew members.

Table 3.7
Summary of Hangar Facility Requirements

Facility	*2015*	*Short (0-5 Years)*	*Mid (6-10 Years)*	*Long (11-20 Years)*
Based Aircraft	45	47	50	55
Annual Operations	11,600	12,192	12,814	14,154
Based Aircraft Tie Down Parking	8	14	14	14
Hangars				
Small Aircraft Hangar Area (sq. ft.)	50,400	52,800	56,400	61,200
Twin-Engine Hangar Area (sq. ft.)	4,200	4,200	4,200	4,200
Jet Hangar Area (sq. ft.)	0	0	0	3,000
Total Hangar Space (sq. ft.)	54,600	57,000	60,600	68,400

4.0 Alternatives

Based on the airport design criteria specified and recommended in the previous chapter, *Facility Requirements,* this chapter describes how those requirements will be met by describing three development alternatives. The purpose of this chapter is to evaluate the positive and negative attributes of each alternative and determine a recommended airport development plan for Smithville-Crawford Municipal Airport.

Assessment of each alternative is grounded primarily in local, state, and federal planning standards, however, technical judgment must also be applied in order to determine realistic development alternatives. Additionally, the recommended development plan will consider feasibility of each alternative based on the following factors:

- Compliance with FAA airport and airspace standards
- Compatibility with short and long-range goals of the City of Smithville and Bastrop County
- Mitigation of potential environmental impacts
- Compatibility with airport airside and landside land use and zoning standards

Certain developments that must be addressed due to the need to meet FAA development standards or grant requirements are shown in all three alternatives. This includes taxiway reconfiguration to meet FAA design standards as well as ramp expansion, water utilities, and fire retardant storage to accommodate firefighting operations. Additionally, all three alternatives show dilapidated hangar #2 as removed and replaced with apron development.

While not specifically addressed in the facility requirements, a restaurant building is shown on all three alternatives. The airport has an interest in attracting some type of dining option for both airport users and the general public. For planning purposes, the building is depicted in a recommended area for this type of development. This area has visible highway frontage, access to parking, and is separated from aeronautical activity. This allows for the general public to visit the building without the interference of aviation activity.

Table 4.1 summarizes the main facility needs at Smithville-Crawford Municipal Airport. The alternatives presented in this chapter show various ways in which development can accommodate those needs.

Table 4.1Summary of Facility Requirements

Facility	*Planning Period Requirements*
Runway 17/35	It is recommended this runway be extended by 1,000 feet.
Taxiway	It is recommended this taxiway be extended to become a full parallel Taxiway .
Taxiway Connectors	Per FAA design standards, it is recommended this taxiway connector be removed and replaced south of the main apron area. Additionally, it is recommended that new connector taxiway be built at the south end of Runway 17/35.
Apron	Current apron area must be increased by at least 16,000 square feet.
Single-Engine Aircraft Storage	A variety of hangars may be necessary during the period. This will vary in size by aircraft but will need to accommodate at least eight new single engine aircraft
Conventional Hangar	At least one 3,000 foot hangar will need to be constructed within the planning period. .
Weather Reporting	It is recommended that an AWOS be installed.
Parking	Parking is adequate in existing areas but may be relocated to accommodate facility development
NAVAIDS	The addition of an RNAV (GPS) approach with not less than one mile visibility minimums is recommended.
Fuel	It is recommended that jet fuel (Jet A) be acquired at the airport. Additionally, the aging fuel pump and credit card reader must be replaced. All fuel facilities, including the existing 100LL storage tank, should collocate to one area of the airport.
SEAT Storage	One 4,500 hangar should be constructed to support the SEAT operation.

4.1 Landside Alternatives

Alternative 1

As shown in **Figure 4.1**, this alternative provides a variety of hangar types and sizes including T-hangars, shade hangars, small box hangars to accommodate small based aircraft and two corporate hangars to accommodate based jet aircraft or multiple single or multi engine aircraft. The hangar space shown on this alternative exceeds the amount of based aircraft projected in the forecast, however, demand may increase over the planning period as a result of facility enhancements recommended in this study.

Apron expansion to the north and south of the terminal area connects the terminal area more efficiently while maximizing development land within the airport boundary. Apron enhancements to the south of the FBO also provide space for additional tiedown parking to accommodate additional based aircraft. Apron covering half of the existing automobile parking lot is shown to better utilize this space for fueling and additional tiedown parking.

Fuel facilities are shown in the existing parking lot area with turnaround road access for fuel trucks. The existing parking lot was shifted to help maximize apron space. Water facilities are shown to the south of the FBO hangar to accommodate firefighting operations. This location provides separation between based aircraft and transient aircraft.

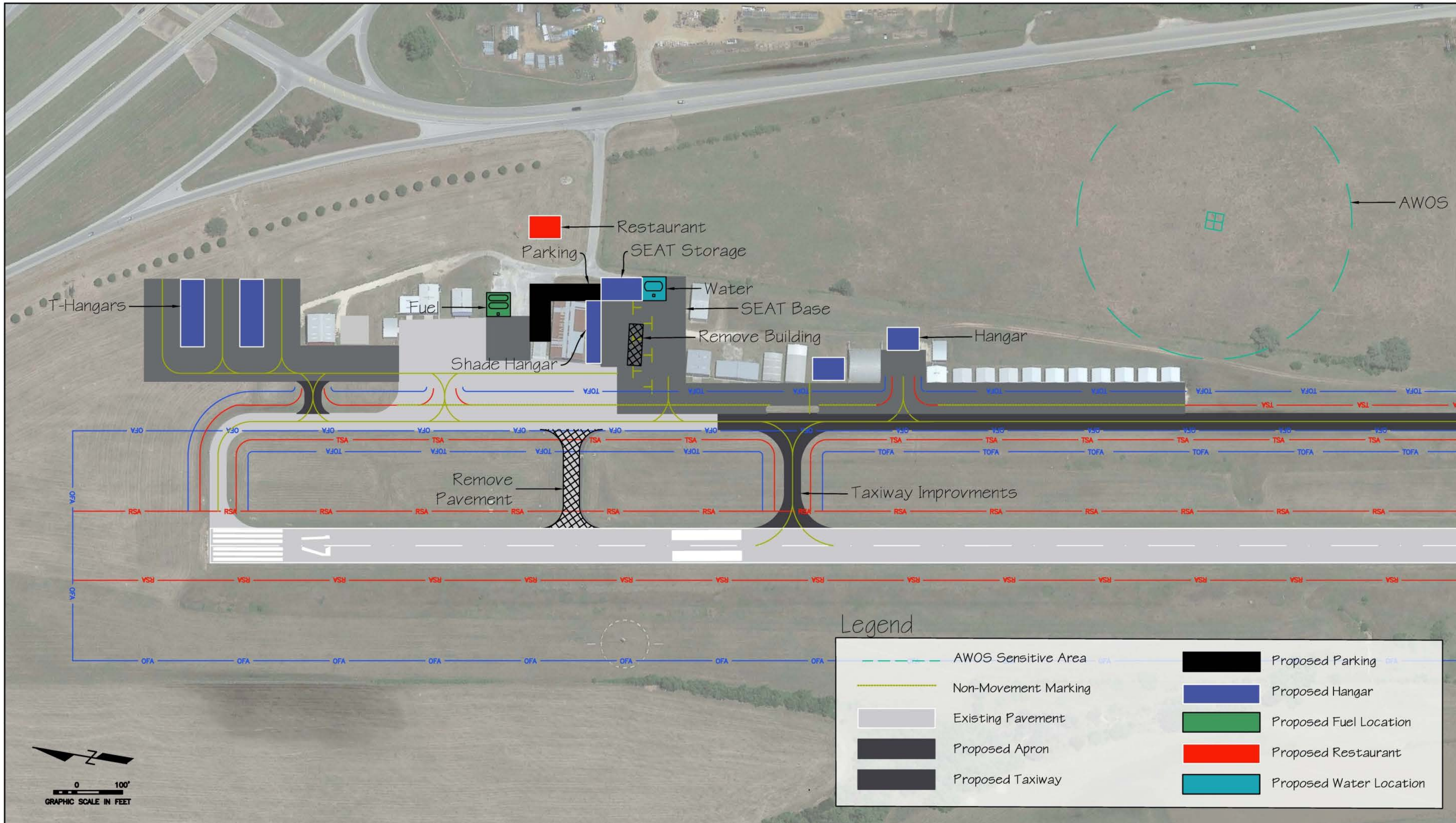
Advantages of this alternative include diversified hangar storage, optimal apron space for transient and based aircraft, and efficient use of existing airport owned land. This alternative accommodates excess storage to account for increased demand as facilities are enhanced and developed at 84R.

One disadvantage to this alternative is the cost associated with maximum apron build out. However, the much of the apron expansion shown on this alternative is to accommodate paved surfaces abutting all existing hangars which are currently unpaved.

Table 4.2
Alternative 1

Facility	*Estimated Area (Square Feet)*
T-Hangars (16-units)	15,284
Shade Hangar (1)	4,500
Single Box Hangars (12)	18,840
Box Hangars (14)	42,100
Apron	245,000

Source: Google Earth, KSA



Smithville-Crawford Municipal Airport

Figure 4.1: Alternative 1

Alternative 2

This alternative is a minimalist option that meets the minimum facility requirement for the airport within the planning period. Six single box hangars are shown as a continuation of the existing line of small hangars at the south end of the development area. Two corporate box hangars are shown at the north end of apron and to the south of the terminal. These hangars will accommodate the forecasted number of based aircraft within the planning period with the assumption that multiple single-engine aircraft will be stored in one of the two corporate hangars, allowing one jet aircraft to be stored in the other. Hangars #2 and #12 are shown as removed to accommodate development.

Apron expansion is shown at the north end of the airport to accommodate one additional corporate hangar and provide access to the existing hangars in that area. Water facilities to support the firefighting activity are depicted in the existing parking lot as well. To accommodate paved access for the small box hangars at the south end of the development area, apron is depicted with multiple taxiway connectors.

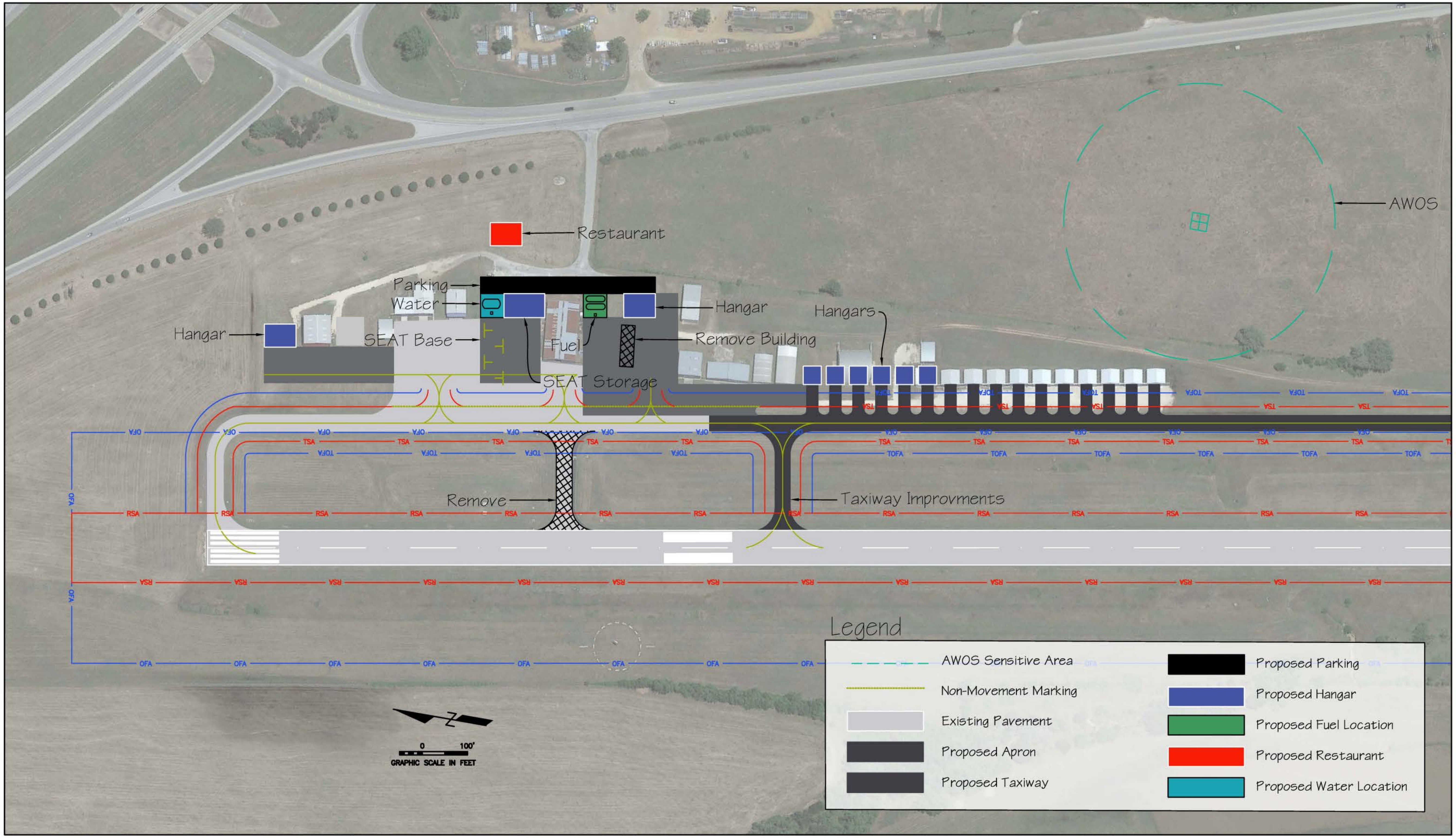
Advantages to this alternative include increased pavement accessibility for all hangars and increased flow around the apron area. This alternative is the lease costly as the square footage for both hangar storage and apron expansion is less than *Alternatives 1 and 3.*

The main disadvantage to this alternative is the lack of hangar variety and minimal storage capacity. This alternative is pending the removal of hangars #2 and #12 which presents inherent challenges and increased costs.

Table 4.3
Alternative 2

Facility	*Estimated Area (Square Feet)*
Single Box Hangars (18)	28,300
Box Hangars (12)	33,100
Apron	190,700

Source: Google Earth, KSA



Smithville-Crawford Municipal Airport

Figure 4.2: Alternative 2

Alternative 3

This alternative features a rebuild of the existing terminal area apron. The area concept for this alternative is a flight-line design with a new terminal and FBO building centered on the main apron. Water, fuel facilities and two corporate hangars are also located on the flight line.

Similar to alternative one, this alternative provides more aircraft storage than forecasted. T-hangar development includes 40 new units. Two corporate hangars are located on the flight line to accommodate one jet aircraft each or multiple smaller aircraft

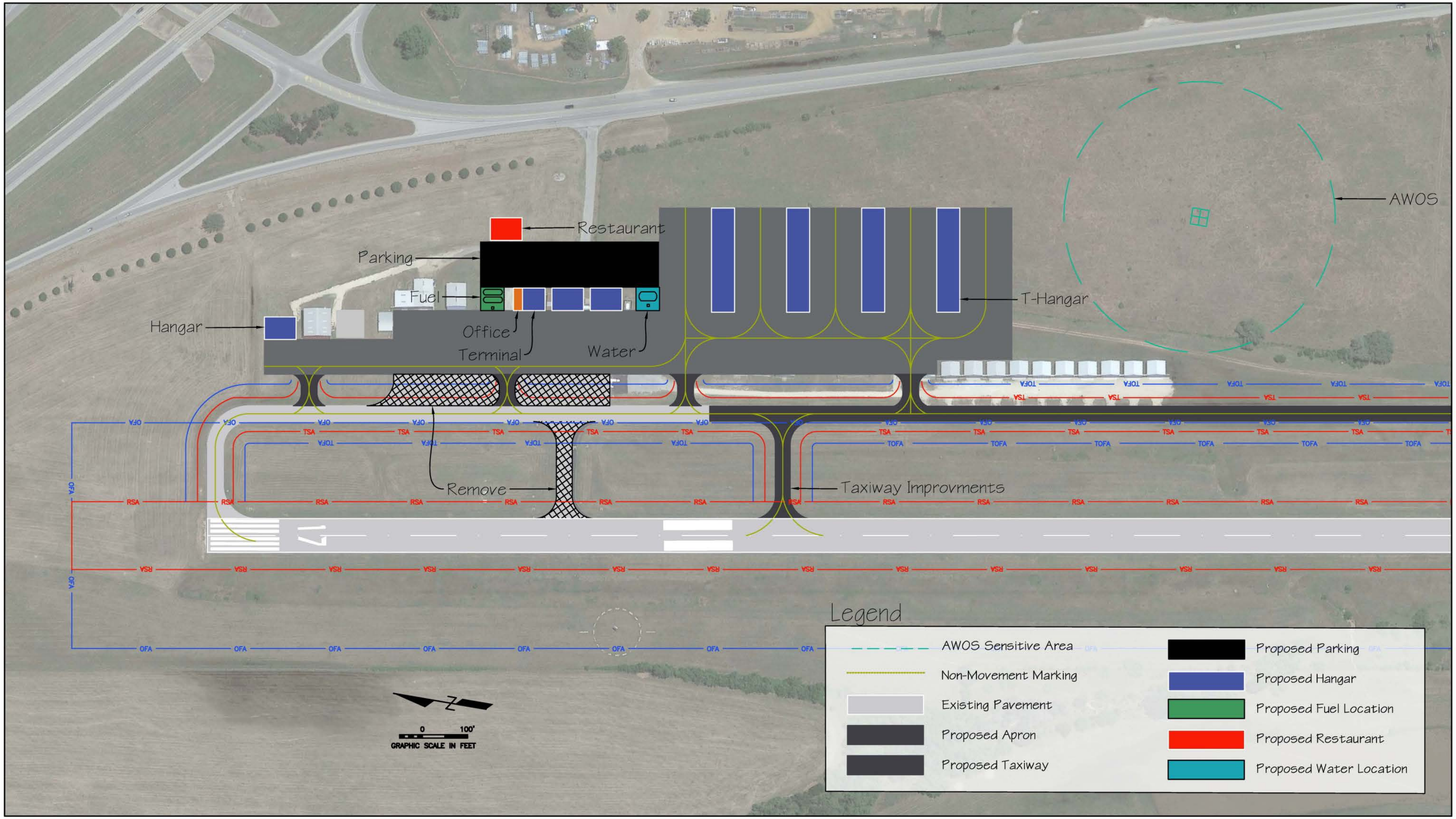
Advantages of this alternative include improved flow, capacity, and access around the main apron and facilities. Based and transient aircraft are located on the same apron but separated by the terminal and two corporate hangars. This alternative also allows for the greatest amount of tiedown space.

The main disadvantage to this alternative is the cost associated with a complete rebuild of the existing terminal area including removal and relocation of the terminal hangar and FBO building and land acquisition. In additional, this alternative shows the largest amount pavement reconstruction and enhancements.

Table 4.4
Alternative 3

Facility	*Estimated Area (Square Feet)*
T-Hangars (40-units)	38,200
Single Box Hangars (12)	18,840
Box Hangars (8)	24,400
Apron	330,000

Source: Google Earth, KSA



Smithville-Crawford Municipal Airport

Figure 4.3: Alternative 3

4.2 Airside Alternatives

The airside functions as the movement area of an airport. It includes runways, taxiways, NAVAIDS, and all support equipment. These facilities serve a primary function as all other airport activities relate to the characteristics of the airside. Airside facilities also present inherent safety concerns due to the amount of aircraft activity compared to landside facilities, thus, are given funding priority by the FAA and state aviation agencies. Specific 84R airside considerations discussed in this section include runway length and taxiway layout.

Because this study focuses on the development of landside facilities, only one airside alternative will be presented. This airside alternative, shown in **Figure 4.4**, includes all facility recommendations identified in the previous chapter for the 20-year planning period.

Taxiway configuration

The current taxiway system needs to be upgraded to meet FAA airport design standards in order to address safety and capacity enhancements. The existing taxiway configuration at 84R allows runway access from the main apron. FAA guidance specifically addresses this safety issue in AC 150/5300-13A. It is recommended in the intermediate term that the existing connector taxiway leading to the runway be shifted south to ensure aircraft must make a 90-degree turn before entering the runway.

FAA design standards recommend a full length parallel taxiway to eliminate runway taxiing, thus increasing capacity and protecting the runway under low visibility conditions. In addition, it is highly recommended that a full length parallel taxiway be present at airport with instrument approaches.

Standard parallel taxiways, per AC 150/5300-13A, include two 90-degree taxiway connectors and an additional two other taxiway connectors. These are depicted in **Figure 4.4**.

Runway Length

As identified in the facility requirements, a 1000-foot extension to the south of Runway 17-35 may be needed in the long-term planning cycle to accommodate larger aircraft. It is likely, with other facilities enhancements on the landside in the planning period, that the airport would see an increase in based aircraft and a greater demand for a runway extension. Several constraints and considerations need to be addressed before this undertaking.

Power Lines

The presence of raised Bluebonnet electrical power lines running through the intended extension area poses a significant cost associated with displacing and burying the power lines. In order to mitigate penetration into any Part 77 surfaces the power line would need to be buried at a length of approximately 1,500 feet underneath what would be the Runway Safety Area (RSA). The presence of people and equipment in the RSA would require phasing in order maximize the availability of Runway 17/35.

Land Acquisition

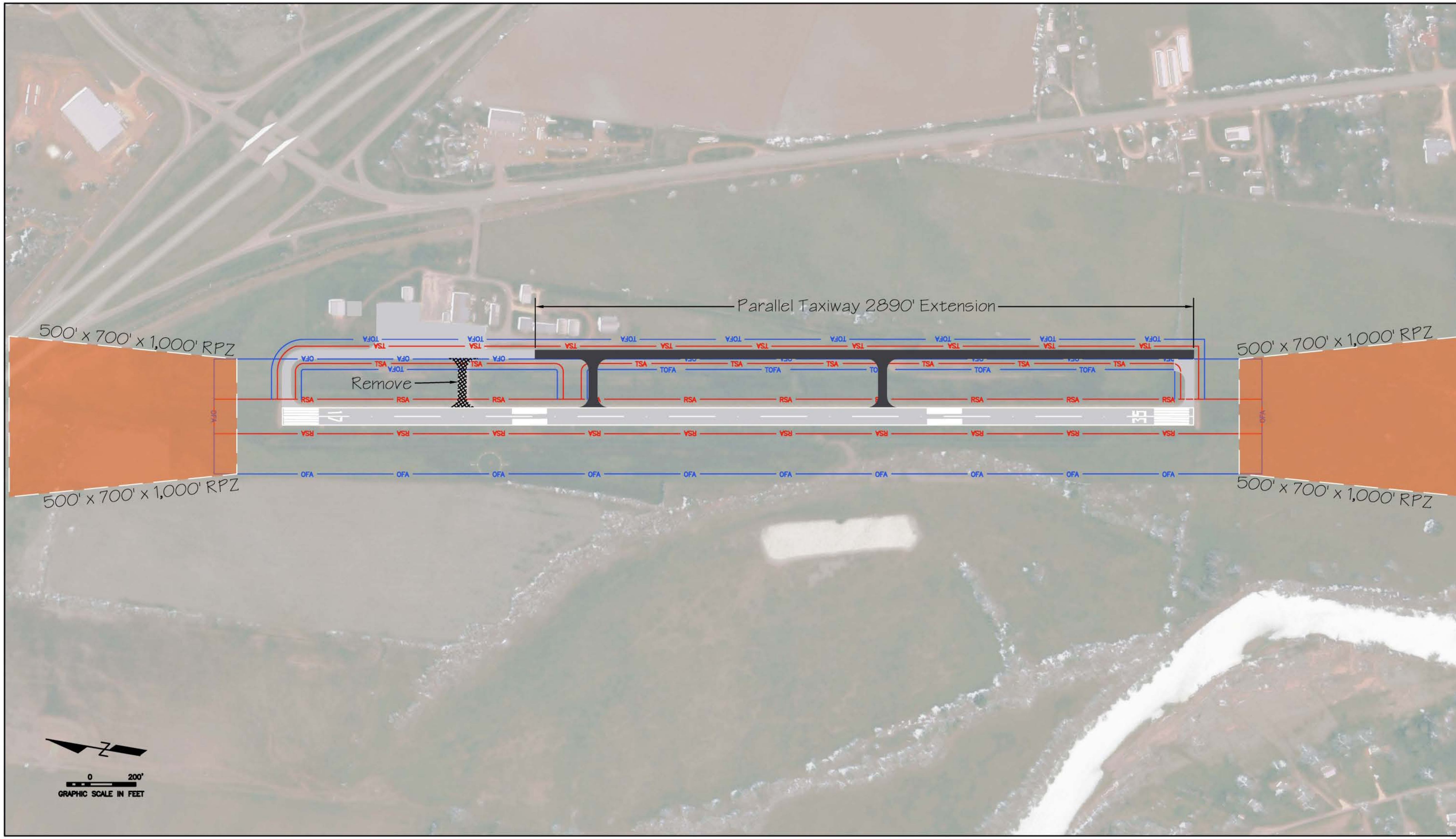
Approximately 800,000 square feet of land acquisition through fee simple or easement would be required at the south end of the airport to accommodate the addition runway length and associated protection surfaces. This includes the land area within the RPZ of Runway 35 per *FAA Memorandum, Interim Guidance on Land Uses within a Runway Protection Zone*.

Topography

A runway extension also poses possible hazards to aircraft using Runway 35. The proposed land within the new proposed Runway 35 RPZ is filled with brush and inconsistent elevation changes. It is also important to consider that the RPZ would border the Colorado River increasing the risk of wildlife presence within the runway approach path.

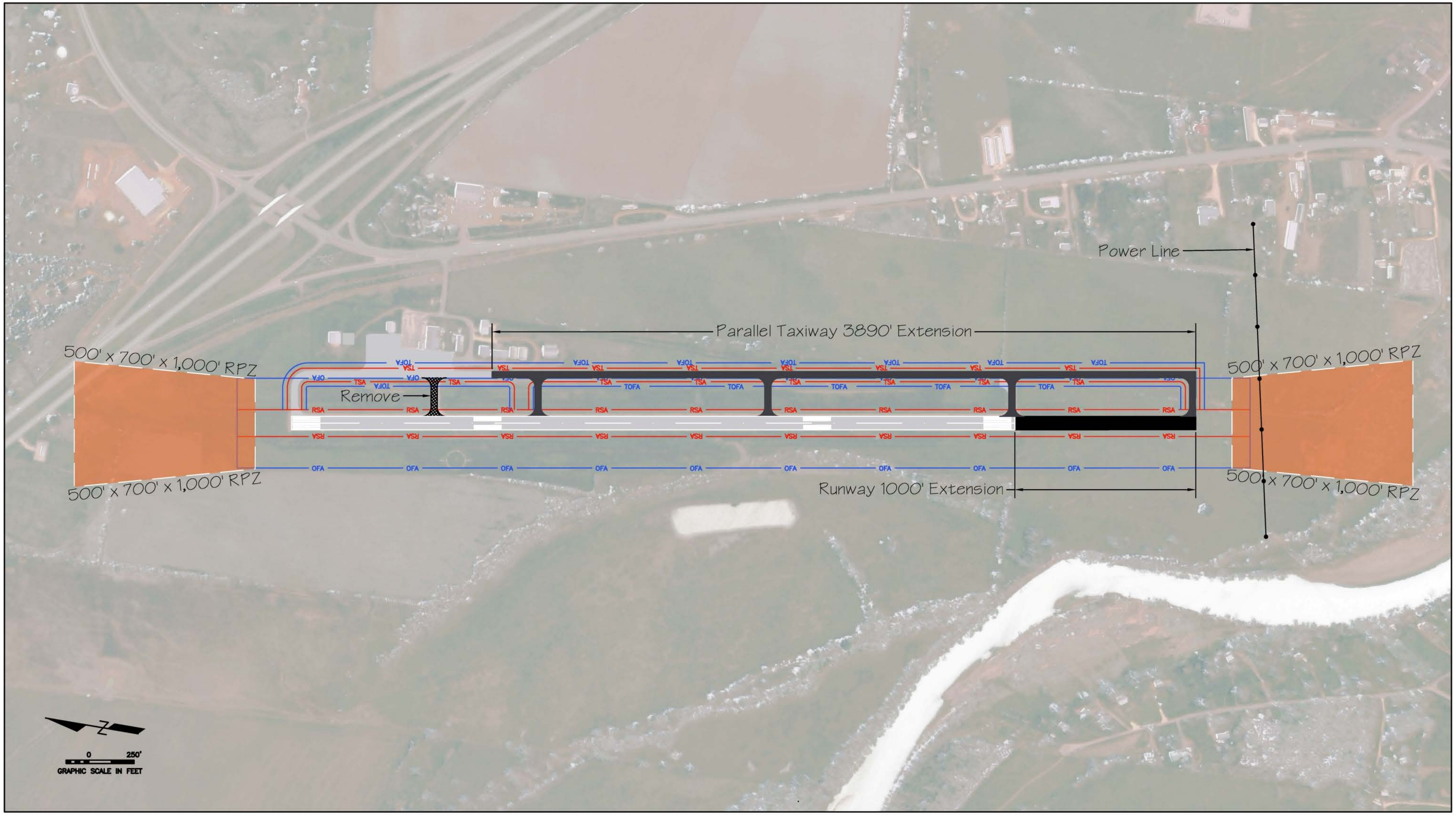
Weather Reporting Capabilities

Currently, no on-airport weather reporting capabilities are present at 84R. It is recommended that the airport acquire an Automatic Weather Observations Station (AWOS). In order to accommodate adequate signal clearance for the AWOS, land on the east side of the airport fence line would need to be acquired through easements.



Smithville-Crawford Municipal Airport

Figure 4.4: Taxiway Enhancemnts



Smithville-Crawford Municipal Airport

Figure 4.5: Runway Extension

4.3 Recommended Alternative

Table 4.5
Recommended Alternative

Facility	*Estimated Area (Square Feet)*
T-Hangars (14 units)	10,000
Single Box Hangars (19)	28,000
Box Hangars (20)	28,000
Apron	300,000

Source: Google Earth, KSA

This alternative captures the most efficient use of the existing airport owned land while limiting hangar removal. Hangar #2 is the only short term removal project followed by the removal and relocation of the terminal building and adjacent FBO hangar as those facilities near the end of their useful life. This option also offers the most variety of hangar types and sizes. The hangar space on this alternative exceeds the forecasted number of based aircraft; however, it allows flexibility to build hangars as demand increases on as as-needed basis.

Compared with the remaining landside alternatives, costs associated with construction of these developments rank higher than *Alternative 2* and much lower than *Alternative 3.* Cost comparisons are directly related to the amount of apron and hangar square footage estimated for each alternative. It is important to recognize that even though costs in this alternative are increased by more hangars, these developments are revenue generating in the long run and will be a worthwhile investments assuming demand supports the additional capacity.

This alternative layout shows enough tiedown capacity for up to six based SEAT aircraft along with support facilities. Compared with the location for the SEAT base in Alternative 2, this option provides greater apron space for tiedowns as well as better separation between firefighting aircraft and civilian aircraft.

The following chapter, *Development Plan*, will describe how the development will be executed and phased over the length of the 20-year planning period.

5.0 Recommended Development Plan

This development plan has previously evaluated the facility requirements and alternatives needed for future development of the airport. These requirements were the foundation of alternatives to address deficiencies and other improvements needed at the Smithville-Crawford Municipal Airport. With the selection of a recommended alternative for future development of the airport, an implementation plan with costs associated with these improvements will be developed to guide actions at the airport in the future. This robust planning exercise presents a clear implementation plan with schedule and costs to ensure the goals and vision of the City of Smithville are realized. The purpose of this chapter is to define these in order to assist the community of Smithville, Texas enact recommendations of this plan.

The following topics will be addressed in this chapter:

- Recommended development and improvements
- Cost estimates
- Project Schedules
- Funding Sources
- Phasing and CIP

5.1 Recommended Development

Alternatives were created during this study to present options for development at 84R. These plans evaluated possibilities for aircraft storage, runway and taxiway improvements, and other weather and safety related information. With input from stakeholders, a recommended development plan was agreed upon. This concept will be incorporated into the Airport Layout Plan and approved as part of the Action Plan.

Once approved in the ALP, this plan becomes eligible for funding as appropriate. For instance, if eligible projects are shown and justified, they will be considered as part of a Capital Improvement Program with the TxDOT and FAA.

The justification and overview of these improvements will be discussed and have been identified in the facility requirements section of this development plan. They include safety, hangar development, facility infrastructure expansion, and enhanced services and operational capabilities.

A summary of these improvements is included in **Figure 5.1.**

Figure 5.1 Recommended Landside Improvements

Automated Weather Observation Station (AWOS)
Safety Enhancement – AWOS report weather conditions for pilots such as barometric pressure, altimeter settings, visibility, sky conditions, and precipitation.

Fuel Upgrades
Critical Facilities – Updates to the fuel pump, relocation of existing fuel farm, and addition of jet fuel may increase revenue while providing necessary service for firefighting and other aeronautical activities within the region.

Hangar Development
Revenue Opportunity – Additional hangar development is in demand within Bastrop County as aircraft storage is limited. Increased hangar capacity at 84R could generate steady revenue for the City.

Taxiway Enhancements
Safety and Flow – Direct runway access from a ramp or apron presents the increased likelihood of dangerous runway incursions. Omission of this potential hazard as well as an extension of the current taxiway to full parallel will enhance safety and flow of aircraft activity.

Navigation Enhancements
Safety – Ground navigation equipment helps the pilot approach the airport and land safely during inclement weather. Currently, no approach capabilities exist at 84R. A GPS (RNAV) approach with no less than one mile visibility minimums would greatly enhance safety at the airport.

The recommended development plan incorporates the following:

- Apron expansion
- Taxiway enhancements
- Automated Weather Observation System (AWOS)
- Water services
- Fuel services (100LL and Jet A with self-service)
- Hangar development
- Land acquisition

A summary of these improvements is included in **Table 5.1.**

Table 5.1 Recommended Improvements

Improvement	Quantity
Apron Expansion	1,500 SY.
Box Hangars (6 units)	30,500 sq. ft.
Fuel farm	Jet A, 100 LL, dispensing system, Card Reader
Install AWOS	-
Land Acquisition	100 Acres
Runway 17/35 Extension	1,000 ft.
Taxiway Improvements	3,000 total ft.
T-Hangar (14 units)	10,000 sq. ft.
Water	-
South FBO apron extension	5,000 SY.
North Apron expansion	8,900 SY.
East apron expansion	1,600 SY.
South apron expansion	11,000 SY.

Source: KSA
Note: Utilities needed are included in estimates above for each improvement. Apron has been included for future reference as part of the alternative analysis.

5.2 Phasing and Capital Improvement Plan

Prioritizing needed improvements is extremely important for airports. Many times the facility needs or wants are much larger than funding and timing will allow to be accomplished in a short amount of time. Given this development plan evaluates a 20-year horizon; emphasis will be put on a strategic prioritization rather than an absolute timeline. This will allow flexibility and understanding by the airport sponsor when making decisions on what should be completed.

Project Schedule

As detailed in the cost estimates, the anticipated funding needed to enact the airport master plan development will be substantial. This is not expected to be completed in a singular time frame and is included in a schedule and phased implementation. With a total of over $16 million in improvements, these must be done incrementally to be financially feasible.

Projects are broken into phases below to help airport and municipal staff prioritize projects and plan accordingly. Certain projects may be shifted into other phases as needed depending on funding priority and user needs over the duration of the planning period.

Short Term - (Current to 5 years)

Projects listed in this phase are considered high priority and will need to be addressed soon after the adoption of the plan. As previously mentioned, this is dependent on funding levels. Apron space is limited and will need to be expanded to accommodate transient aircraft and potential addition of the SEAT aircraft. Fuel Farm upgrades are also a major priority and should be completed during the same period to help full transform the terminal area capabilities. Additionally, hangars are needed immediately. The City of Smithville should focus on gaining local support and justification for the project as soon as feasible to continue momentum.

Mid-Term - (6 to 10 years)

This phase of the plan is usually the most difficult to project. Projects that do not get funded as planned in the first phase can fall into this timeline quite often. However, it is important to keep these in mind as development progresses on the airport to ensure proper sequential development. One key planning consideration is to time the runway rehabilitation with the runway extension project in the short-term timeline. This will allow for a new runway with enhanced capabilities to be constructed in a similar time frame. Maintenance projects such as lighting and marking should also be done concurrently.

Long-Term - (11 to 20 years):

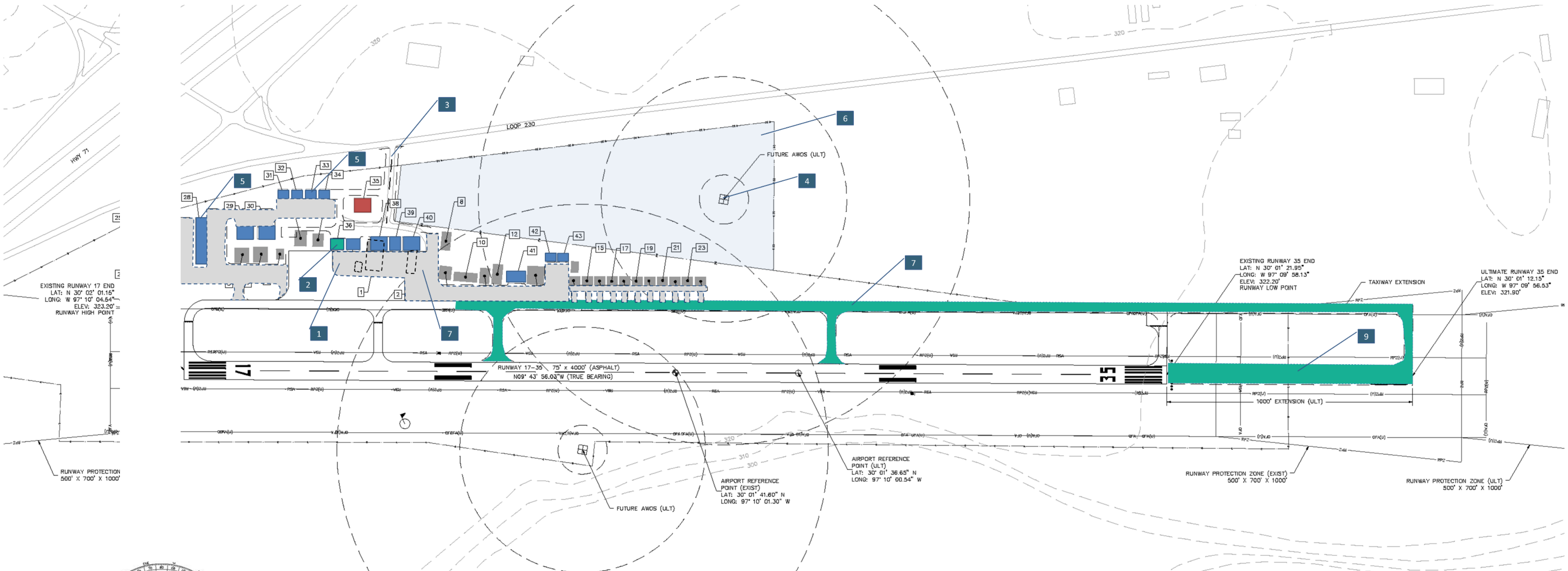
These projects are lumped into a ten year period in the last part of the master plan horizon. These projects tend to be large scale and will include more development given the expected timeline. However, inherently, these projects also provide for the most flexibility as they are far into the future of the airport. Long-term capacity enhancements and development are shown and will be dependent on forecasted demand in the future. Airport mobility will be improved with the addition of the full length parallel taxiway on the east side of the airport and reduce runway crossings for aircraft wishing to get to the terminal area of the airport. Additionally, new apron and hangar development may be needed on both sides of the airport to accommodate new based aircraft and tenant businesses.

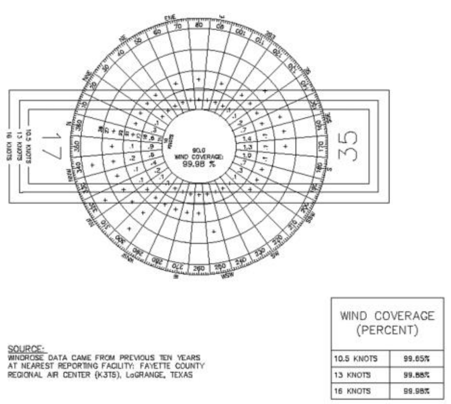
In general, the priorities of the development plan are listed below in **Table 5.2**. CIP priority categories are also depicted in **Figure 5.2** to help identify the location of corresponding projects. The airport should be in communication and coordination with the Texas Department of Transportation Aviation Division staff at the time these are needed.

Table 5.2 Project Priority Ranking

ID	Improvement project	Unit	Timeline	CIP Priority	Estimated Cost	Anticipated Funding Source
1	Engineer/design pavement and construct apron expansion	1,500 SY.	Year 1	Safety/Capacity	$375,000	Federal NPE: $337,500 Local Match: $37,500
	Engineer/construct Jet A fuel system (6,000 gal. tank), engineer/construct new self service 100LL fuel system (6,000 gal. tank), construct dispensing system and card reader	-	Year 1	Upgrade/Capacity	$350,000	City FMAG:$20,000 FMAG: $330,000
	Design vehicle road improvements (realign, repave, construct additional roadways, construct parking areas and paved fuel/ water fill area)	5,600 SY.	Year 1	Safety/Preservation	$560,000	Federal NPE: $262,500 Local Match: $26,250 Ramp Grant: (Match up to $100,000 annually)
	Construct water facilities (above ground tanks, construct facility)	-	Year 1	Upgrade/Capacity	$90,000	City FMAG: $90,000
2	Engineer/design and construct box hangar #6	3,500 SF.	Year 2	Capacity	$525,000	NPE Hangar (90/10)
	Engineer/design and construct single box hangars #7	two-1,200 SF.	Year 2	Capacity	$360,000	NPE Hangar (90/10)
3	Engineer/design pavement and construct north apron	8,900 SY.	Year 3	Standards/Capacity	$1.6 Million	NPE Hangar (90/10)
	Engineer/design and construct t- hangar (8 units)	9,800 SF.	Year 4	Capacity	$1.3 Million	NPE Hangar (90/10)
	Engineer/design and construct T-Hangar (6 units)	7,700 SF.	6-10 Years	Capacity	$1 Million	NPE Hangar (90/10)
4	Install AWOS	-	Year 5	Safety	$200,000	NPE: (75/25)
5	Demolish Hangar #2	2,700 SF.	6-10 Years	Preservation/Capacity	$15,000	NPE
	Engineer/design pavement and construct apron south of FBO	5,000 SY.	6-10 years	Capacity	$900,000	NPE Hangar (90/10)
	Engineer/design and construct Terminal building	2,100 SF.	11-20 Years	Preservation	$315,000	NPE: (50/50)
	Demolish FBO Hangar and pilot lounge	9,500 SF.	11-20 Years	Preservation	$15,000	NPE
	Engineer/design pavement and construct central apron	1,700 SY.	11-20 Years	Capacity	$330,000	NPE Hangar (90/10)
	Engineer/design and construct terminal area box hangars	Two-4,200 SF.	11-20 Years	Capacity	$1.2 Million	NPE Hangar (90/10)
6	Engineer/design pavement and construct Parallel TWY and connector improvements	3,000 total ft. of taxiway length	11-20 Years	Safety/Standards	$3.5 Million	NPE (90/10)
7	Engineer/design pavement and construct east apron construction (provides access to future hangar development)	1,600 SY.	11-20 Years	Capacity	$288,000	NPE Hangar (90/10)
	Engineer/design pavement and construct north box hangars	One- 2,500 SF. One- 3,500 SF.	11-20 Years	Capacity	$380,000	NPE Hangar (90/10)
	Engineer/design and construct east hangars	Two-3,500 SF. box hangars and 4-1,600 SF. single box hangars	11-20 Years	Capacity	$2.1 Million	NPE Hangar (90/10)
8	Land Acquisition	100 Acres	11-20 Years	Capacity	$2 Million	AIP Discretionary
9	Engineer/design and construct Runway 17/35 Extension	1,000 ft.	11-20 Years	Capacity	2.2 Million	NPE (90/10)
10	Engineer/design pavement and construct south apron	11,000 SY.	11-20 Years	Standards	$1.5 Million	NPE Hangar (90/10)

Figure 5.2 Recommended Development Projects





ID	IMPROVEMENT PROJECT	TIMELINE	JUSTIFICATION	ESTIMATED COST	ANTICPATED FUNDING SOURCE
1	Apron Terminal Apron Improvements	Immediate	Safety/Capacity	$375,000	Federal
2	Upgrade/Relocate Fuel Farm (Jet-A system, 100LL system)	Immediate	Upgrade/Capacity	$350,000	Local
3	Vehicle Roadway Improvements	Immediate	Safety/Preservation	$560,000	Federal
4	Install Automated Weather Observation Station (AWOS)	Mid-Term	Safety	$200,000	TxDOT
5	Hangar Development/Apron Improvements	Mid-Term	Capacity	$1.3 Million	TxDOT
6	Land Acquisition	Mid-Term	Capacity	$2 Million	AIP Discretionary
7	Taxiway Extension (3,000 feet)	Long Term	Safety/Standards	$3.5 Million	TxDOT
8	Redevelopment of Terminal Apron	Long Term	Capacity	$288,000	TxDOT
9	Runway Extension (1,000 feet)	Long Term	Capacity	$2.2 Million	Federal

5.3 Funding Sources

This section describes sources and eligibility criteria for funding programs the airport may take advantage of to aid in the funding of future development projects. It is not guaranteed all funding sources will be available and used on airport projects, however lists the general options and funding criteria. During financial implementation of projects at the airport, all funding sources should be evaluated and coordinated with the appropriate funding source for eligibility.

FAA Funding

To promote the development of airports a comprehensive program was established to provide grants for airport under what is now the Airport Improvement Program (AIP). Established by the Airport and Airway Improvement Act of 1982, initial AIP provided funding legislation through fiscal year 1992. Since then, the AIP has been authorized and appropriated on a yearly basis. Funding for this program is generated from a tax on airline tickets, freight waybills, international departure fees, and a tax on aviation fuel. Currently, the approved funding level for AIP is approximately $3.35 Billion.

The FAA issues and administers AIP grants through its regional offices and airport district offices. The AIP provides up to 90 percent funding for AIP eligible project costs, with the airport sponsors being responsible for the remaining 10 percent share. AIP funding must be spent on FAA eligible projects, represented in **Table 5.2**, as defined in FAA Order 5100.38 "Airport Improvement Program (AIP) Handbook." In general, the handbook states:

- An airport must be in the currently approved National Plan of Integrated Airport Systems (NPIAS),
- AIP provides up to 90 percent federal funding for most eligible public-use airport improvements, and
- General aviation terminal buildings, T-hangars, and corporate hangars and other private-use facilities are not eligible for federal funding.

In addition, most revenue-producing items are not typically eligible for federal funding, and all eligible projects must be depicted on an FAA-approved Airport Layout Plan. Other sources of FAA funding include Facilities and Equipment (F&E) funding for facilities such as air traffic control towers and some runway instrumentation. This funding is separate from the AIP program and typically requires no local match. Federal noise funds (Part 150 funds) may also be available for noise mitigation with an 80 percent Federal and a 20 percent State and/or local share.

Table 5.3 Eligible & Ineligible NPE Projects

Eligible Projects	Ineligible Projects
Runways, Taxiways & Aprons	Mowers
Airfield lighting	Debris sweepers
Airport layout plans Environmental Studies	Landscaping
Access roads located on Airport Property	Airport Vehicles (Trucks, cars)
Removing hazards to aviation	Salaries
Drainage Improvements	Office equipment
Fuel farms	Automobile parking lots
Land acquisition for eligible development	Industrial park infrastructure
Tree clearing in runway approaches	Business & marketing plans
Maintenance hangars	Training
T-hangars, Terminals	Exclusive Use Improvements
Weather observation stations (AWOS)	Supplies

State Funding

The Texas Department of Transportation (TxDOT) Aviation Division oversees grant funding for General Aviation and Reliever Airports in the state of Texas, known as a block grant state. Texas is one of 10 Block Grant states that allocate funding on behalf of the FAA. Funding is eligible for cities and counties to obtain and disburse federal and state funds for these airports included in the 300-airport Texas Airport System Plan (TASP).

Aviation Capital Improvement Program (CIP)

The ACIP is a plan for general aviation airport development in Texas. This program details anticipated airport projects based on the projected funding levels of the FAA AIP program and the Texas Aviation Facilities Development Program. This multi-year program is amended annually and designed to give airport sponsors, the FAA, and TxDOT a realistic plan for potential projects including scope, cost, and schedule. However, inclusion of a project in the Aviation CIP is not a commitment for future funding; and will not guarantee that the project will be implemented during the year it is programmed. Continued justification and local sponsor cost share are determining factors in the timely implementation of these projects. Projects identified in the current year will go before the Texas Transportation Commission for approval prior to going out for proposals and funding. Most grant items funded through this program are a 90/10 cost share.

This program will fund the largest share of the airport's capital improvement needs over the duration of the master plan. Airport sponsors should consistently engage TxDOT Aviation staff on airport project needs for consideration in the ACIP.

RAMP Program

TxDOT Aviation Division also administers the Routine Airport Maintenance Program (RAMP), which matches local government grants (50/50) up to $50,000 for basic improvements such as parking lots, fencing, and other airside and landside needs. This program is aimed at assisting airports continue to provide quality services and infrastructure through an annual maintenance basis. Projects that may not be eligible under other funding sources may be used here after other obligations are met. The local government match is 50% of actual costs plus any excess of $100,000 total costs.

This program includes smaller budget airside and landside airport improvements such as:

- construction of airport entrance roads
- pavement of airport public parking lots
- installation of security fencing
- replacement of rotating beacon

TxDOT determines the eligibility of specific items and insists that airside improvements are secure before requesting assistance with landside maintenance and improvements.

Terminal Program

One additional program that TxDOT Aviation provides is specific to general aviation terminal buildings. Many airports across the state are in need of upgrading or new terminal facilities for pilot lounges, FBO facilities, and airport staff administration. This program assists airport sponsors with funding these buildings with a local share of 50% up to a state maximum contribution of $500,000.

Alternative Funding Sources

Often when traditional aviation funding sources are not eligible or have been expended, other local and alternative funding options should be considered. Innovative financial strategies can be evaluated with the support of local elected officials and the general public. In addition to traditional municipal debt services such as general bond elections, other funding sources may be applicable.

Texas Enterprise Fund

The Texas Enterprise Fund (TEF) is the largest fund of its kind in the nation. The fund is used as a final incentive tool for projects that offer significant projected job creation and capital investment and where a single Texas site is competing with another viable out-of-state option. This may be useful in attracting aeronautical companies to the airport from other states that will significantly impact the local and state economy.

State Financing

Texas is committed to facilitating funding for companies and communities with expansion and relocation projects in the state. Asset-based loans for companies, leveraged loans to communities, and tax-exempt bond financing are just a few means of obtaining the capital necessary for a successful project.

Tax Incentives

The state also offers a variety of tax incentives and innovative solutions for businesses expanding in or relocating to Texas. Programs include Enterprise Zone sales tax refunds, manufacturing sales tax exemptions, property tax value limitation, and "freeport" inventory tax exemptions.

Spaceport Trust Fund

The Spaceport Trust Fund is a tool to assist in fostering the growth of the aerospace industry in Texas. This includes job creation, capital investment, and energizing students to pursue an interest in space. The fund is a grant program that assists a spaceport development corporation establishes infrastructure needed to operate a launch facility.

In addition to possible funding sources mentioned above, there are numerous federal programs that assist with workforce and job creation along with research and innovation. Partnerships with area universities and junior colleges may be an exciting way to involve education in the airports development goals.

Federal Emergency Management Agency (FEMA) Single Engine Air Tractor (SEAT) Base Grant

Smithville-Crawford Municipal Airport is eligible for a grant through the Federal Emergency Management Agency Fire Management Assistance Grant Program (F- MAG). If awarded to 84R, eligible funds would be used to establish facilities to accommodate four to six based firefighting aircraft. Grant funds will be allocated toward fuel facility upgrades reflected in the CIP section of this chapter.

Private Interest Funding

Through the course of this study, interest from third parties in developing privately owned hangar facilities have been identified. General aviation airports can benefit from private financing by providing business related benefit to community. Moreover, third party investments may help fund eligible projects that exceed funding assistance from AIP and TxDOT and even help fund airport projects that are not eligible for federal and state funding programs. General aviation airports typically use bank loans to finance smaller terminal area improvements as well as hangar development. Another financing option is to build and lease back to private interest.

In addition to possible funding sources mentioned above, there are numerous federal programs that assist with workforce and job creation along with research and innovation. Partnerships with area universities and junior colleges may be an exciting way to involve education in the airports development goals.

Municipal Debt Financing

In the event alternative funding sources are not available in a timely fashion or other eligibility requirements are not met for capital improvements, municipalities may acquire loans in the form of debt financing. This type of financing is usually in the form of municipal bonds and can be achieved in three ways:

- General Obligation
- Revenue Financing
- Special Assessment

6.0 Airport Layout Plan

As required by the FAA and TxDOT, an Airport Layout Plan set was prepared to graphically depict the airport environs and the subsequent recommendations for development described in this Airport Development Plan. Recommendations for airfield geometry, airspace and obstructions, landside development are described in the following set of 4 plan sheets:

1. Cover Sheet
2. Airport Layout Drawing
3. Inner Portion of the Approach Surface Drawing 17
4. Inner Portion of the Approach Surface Drawing 35

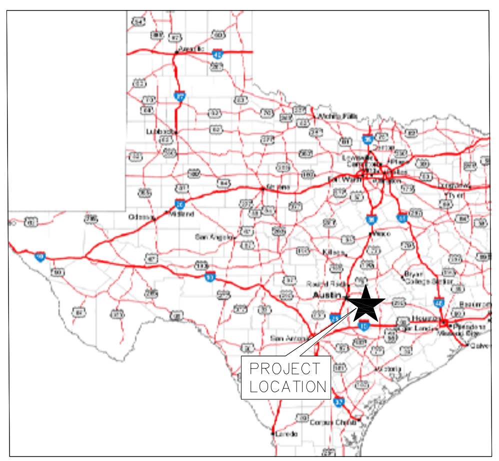
The drawing set was prepared according with FAA Advisory Circular 150/5070 6B and TxDOT Aviation Division standards.

AIRPORT LAYOUT PLAN

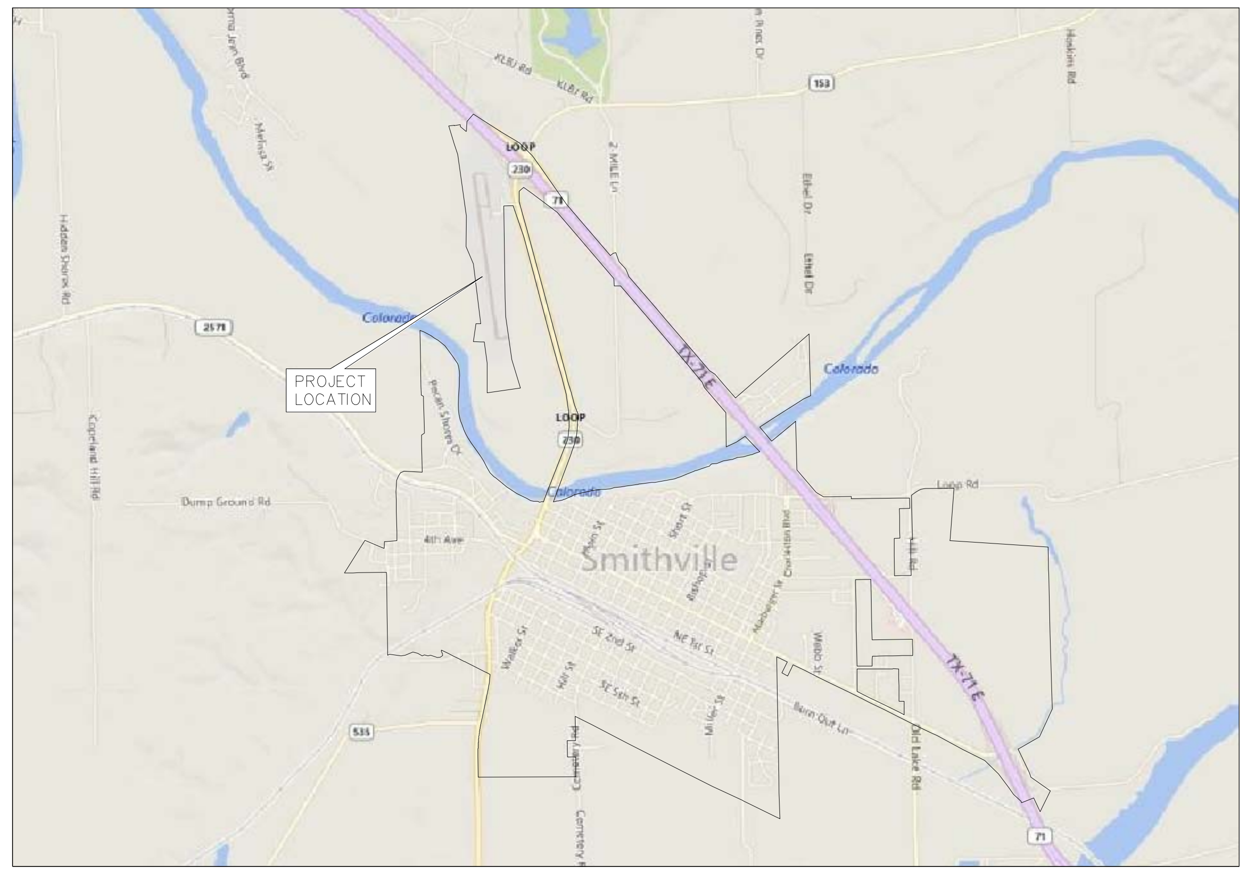
FOR

SMITHVILLE CRAWFORD MUNICIPAL AIRPORT

SMITHVILLE, TEXAS



VICINITY MAP



LOCATION MAP

SHEET INDEX	
NO.	TITLE
1	TITLE SHEET
2	AIRPORT LAYOUT DRAWING
3	INNER PORTION OF THE APPROACH SURFACE DRAWING – RUNWAY 17
4	INNER PORTION OF THE APPROACH SURFACE DRAWING – RUNWAY 35

MAYOR
SCOTT SAUNDERS, JR.

CITY COUNCIL
BENNIE ROOKS
RHONDA JANAK
WILLIAM GORDON
JOANNA MORGAN
TROY STREUER

CITY MANAGER
ROBERT TAMBLE

AIRPORT MANAGER
ROBERT TAMBLE

TEXAS DEPARTMENT OF TRANSPORTATION
AVIATION DIVISION

ALP APPROVED ACCORDING TO FAA AC 150/5300–13 CHANGE 18 PLUS THE REQUIREMENTS OF A FAVORABLE ENVIRONMENTAL FINDING AND FAA NRA STUDY PRIOR TO THE START OF ANY LAND ACQUISITION OR CONSTRUCTION ON AIRPORT PROPERTY.

DAVID FULTON, DIRECTOR, AVIATION DIVISION — DATE

AIRPORT SPONSOR

CURRENT AND FUTURE DEVELOPMENT DEPICTED ON THIS ALP IS APPROVED AND SUPPORTED BY AIRPORT SPONSOR

SPONSOR ACKNOWLEDGES APPROVAL OF ALP BY TXDOT DOES NOT CONSTITUTE A COMMITMENT TO FUNDING.

SIGNATURE — DATE

TITLE, AIRPORT SPONSOR'S REPRESENTATIVE

PREPARED BY:

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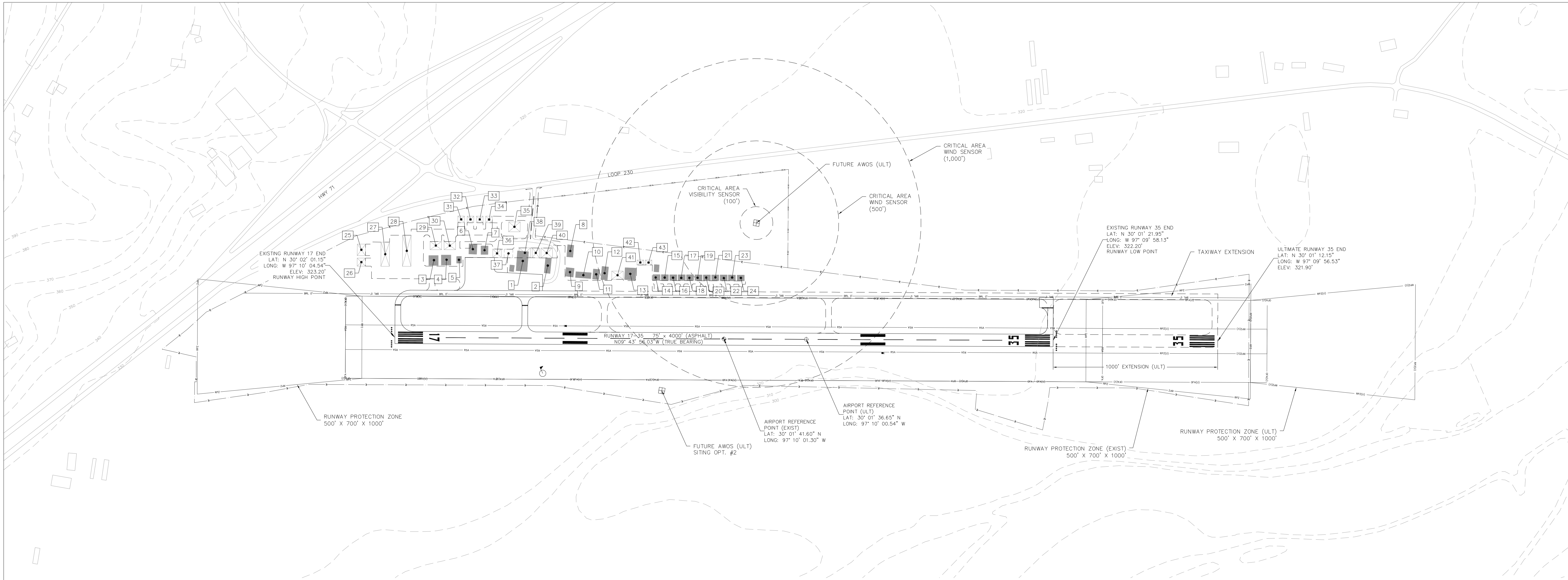
MICHAEL MALLONEE — OCTOBER 2016
DESIGNED BY — DATE

JANET PENNINGTON — OCTOBER 2016
DRAWN BY — DATE

COVER SHEET
SMITHVILLE CRAWFORD MUNICIPAL
SMITHVILLE, TEXAS (84R)

Texas Department of Transportation
Aviation Division



BUILDING TABLE

BUILDING NUMBER	DESCRIPTION EXISTING	DESCRIPTION ULTIMATE	TOP ELEVATION	BUILDING NUMBER	DESCRIPTION EXISTING	DESCRIPTION ULTIMATE	TOP ELEVATION	BUILDING NUMBER	DESCRIPTION EXISTING	DESCRIPTION ULTIMATE	TOP ELEVATION	BUILDING NUMBER	DESCRIPTION EXISTING	DESCRIPTION ULTIMATE	TOP ELEVATION
1	FBO HANGAR/OFFICE	–	339'	14	HANGAR	–	341'	27	–	HANGAR	–	40	–	HANGAR	–
2	HANGAR	–	340'	15	HANGAR	–	UNKNOWN	28	–	HANGAR	–	41	–	HANGAR	–
3	HANGAR	–	342'	16	HANGAR	–	UNKNOWN	29	–	HANGAR	–	42	–	HANGAR	–
4	HANGAR	–	UNKNOWN	17	HANGAR	–	UNKNOWN	30	–	HANGAR	–	43	–	HANGAR	–
5	HANGAR	–	UNKNOWN	18	HANGAR	–	UNKNOWN	31	–	HANGAR	–				
6	HANGAR	–	UNKNOWN	19	HANGAR	–	UNKNOWN	32	–	HANGAR	–				
7	HANGAR	–	UNKNOWN	20	HANGAR	–	UNKNOWN	33	–	HANGAR	–				
8	HANGAR	–	UNKNOWN	21	HANGAR	–	–	34	–	HANGAR	–				
9	HANGAR	–	339'	22	HANGAR	–	–	35	–	RESTAURANT	–				
10	HANGAR	–	337'	23	HANGAR	–	–	36	–	WATER LOCATION	–				
11	HANGAR	–	334'	24	HANGAR	–	–	37	–	FUEL LOCATION	–				
12	HANGAR	–	337'	25	–	HANGAR	–	38	–	HANGAR	–				
13	HANGAR	–	346'	26	–	HANGAR	–	39	–	TERMINAL BLDG	–				

ALD LEGEND

FEATURE	EXISTING	ULTIMATE
RUNWAY/TAXIWAY OUTLINE		
RUNWAY/TAXIWAY TO BE REMOVED		
BUILDINGS/FACILITIES		
AIRPORT PROPERTY LINE		
AIRPORT PROPERTY LINE w/FENCE		
FENCE LINE		
BUILDING RESTRICTION LINE (BRL)		
AIRPORT REFERENCE POINT		
WIND CONE & SEGMENTED CIRCLE		
THRESHOLD LIGHTS		
RW END IDENTIFIER LIGHTS (REILS)		
C&G BEACON		
VGSI		
HOLD POSITION AND SIGN		
ASOS/AWOS		
PACS AND SACS MARKERS		
GROUND CONTOURS		
SIGNIFICANT OBJECT LOCATION		
TREES/BRUSH		
NONDIRECTIONAL BEACON (NDB)		

RUNWAY END COORDINATES AND ELEVATIONS

RUNWAY END	LATITUDE	LONGITUDE	ELEVATION
EXISTING END OF RWY 17	30°02'01.15" N	97°10'04.54" W	323.2'
ULTIMATE END OF RWY 17	30°02'01.15" N	97°10'04.54" W	323.2'
EXISTING END OF RWY 35	30°01'21.95" N	97°09'58.13" W	322.2'
ULTIMATE END OF RWY 35	30°01'12.15" N	97°09'56.53" W	321.9'

AIRPORT DATA TABLE

	EXISTING	ULTIMATE
AIRPORT ELEVATION (MSL)	323.20'	323.20'
AIRPORT NAVIGATION AIDS	NONE	NONE
MEAN MAX TEMP (Hottest Month °F)	98°F	98°F
AIRPORT REFERENCE CODE (ARC)	B-II	B-II
TAXIWAY MARKING	STD W/ ℄ REF	STD W/ ℄ REF
TAXIWAY LIGHTING	NONE	NONE
AIRPORT REFERENCE POINT COORDINATES	30°01'41.60" N	30°01'36.65" N
	97°10'01.30" W	97°10'00.54" W

NOTES

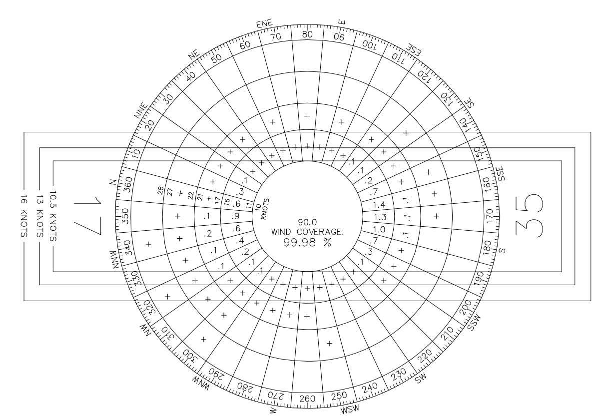
DATUM COORDINATE SYSTEMS – HORIZONTAL DATUM NAD 1983 State Plane Texas, VERTICAL DATUM NAVD88.

NO OFZ OBJECT PENETRATIONS

A VERTICALLY-GUIDED SURVEY WAS COMPLETED MEETING THE REQUIREMENTS OF AC 150/5300-16, 17, AND 18.

RUNWAY DATA TABLE

	RW 17-35 EXISTING		RW 17-35 ULTIMATE	
RUNWAY ARC	B-II		B-II	
DESIGN AIRCRAFT & ARC	KING AIR B200		KING AIR B200	
RUNWAY LENGTH & WIDTH (ft.)	4000' X 75'		5000' X 75'	
PAVEMENT DESIGN STRENGTH (1000 lbs.)	12.5 SW		12.5 SW	
RUNWAY LIGHTING	MIRL		MIRL	
PERCENT EFFECTIVE GRADIENT	0.03%		0.03%	
PERCENT WIND COVERAGE	99.98%		99.98%	
MAXIMUM ELEVATION ABOVE MSL	323.20'		323.20'	
RW SURFACE TYPE	ASPH		ASPH	
RSA – LENGTH BEYOND RW END	300'		300'	
RSA – WIDTH	150'		150'	
OFA – LENGTH BEYOND RW END	300'		300'	
OFA WIDTH	500'		500'	
OFZ – LENGTH BEYOND RW END	200'		200'	
OFZ WIDTH	400'		400'	
RUNWAY END	17	35	17	35
APPROACH TYPE	VISUAL	VISUAL	GPS	GPS
APPROACH VISIBILITY MINIMA	VISUAL	VISUAL	1-MILE	1 MILE
THRESHOLD SITING SURFACE & SLOPE	#2 20:1	#2 20:1	#5 20:1	#5 20:1
RUNWAY MARKING	NPI	NPI	NPI	NPI
RUNWAY VISUAL AIDS	PVASI	PVASI	PVASI	PVASI
TOUCHDOWN ZONE ELEVATION	323.20'	322.80'	323.20'	322.50'
FAR PART 77 APPROACH CATEGORY	A(V)	A(V)	C	C
FAR PART 77 APPROACH SURFACE SLOPE	20:1	20:1	34:1	34:1
TAKE-OFF RUN AVAILABLE (TORA)	4000'	4000'	5000'	5000'
TAKE-OFF DISTANCE AVAILABLE (TODA)	4000'	4000'	5000'	5000'
ACCELERATE STOP DISTANCE AVAIL. (ASDA)	4000'	4000'	5000'	5000'
LANDING DISTANCE AVAILABLE (LDA)	4000'	4000'	5000'	5000'



SOURCE:
WINDROSE DATA CAME FROM PREVIOUS TEN YEARS AT NEAREST REPORTING FACILITY: FAYETTE COUNTY REGIONAL AIR CENTER (K3T5), LaGRANGE, TEXAS

WIND COVERAGE (PERCENT)	
10.5 KNOTS	99.65%
13 KNOTS	99.88%
16 KNOTS	99.98%

MAGNETIC DECLINATION 2016-10-12 3°39.00 E
CHANGING 7.2'W PER YEAR
TRUE NORTH

300' 0 300' 600'
GRAPHIC SCALE IN FEET

TEXAS DEPARTMENT OF TRANSPORTATION
AVIATION DIVISION

ALP APPROVED ACCORDING TO FAA AC 150/5300-13 CHANGE 18 PLUS THE REQUIREMENTS OF A FAVORABLE ENVIRONMENTAL FINDING AND FAA NRA STUDY PRIOR TO THE START OF ANY LAND ACQUISITION OR CONSTRUCTION ON AIRPORT PROPERTY.

DAVID FULTON, DIRECTOR, AVIATION DIVISION DATE

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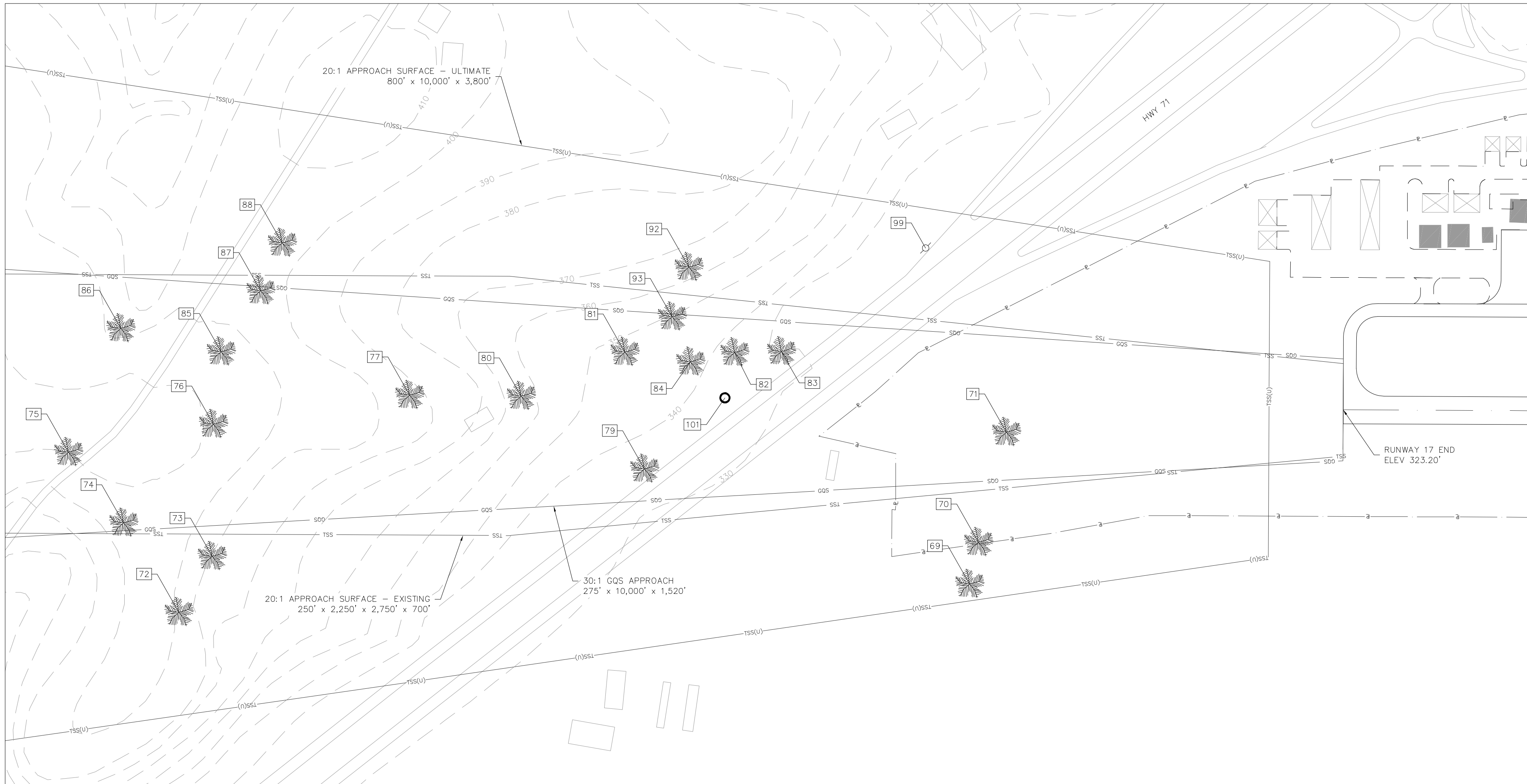
MICHAEL MALLONEE — OCTOBER 2016
DESIGNED BY — DATE

JANET PENNINGTON — OCTOBER 2016
DRAWN BY — DATE

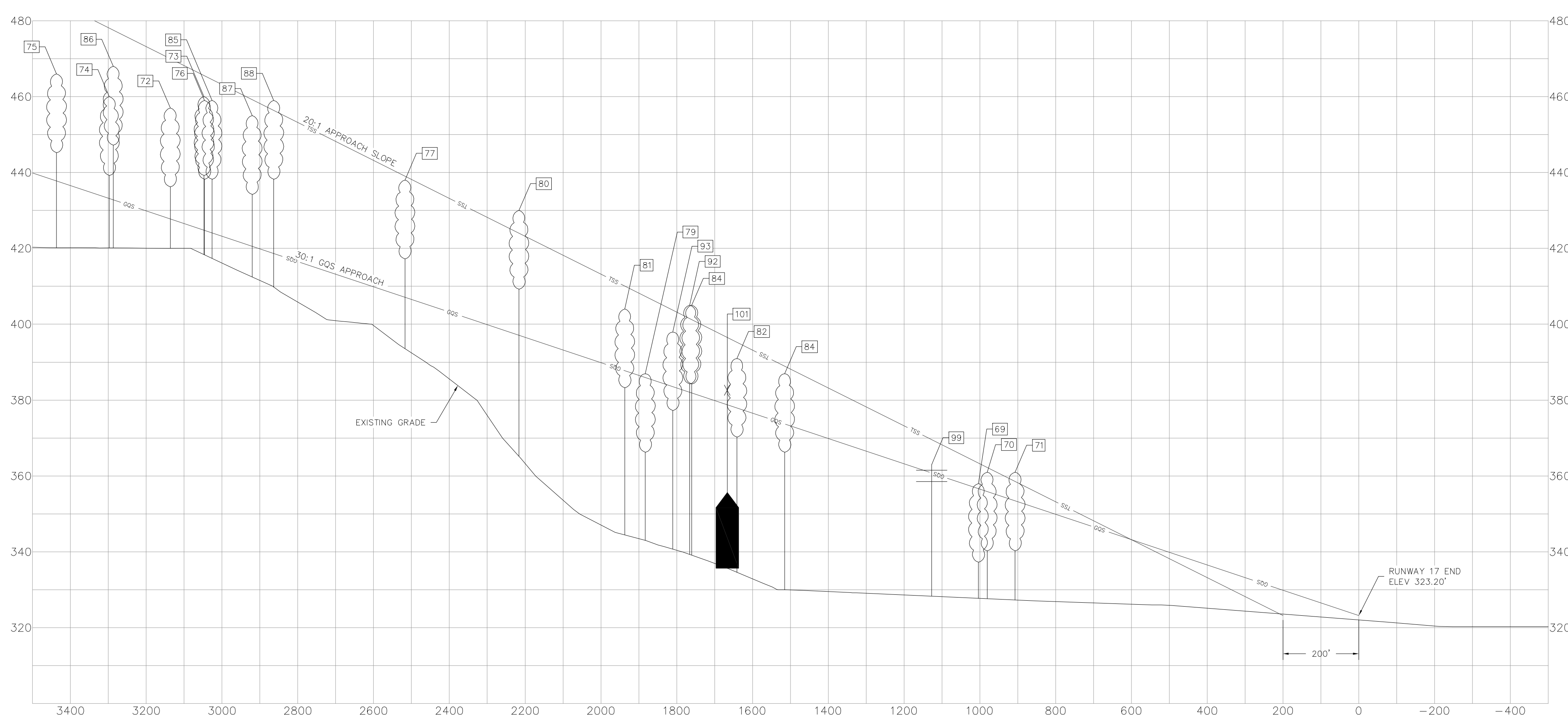
AIRPORT LAYOUT DRAWING
SMITHVILLE CRAWFORD MUNICIPAL
SMITHVILLE, TEXAS (84R)

Texas Department of Transportation
Aviation Division



RWY 17 OBSTRUCTION TABLE									
No.	Object Description	Latitude (N)	Longitude (W)	Distance fm RW end	Offset fm RW C/L*	Top Elevation**	Amt of Penetration (TSS)	Amt of Penetration (GQS)	REMEDIATION
69	TREE	30°02'10.34"	97°10'11.51"	1005'	475' R	358.00'	CLEAR	1.3'	
70	TREE	30°02'10.27"	97°10'10.20"	982'	362' R	361.00'	CLEAR	5.1'	
71	TREE	30°02'09.96"	97°10'06.73"	908'	65' R	361.00'	2.5'	7.6'	LOWER TREE
72	TREE	30°02'31.12"	97°10'15.90"	3138'	562' R	457.00'	CLEAR	29.3'	
73	TREE	30°02'30.46"	97°10'14.05"	3049'	410' R	460.00'	CLEAR	35.2'	
74	TREE	30°02'32.93"	97°10'13.43"	3289'	321' R	468.00'	CLEAR	26.9'	
75	TREE	30°02'34.66"	97°10'11.53"	3438'	131' R	466.00'	CLEAR	28.2'	
76	TREE	30°02'30.94"	97°10'10.03"	3048'	53' R	459.00'	CLEAR	34.3'	
77	TREE	30°02'25.87"	97°10'08.27"	2519'	28' L	438.00'	2.6'	30.9'	LOWER TREE
79	TREE	30°02'19.38"	97°10'09.46"	1884'	168' R	387.00'	CLEAR	1.0'	
80	TREE	30°02'22.92"	97°10'07.80"	2218'	27' L	430.00'	6.0'	32.9'	LOWER TREE
81	TREE	30°02'20.35"	97°10'06.00"	1938'	147' L	404.00'	CLEAR	16.2'	
82	TREE	30°02'17.45"	97°10'05.52"	1642'	147' L	391.00'	CLEAR	13.1'	
83	TREE	30°02'16.22"	97°10'05.28"	1516'	151' L	387.00'	CLEAR	13.3'	
84	TREE	30°02'18.58"	97°10'06.00"	1761'	121' L	405.00'	3.8'	23.1'	LOWER TREE
85	TREE	30°02'31.02"	97°10'07.79"	3028'	143' L	459.00'	CLEAR	34.9'	
86	TREE	30°02'33.76"	97°10'07.53"	3299'	204' L	460.00'	CLEAR	35.2'	
87	TREE	30°02'30.21"	97°10'05.76"	2922'	308' L	455.00'	CLEAR	34.5'	
88	TREE	30°02'29.83"	97°10'04.21"	2864'	437' L	459.00'	CLEAR	40.4'	
92	TREE	30°02'18.99"	97°10'03.13"	1767'	377' L	405.00'	3.5'	22.9'	LOWER TREE
93	TREE	30°02'19.24"	97°10'04.71"	1811'	243' L	398.00'	CLEAR	14.5'	
99	POWER POLE	30°02'12.81"	97°10'01.49"	1128'	432' L	363.00'	CLEAR	2.2'	
101	ANTENNA ON BLDG	30°02'17.53"	97°10'06.94"	1668'	25' L	384.00'	CLEAR	5.3'	

* OFFSETS FROM CENTERLINE ARE DESCRIBED RIGHT OR LEFT OF THE RUNWAY CENTERLINE AS SEEN BY A PILOT APPROACHING THE RUNWAY TO LAND
** ELEVATIONS ADJUSTED UPWARD 15' FOR PUBLIC ROADWAY, 17' FOR INTERSTATE HIGHWAY, 23' FOR RAILROADS



200' 0 200' 400'
GRAPHIC SCALE IN FEET

TEXAS DEPARTMENT OF TRANSPORTATION
AVIATION DIVISION

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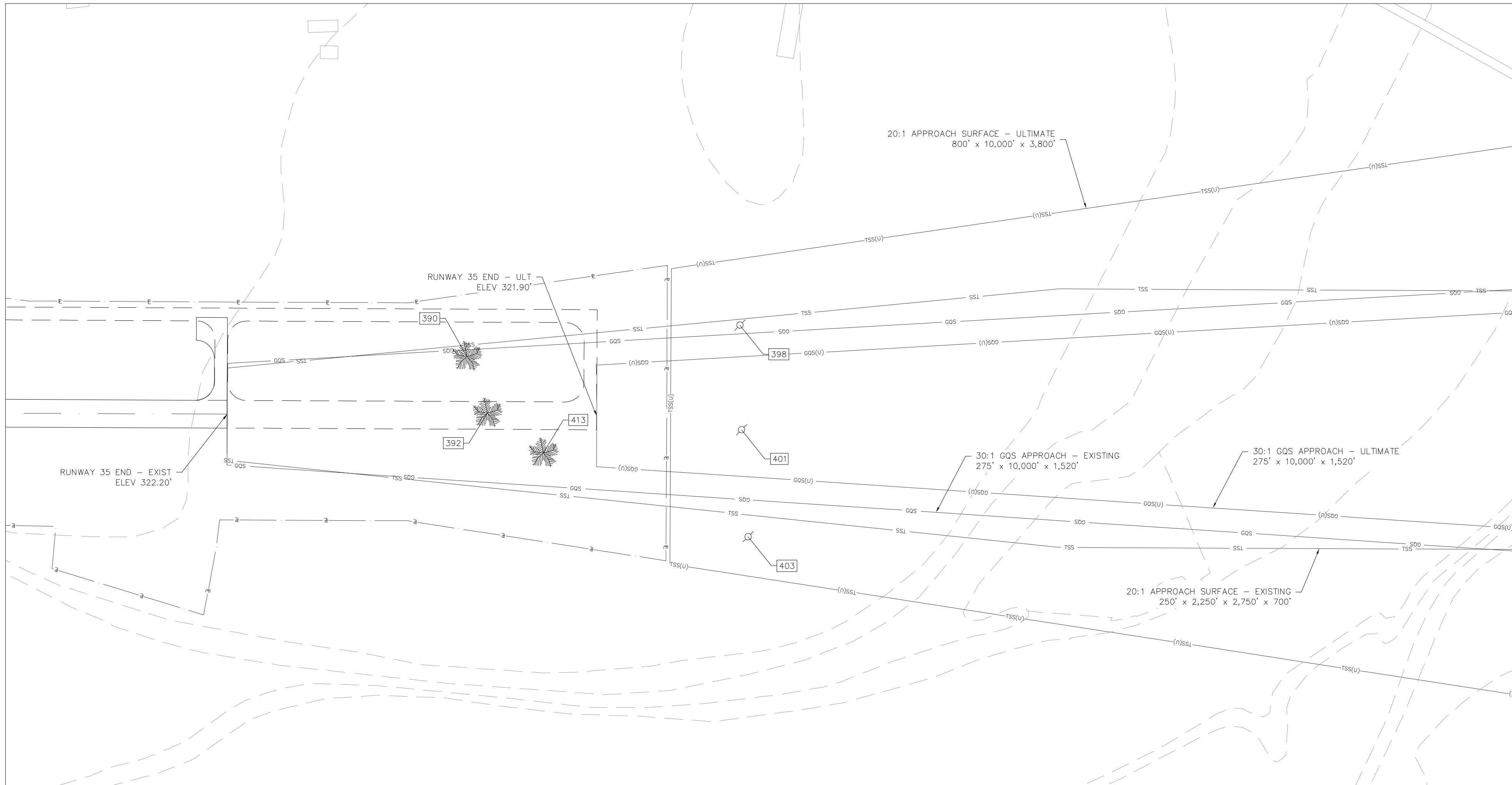
MICHAEL MALLONEE   OCTOBER 2016
DESIGNED BY   DATE

JANET PENNINGTON   OCTOBER 2016
DRAWN BY   DATE

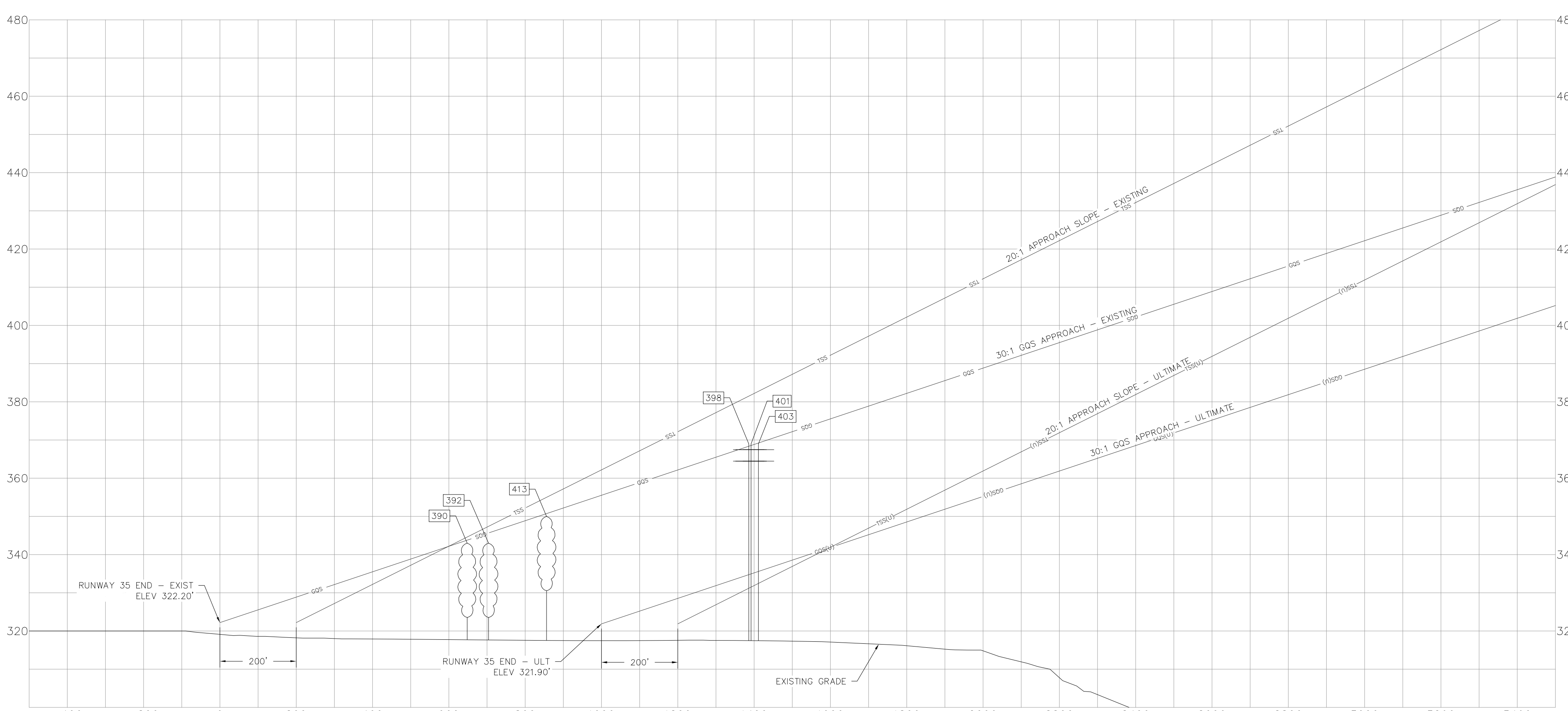
IPASD RWY 17
SMITHVILLE CRAWFORD MUNICIPAL
SMITHVILLE, TEXAS (84R)

Texas Department of Transportation
Aviation Division



RWY 35 OBSTRUCTION TABLE											
No.	Object Description	Latitude (N)	Longitude (W)	Distance fm RW end EX/ULT	Offset fm RW C/L*	Top Elevation**	Amt of Penetration (TSS)–EX	Amt of Penetration (GQS)–EX	Amt of Penetration (TSS)–ULT	Amt of Penetration (GQS)–ULT	REMEDIATION
390	TREE	30°01'15.82"	97°0955.30"	649'/–351'	159' R	343.00'	CLEAR	CLEAR	25.3'	25.3'	
392	TREE	30°01'15.06"	97°09'56.93"	704'/–296'	7' R	343.00'	CLEAR	CLEAR	25.3'	25.3'	
398	POWER POLE	30°01'08.71"	97°09'53.12"	1387'/387'	248' R	369.00'	CLEAR	0.6'	34.2'	37.8'	RUNWAY EXTENSION – BURY LINES
401	POWER POLE	30°01'08.26"	97°09'56.30"	1392'/392'	36' L	369.00'	CLEAR	0.4'	34.0'	37.5'	RUNWAY EXTENSION – BURY LINES
403	POWER POLE	30°01'07.67"	97°09'59.53"	1411'/411'	325' L	369.00'	CLEAR	CLEAR	33.4'	36.5'	RUNWAY EXTENSION – BURY LINES
413	TREE	30°01'13.42"	97°09'57.90"	856'/–144'	101' L	350.00'	CLEAR	CLEAR	32.4'	32.4'	

* OFFSETS FROM CENTERLINE ARE DESCRIBED RIGHT OR LEFT OF THE RUNWAY CENTERLINE AS SEEN BY A PILOT APPROACHING THE RUNWAY TO LAND
** ELEVATIONS ADJUSTED UPWARD 15' FOR PUBLIC ROADWAY, 17' FOR INTERSTATE HIGHWAY, 23' FOR RAILROADS



200' 0 200' 400'
GRAPHIC SCALE IN FEET

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AVIATION DIVISION

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MICHAEL MALLONEE — OCTOBER 2016
DESIGNED BY — DATE

JANET PENNINGTON — OCTOBER 2016
DRAWN BY — DATE

IPASD RWY 35
SMITHVILLE CRAWFORD MUNICIPAL
SMITHVILLE, TEXAS (84R)

Texas Department of Transportation
Aviation Division

Appendix A – SEAT Base Requirements

This evaluation was conducted separately from the Airport Development Plan but has been considered in the requirements outlined for airport development.

Memorandum

Airport: Smithville Municipal Airport **Date:** June 16, 2016

Project: Evaluation of Facility Requirements to Provide a SEAT Base at Smithville Municipal Airport

KSA Project No.: SMV.003

It has been determined that firefighting capabilities should be provided for Bastrop and surrounding counties. Smithville Airport (84R) was approached regarding the formation of a Single-Engine Airtankers (SEATs) base. SEAT aircraft are small, fixed-wing aircraft (Air Tractor AT-802) that can carry up to 800 gallons of fire retardant to support firefighters. SEATs based at 84R will be responsible for supporting wildfires within a 200-mile radius of the airport. The SEAT base facilities will need to be sufficient to support up to six Air Tractors.

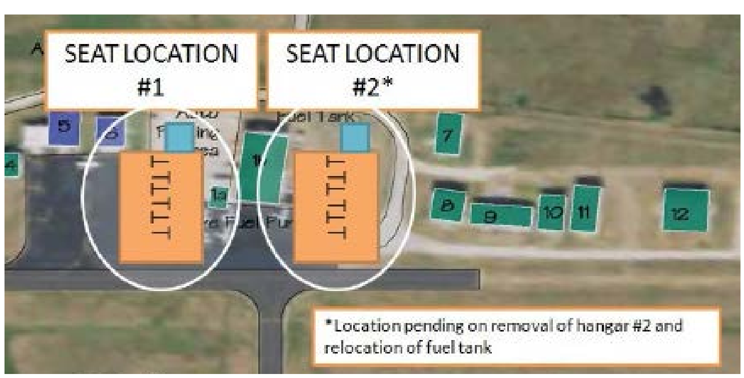
The City of Smithville is interested in providing fire support; however, in its current state, 84R does not have sufficient apron space for aircraft storage and does not have a water supply that meets the SEAT base requirements of 250 gallons per minutes. At present, 84R uses a well system that does not provide sufficient flow to support the requirements of SEAT aircraft.

The following sections provide alternatives that could be employed to meet the SEAT base requirements.

Apron Improvements

Apron area will need to be increased to support a SEAT base at 84R. The additional based aircraft need to be parked on paved tie-down spaces with quick access to both water and the airfield. As referenced in AC 150/5300-13A, *Airport Design*, the recommended apron space needed to park six based aircraft is 1,800 square yards (300 sq. yards per aircraft). Depending on the location of the apron expansion, a taxilane may need to be built in order to access the SEAT parking area. Apron space will also need to accommodate water filling access and water support facilities. Up to six tie-down spaces will need to be painted on the apron.

The image below depicts the alternative that effectively meets these requirements. Preliminary cost estimates for this apron configuration are $324,000. These improvements would be eligible for grant monies from the TxDOT Aviation Division; however, the timing of such funds would need to be discussed as many funds are already programmed for FY16 and FY17.



Hangar Storage

Hangar storage space for SEAT aircraft and fire retardant is recommended for protection during inclement weather. Storage area to accommodate up to four Air Tractor AT-802's with additional storage capacity for fire retardant requires approximately a 4,500 square foot hangar. Restroom and office facilities may also be required to support crew members during firefighting missions. Preliminary cost estimates for this storage hangar are shown below.

Preliminary Probable Construction Cost ($150/sq. ft.)		$675,000
Engineering Costs & Contingencies	*10.0%*	$67,500
Total Construction with Engineering		$742,500

Fuel Facilities

In order to accommodate the Air Tractor AT-802, Jet fuel (JET A) will need to be supplied at the airport. In addition, the existing 100LL self-service dispenser needs to be replaced. It is recommended that the 100LL and Jet A storage tanks be collocated to provide one fueling area on the airport. This will require the relocation of the existing fuel storage tank. The cost for new fuel storage tanks, self serve fuel pumps, and associated utilities are included in the cost estimate below. This estimate does not include the removal of the existing fuel tank.

Preliminary Probable Costs for Fuel Farm, Fuel Pump, and Utilities ($150/sq. ft.)	$350,000

Water Source Improvements

A number of options were evaluated to establish a reliable source of water to the airport. Each of the water supply options were analyzed in regards to feasibility and probable cost. The options include:

1. A connection to the Aquanet water system
2. A connection to City Water System in front of the VFW
3. Improve the current well system at 84R
4. Provide an above ground storage tank capable of providing the necessary water quantity and flow.

Connection to Aqua Water System

The feasibility of this option is unknown. Aqua Water will need to complete a Fire Flow Study to determine if they will be able to provide water to the Airport for fire protection. The estimate above includes the cost of this study by Aqua Water.

If Aqua Water is able to provide water for fire protection to the Airport, a substantial part of the project would be completed by Aqua Water and their consultants/contractor. They will develop their own cost estimate in the Fire Flow Study which may vary from KSA's estimate. Estimated costs does not include meter maintenance fee charged by Aqua Water. This fee is set by Aqua Water based on size of water meter.

Finally, the estimate includes a necessary bore under SH 71 which is a significant portion of the construction cost.

Preliminary Opinion of Probable Construction Cost		$285,000
Construction Contingencies	*20.0%*	$57,000
Total Construction with Contingencies		$342,000
Non-Construction Costs (Survey, Engineering, and Administrative)		$86,000
Preliminary Opinion of Probable Project Cost		$428,000

Connection to City Water System

A hydraulic analysis of the City's water system will likely need to be completed to verify that water to the Airport can be provided for at the rates needed. The cost of the analysis depends on what modeling has already been completed for the City. If an accurate and up-to-date water model is already completed, the water service connection to the Airport can be studied within the estimated costs shown here. If not, additional costs would apply. The cost estimate below includes approximately 6,000 linear feet of water line along SH 95 which is the significant portion of the construction cost.

Preliminary Opinion of Probable Construction Cost		$470,000
Construction Contingencies	*20.0%*	$94,000
Total Construction with Contingencies		$564,000
Non-Construction Costs (Survey, Engineering, and Administrative)		$141,000
Preliminary Opinion of Probable Project Cost		$705,000

Well Site Improvements

Currently the airport utilizes an on-site well to provide basic water service to the airport. It is anticipated the well pump will need to be upgraded to provide the 250 gpm required for the fire service. The cost of this evaluation is included in the cost estimate.

If not already, it is recommended that this site become a public water supply since it is serving public Airport facilities. Needed improvements to meet public water requirements include a chlorination station and a pressure tank.

The estimate below includes an above ground storage tank to ensure necessary water supply. Depending on the application and setup, the ground storage tank may be removed which would reduce the estimate by $90,000.

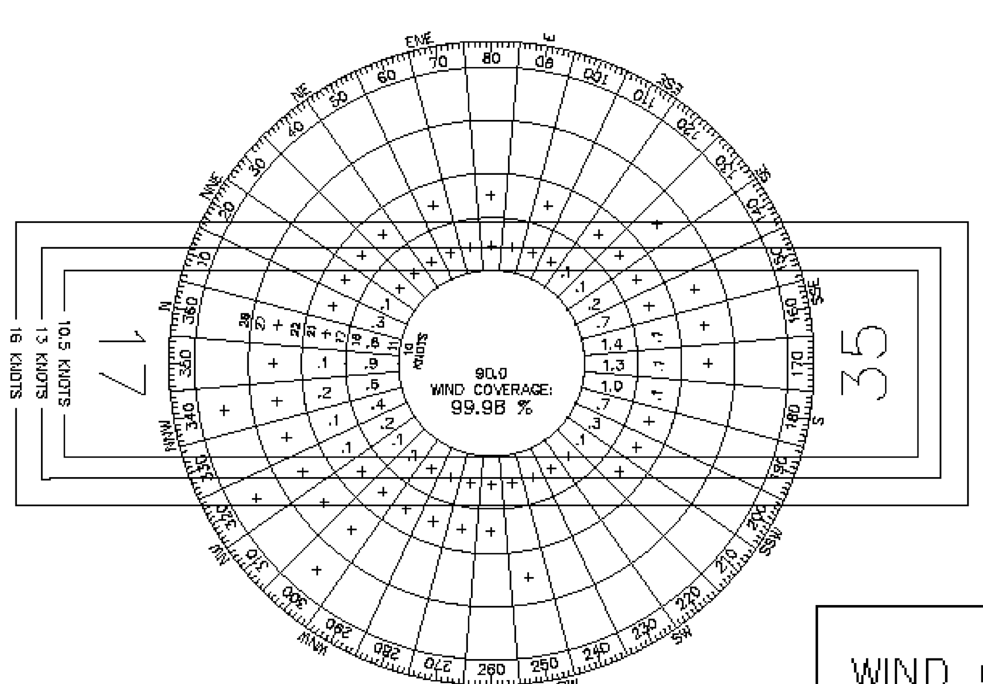
Preliminary Opinion of Probable Construction Cost		$470,000
Construction Contingencies	*20.0%*	$94,000
Total Construction with Contingencies		$564,000
Non-Construction Costs (Survey, Engineering, and Administrative)		$141,000
Preliminary Opinion of Probable Project Cost		$705,000

Above Ground Storage Tank

The final option provides for an above ground water storage tank that would be filled to meet the needs of the SEAT base. This option is the least costly; however, it does not have the additional benefit of improved water service to the airport. The cost of the water tank is estimated to be $90,000 and site preparation is estimated at $20,000.

Appendix B – Outreach Posters

Recommended Development Concept



SOURCE:
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WIND COVERAGE (PERCENT)	
10.5 KNOTS	99.65%
13 KNOTS	99.88%
16 KNOTS	99.98%

ID	IMPROVEMENT PROJECT	TIMELINE	JUSTIFICATION	ESTIMATED COST	FUNDING SOURCE
1	Terminal Area Apron Improvements	Immediate	Safety/Capacity	$375,000	Federal
2	Upgrade/Relocate Fuel Farm (100LL, Jet A)	Immediate	Upgrade/Capacity	$350,000	State
3	Vehicle Roadway Improvements	Immediate	Safety/Preservation	$560,000	Local
4	Install Automated Weather Observation Station (AWOS)	Mid-Term	Safety	$200,000	State
5	Hangar Development/Apron Improvements	Mid-Term	Capacity	$1.3 Million	Local/State
6	Possible Land Acquisition/Easement	Mid-Term	Capacity	$2 Million	Local
7	Taxiway Extension (3,000 feet)	Long Term	Safety/Standards	$3.5 Million	Federal
8	Redevelopment of Terminal Apron	Long Term	Capacity	$288,000	Federal
9	Runway Extension (1,000 feet)	Long Term	Capacity	$2.2 Million	Federal

SMITHVILLE
TEXAS

SMITHVILLE CRAWFORD MUNICIPAL AIRPORT
DEVELOPMENT PLAN

The TxDOT Aviation Division oversees grant funding for General Aviation airports in the state of Texas, known as a block grant state. Funding is eligible for cities and counties to obtain and disburse federal and state funds for these airports included in the 300-airport Texas Airport System Plan (TASP). Most grant items funded through this program are a 90/10 cost share and Smithville-Crawford Airport is eligible for Federal Non-Primary Entitlement funding that is allocated at $150,000 per year.

November 2016

Airport Growth Opportunities

KSA
A·DYNAMIC·PERSPECTIVE

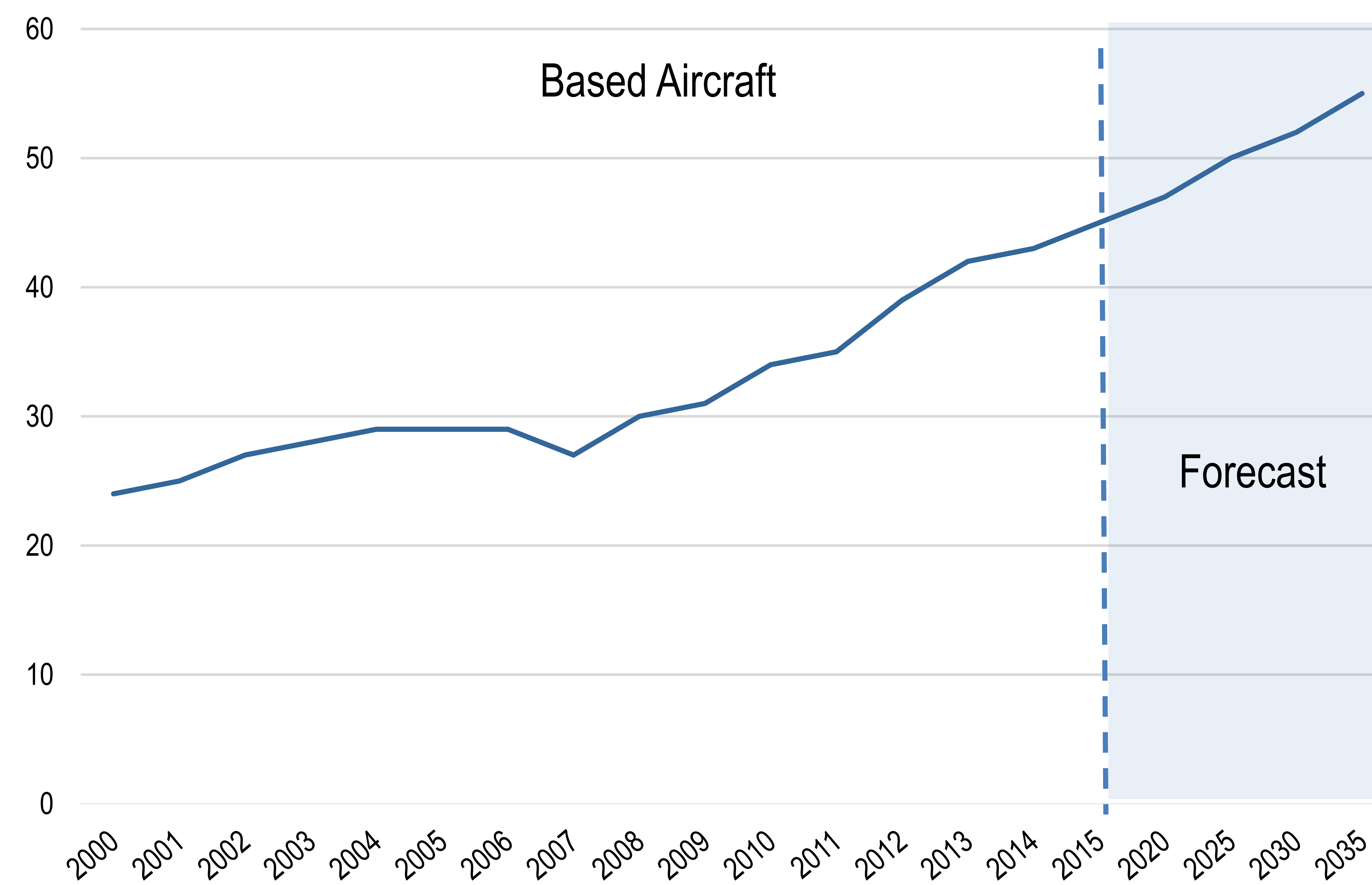
Automated Weather Observation System (AWOS)
Safety Enhancement – AWOS report weather conditions for pilots such as barometric pressure, altimeter settings, visibility, sky conditions and precipitation.

Fuel Upgrades
Critical Facilities – Updates to the fuel pump, relocation of existing fuel farm, and addition of jet fuel may increase revenue while providing service for firefighting and other aeronautical activities within the region.

Hangar Development
Revenue Opportunity – Additional hangar development is in demand within Bastrop County as aircraft storage is limited. Increased hangar capacity at the airport could generate steady revenue for the city.

Navigation Enhancements
Safety – Satellite based navigation helps the pilot approach the airport and land safely during inclement weather. Currently, no approach capabilities exist at the airport. A GPS (RNAV) approach with no less than one mile visibility minimums would greatly enhance safety and accessibility.

Runway and Taxiway Enhancements
Safety and flow – Direct runway access from a ramp or apron presents the increased likelihood of dangerous runway incursions. Omission of this potential hazard as well as an extension of the current taxiway to full parallel will enhance safety and flow of aircraft activity.



- A projected growth rate of 1% CAGR falls within an acceptable range of other FAA forecast categories – hours flown and active pilots.
- This methodology is consistent with the growth of itinerant operations experienced at the airport over the past 15 years.
- Based on local economic opportunity and proximity to Austin, this methodology represents growth of the number of based aircraft at Smithville, some of which may come from other, more congested airports.

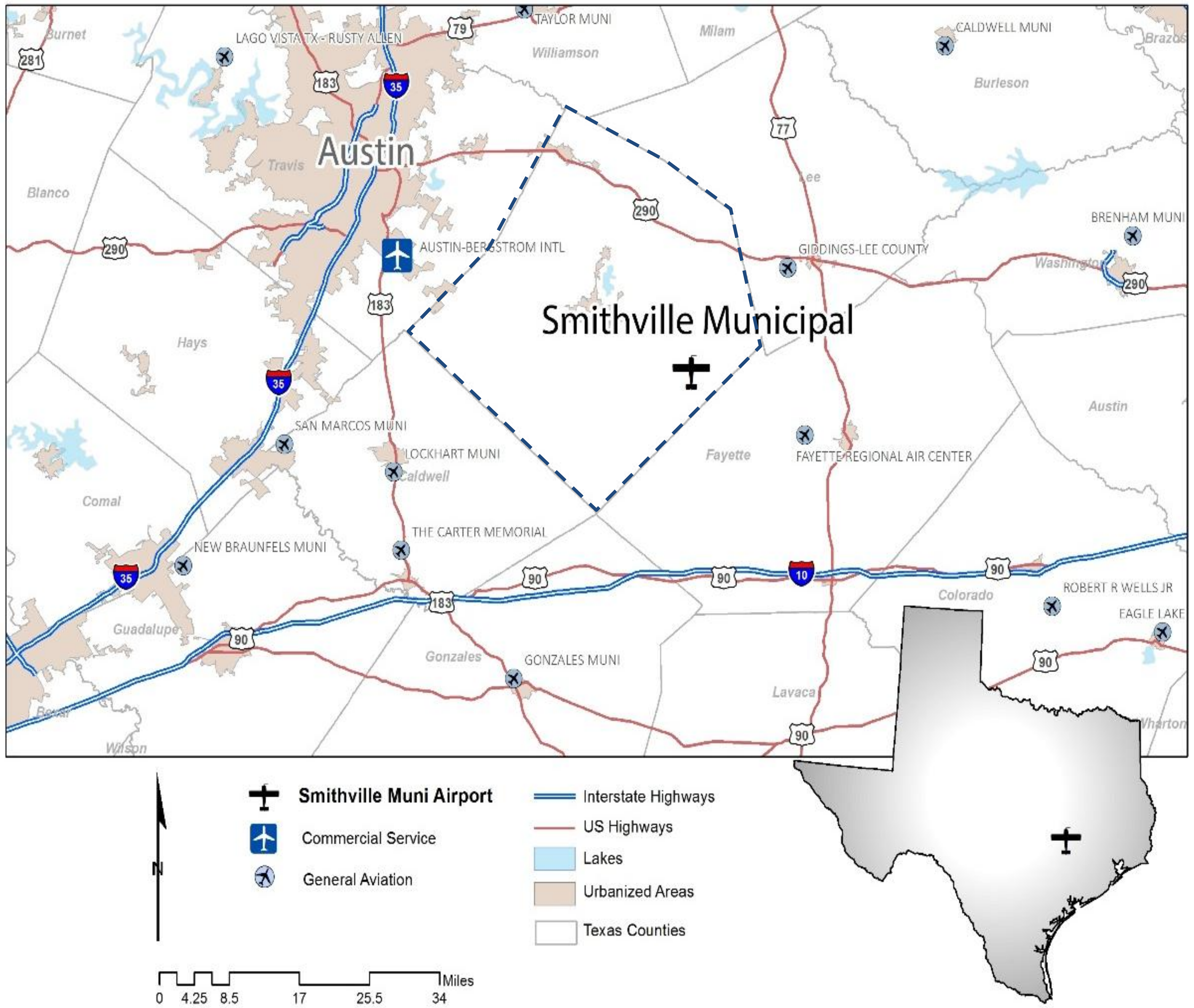
SMITHVILLE
★ TEXAS ★

SMITHVILLE CRAWFORD MUNICIPAL AIRPORT
DEVELOPMENT PLAN

November 2016

Airport Users and Community Value

KSA
A·DYNAMIC·PERSPECTIVE



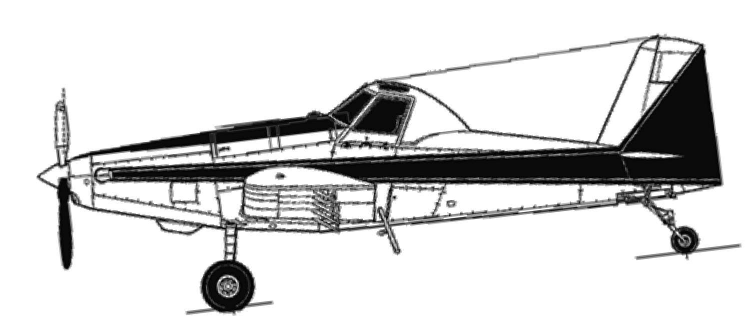
Smithville is just an hour drive from Austin and less than a two hour drive from Houston, San Marcos, San Antonio, and College Station. Its locatation between high density population areas makes Smithville and attractive area for commuters as well as business.

Recreation

Approximately 50% of operations at Smithville Crawford Municipal Airport are classified as recreational flying. The airport is an important amenity for residents and businesses in the area, enhancing quality of life and regional competitiveness.

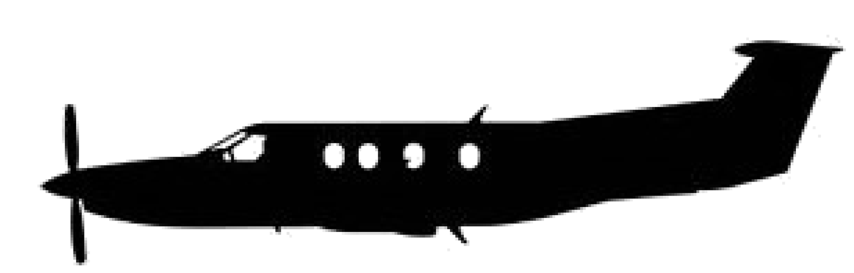
Flight Training

Local operations include helicopter and fixed-wing flight training. The military also uses the airport occasionally for training flights from nearby installations



Wildfire Firefighting

The Texas A&M Forest Service provides fire and disaster mitigation, suppression, and rescue services for the state of Texas. TFS uses the airport for staging during wildfire fighting missions.



Business and Corporate

The airport is used as a business recruitment tool and to attract tourism to the area. Other general aviation flights include corporate/business activity, agricultural spraying, and Civil Air Patrol.

SMITHVILLE
★ TEXAS ★

AGENCIES

84R	Smithville-Crawford Municipal Airport
TXDOT	Texas Department of Transportation
FAA	Federal Aviation Administration

GENERAL TERMS

AC	Advisory Circular
ADG	Airplane Design Group
AGL	Above Ground Level
AIP	Airport Improvement Program
ALD	Airport Layout Drawing
ALP	Airport Layout Plan
AOA	Aircraft Operations Area
AOPA	Aircraft Owners and Pilots Association
ARC	Airport Reference Code
ARFF	Aircraft Rescue and Fire Fighting
ARTCC	Air Route Traffic Control Center
ASOS	Automated Surface Observation Station
ASV	Annual Service Volume
ATC	Air Traffic Control
ATCT	Air Traffic Control Tower
ATIS	Automated Terminal Information System
AVGAS	Aviation Gasoline - Typically 100 Low Lead (100LL)
AWOS	Automated Weather Observation Station
BRL	Building Restriction Line
CFR	Code of Federal Regulations
CIP	Capital Improvement Plan
DME	Distance Measuring Equipment
EA	Environmental Assessment
EIS	Environmental Impact Statement
FAA	Federal Aviation Administration

FAR	Federal Aviation Regulations
FBO	Fixed Base Operator
FONSI	Finding of No Significant Impact
FY	Fiscal Year
GA	General Aviation
GIS	Geographical Information Systems
GPS	Global Positioning System
HIRL	High Intensity Runway Edge Lighting
IFR	Instrument Flight Rules
ILS	Instrument landing System
Jet A	Jet Fuel
LIRL	Low Intensity Runway Edge Lighting
LP	Localizer Performance
LPV	Localizer Performance with Vertical Guidance
MIRL	Medium Intensity Runway Edge Lighting
MITL	Medium Intensity Taxiway Edge Lighting
MOA	Military Operations Area
MSL	Mean Sea Level
NAS	National Airspace System
NAVAIDS	Navigational Aid
NDB	Non-Directional Beacon
NM	Nautical Mile (6,076.1 Feet)
NPIAS	National Plan of Integrated Airport Systems
OFA	Object Free Area
OFZ	Obstacle Free Zone
PAC	Planning Advisory Committee
PAPI	Precision Approach Path Indicator
RDC	Runway Design Code
REIL	Runway End Identifier Lighting
RNAV	Area Navigation
RPZ	Runway Protection Zone
RSA	Runway Safety Area
RVR	Runway Visibility Range

RVZ	Runway Visibility Zone
RWY	Runway
SASP	State Aviation System Plan
SM	Statute Mile (5,280)
SWOT	Analysis
TAF	Federal Aviation Administration (FAA) Terminal Area Forecast
TODA	Takeoff Distance Available
TORA	Takeoff Runway Available
TRACON	Terminal Radar Approach Control
TRSA	Terminal Radar Service Area
TWY	Taxiway
VASI	Visual Approach Slope Indicator
VFR	Visual Flight Rules (FAR Part 91)
VOR	Very High Frequency Omni-Directional Range
VORTAC	VOR and TACAN collocated
WAAS	Wide Area Augmentation Systems

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