Chapter Four

AIRFIELD CAPACITY/FACILITY REQUIREMENTS

A. INTRODUCTION

The purpose of this Chapter is to determine the airport's ability to accommodate the forecast of aviation demand presented in Chapter Three and identify the facilities that will be required to meet forecast demand during the 20-year planning period. The forecasts presented in Chapter Three indicate moderate increase in all segments of activity at the Fort Smith Regional Airport; therefore, to accommodate these increases, airfield improvements and/or facility development will be necessary.

The methodology used to determine facility requirements begins with an examination of the airport system's major components: airspace, airfield, buildings and surface access. It is important to note that these system components serve as the foundation for the airport's capacity and efficiency, and any deficiencies in the design or implementation of any of the components may create unnecessary congestion or delay in the air transportation system. Any deficiencies in the Airport's facilities will be identified based upon standards presented in Federal Aviation Administration (FAA) Advisory Circular (AC) 150/5300-13, *Airport Design,* through change number eight. Recommended improvements to facilities will be noted as required.

B. CRITERIA FOR PLANNING

From a planning perspective, airports and associated runways and taxiways are evaluated for the most demanding airplane (critical aircraft) currently using or projected to use the facility on a regular basis. The weight, wingspan and performance characteristics of these aircraft, under site specific conditions, will ultimately determine the airport's geometry in terms of runway/taxiway configurations, lengths, and separations. The types of approach aids, lighting and navigational equipment required at an airport are determined primarily by the level of annual activity, weather, terrain characteristics and role of the airport in the national system of airports. The planning criteria described above are applied with the forecast demand presented in Chapter Three to produce the resulting facility requirements.

1. Fundamental Airfield Development

FAA Order 5090.3C, "Field Formulation of the NPIAS", provides guidelines for fundamental airfield development. Fundamental development is considered to be the basic configuration recommended for an airport in the national system. The development is affected by the type of activity the airport serves. It includes, but is not limited to, land acquisition, aircraft movement areas, landing and navigation aids, and aircraft parking areas. Fundamental development should be recommended in accordance with the standards and criteria contained in FAA Advisory Circulars and Orders.

The FAA Order cited above indicates that an airport should control land as appropriate for airfield development, building area, runway protection zones, approach aids and compatible land use in accordance with current FAA criteria. Current airport property incorporates most of the fundamental development items cited by the

FAA. The FAA prefers the airport owner control the defined Runway Protection Zone (RPZ) area to enhance protection of people and property on the ground. The Fort Smith Regional Airport Authority does not currently hold fee simple interest in all of the RPZ areas for Runway 7, 1, or 19. However, avigation easements are owned over these areas.

2. Existing and Future Role of the Airport

The Fort Smith Regional Airport (FSM) is currently a non-hub, commercial service airport (FAR Part 139) with an airport reference code (ARC) of D-III. Operational activity is forecasted to increase during the planning period; however, the overall role of the airport will remain as non-hub, commercial service. It is recommended that the airport remain classified as Airport Reference Code (ARC) D-III capable of accommodating:

- Approach Category D Aircraft - Approach speeds of 141 knots up to but not including 165 knots.
- Design Group III Aircraft - Wingspans of 79 feet up to but not including 118 feet.

Over the 20-year planning period, the Airport will continue to accommodate the scheduled commercial air carrier aircraft as well as the general aviation and military aircraft.

3. Critical Aircraft

Airport facility requirements are developed based on the most demanding aircraft the Airport serves on a regular basis. The critical aircraft, or family of aircraft, is defined by both the largest wingspan and the highest approach to landing speed with more than 500 itinerant operations per year. In some cases, the critical aircraft can be two different aircraft where one is used for the largest wingspan and another for the highest approach speed, as is the case for FSM. Analysis in this study suggest that the 70-seat Bombardier's CRJ-700 or Embraer's EMB-170 are the critical aircraft for airline use, the Gulfstream V for general aviation, and the C-130 for military operations.

C. AIRFIELD AND AIRSPACE CAPACITY

The ability of an airport to accommodate aviation activity is a function of the number of runways, the runway and taxiway configuration, and the mix of aircraft using the airport. The capacity of any runway is finite with respect to the number of hourly and annual operations it may ultimately accommodate. Moreover, capacity is expressed by two principle terms: annual service volume and hourly capacities under Visual Flight Rules (VFR) and Instrument Flight Rules (IFR).

These variables are used to provide a quantitative breakdown of the airport's annual service volume (ASV) and hourly capabilities (VFR and IFR). The procedures used for this analysis are detailed in FAA AC 150/5060-5, *Airport Capacity and Delay* and FAA Airport Design Program, Version 4.2D.

1. Runway Capacity

Runway capacity is defined as a measure of the maximum number of aircraft operations which can be accommodated at that airport on an hourly and/or annual basis without compromising the safety of aircraft operations. This estimate accounts for differences in runway use, aircraft mix, and weather that may be encountered over the span of a typical year. The Fort Smith Regional Airport has two runways, Runway 7-25, an ARC D-III runway (8,000 feet long and 150 feet wide), and Runway 1-19, an ARC B-II runway (5,002 feet long and 150 feet wide). **The critical aircraft demand, as defined in Chapter Three, indicates these runways will remain ARC D-III and B-II throughout the planning period.**

A runway's ability to accommodate aircraft is largely determined by an aircraft's speed and weight. General aviation aircraft (lighter aircraft) typically have lower approach-to-landing speeds which equates to a lower runway occupancy time. Conversely, larger and heavier aircraft typically operate at higher approach-to-landing speeds which require more deceleration time. This increased deceleration time results in a longer runway occupancy time which decreases runway capacity.

Another distinction between lighter and heavier aircraft which affects runway capacity is wake turbulence. This phenomenon results from aircraft operations, both on the ground and in the air. The term wake turbulence includes vortices, thrust stream turbulence, jet blast and propeller wash. Wake turbulence generated from another aircraft can greatly affect the safe operation of a subsequent aircraft. The affect of wake turbulence is increased aircraft separation distances on the ground and in the air. Heavier aircraft generate more wake turbulence than lighter aircraft. Depending on the types of aircraft following each other during approach-to-landing operations, a typical separation distance of four to six miles is required. Appropriate time or distance intervals are also required for aircraft departing a runway. Similar to aircraft approach-to-landing speeds discussed earlier, heavy aircraft departures decrease a runway's capacity as opposed to lighter type aircraft.

In order to measure an airport's runway capacity, the FAA developed an aircraft wake turbulence classification system based upon a particular aircraft's weight and number of engines. **Table 4-1** presents the FAA Aircraft Classification System used in determining aircraft mix. The wake turbulence alphabetical classification is different from the aircraft approach speed alphabetical classification system associated with the airport reference code system.

Table 4-1
Fort Smith Regional Airport
Aircraft Classification

Aircraft Classification	Description[1]
Class A	Small single-engine aircraft weighing 12,500 pounds or less
Class B	Small twin-engine aircraft weighing 12,500 pounds or less
Class C	Large aircraft weighing more that 12,500 pounds, but less than 300,000 pounds
Class D	Heavy aircraft weighing more than 300,000 pounds

[1] Weights refer to maximum certificated take-off weight.
Source: FAA AC 150/5060-5 *Airport Capacity and Delay*, 1983

The fleet mix for the Fort Smith Regional Airport was developed from airport records and the aviation forecasts presented in Chapter Three. **Table 4-2** presents the aircraft fleet mix for the existing conditions in 2005 and the projected fleet mix for the end of the planning period in 2024.

Table 4-2
Fort Smith Regional Airport
Aircraft Fleet Mix

		2005		2024	
Aircraft Class	Description	Operations	Percent	Operations	Percent
A	Single-engine ≤12,500 lbs [1]	12,888	19.9	15,420	23.0
B	Twin-engine ≤12,500 lbs	11,036	17.0	14,180	21.2
C[2]	Aircraft ≥12,500 lbs but ≤300,000 lbs	40,691	62.9	37,335	55.8
D	Aircraft >300,000 lbs	0	0	0	0
Total		64,615	100	66,935	100

Source: FAA AC 150/5060-5 *Airport Capacity and Delay*, 1983.
1 Includes single-engine, experimental, rotorcraft, and other aircraft types.
2 For this analysis military aircraft were grouped as Class C aircraft and were approximately 49 percent of the total operations at FSM in 2005. They are forecasted to be approximately 37 percent of the operations in 2024.
Delta Airport Consultants, Inc.

a. Existing Runway Capacity Analysis

Both VFR and IFR hourly runway capacities and the annual service volume (ASV) were calculated for the existing runway system configuration at the Fort Smith Regional Airport. The following discussion adheres to the guidelines contained in the FAA AC 150/5060-5 *Airport Capacity and Delay* and the FAA *Airport Design* computer program version 4.2D. These resources are able to compute a reasonable estimate of the Airport's hourly and annual runway capacity. These estimates are then compared to the approved forecast to determine if the capacity of the runway is sufficient.

To determine an airport's runway capacity, a mix index must first be calculated. The mix index is a mathematical formula and is expressed as a percentage of wake turbulence class "C" aircraft plus 3 times the percent of class "D" aircraft (C+3D). The aircraft mix presented in Table 4-2 was used in calculating the index mix for the Fort Smith Regional Airport.

Both hourly and annual runway capacities were calculated using the FAA *Airport Design* Program, Version 4.2D. The existing and future capacities were predicated on the current runway configuration and operating characteristics. **Table 4-3** presents a comparison of existing demand versus existing capacity. As indicated, **the Fort Smith Regional Airport is currently operating at 30 percent of its total annual service volume, and at 57 percent and 79 percent of VFR/IFR peak hour capacity, respectively.** These figures represent a decrease over the levels documented in the 1997 Master Plan which were as follows, 37 percent of annual service volume and 62 percent and 86 percent of VFR/IFR peak hour capacity respectively.

Table 4-3
Fort Smith Regional Airport
Existing (2005) Demand Versus Existing Capacity

Demand		Capacity		
Peak Hour Operations	Total Operations	Hourly Operations VFR	IFR	Annual Service Volume
44	64,615	77 (57%)	56 (79%)	215,000

Source: FAA Design Program Version 4.2D
Delta Airport Consultants, Inc.

b. Future Runway Capacity Analysis

The future runway capacity was calculated using the same procedure as previously described. Based on the mix index formula, no changes are expected in the VFR or IFR hourly capacities. As presented in **Table 4-4,** forecasted demand versus future runway capacity is expected to **increase to 31 percent of the ASV and at 58 percent and 80 percent of VFR/IFR peak hour capacity, respectively, during the planning period**. Industry and Federal Aviation Administration guidelines recommend that runway capacity improvements be considered when actual operations reach 60 percent of the theoretical ASV. Therefore, **when actual operations reach 129,000 a more detailed analysis should be performed to determine the capacity.**

Table 4-4
Fort Smith Regional Airport
Future (2024) Demand Versus Existing Capacity

Demand Peak Hour Operations	Total Operations	Capacity Hourly Operations VFR	IFR	Annual Service Volume
45	66,935	77 (58%)	56 (80%)	215,000

Source: FAA Design Program Version 4.2D
Delta Airport Consultants, Inc.

2. Taxiway Capacity

The location of the exit taxiways can also affect the overall capacity of an airport and contribute to the efficiency of aircraft circulation. The location of exit taxiways depends a great deal on the mix of aircraft, approach and touchdown speeds, point of touchdown, exit speed, rate of deceleration, condition of the pavement surface (i.e., wet or dry) and the number of exits. General design practices recommend placing exit taxiways at intervals of 1,500 feet to 2,000 feet for airports that handle a wide variety of aircraft. FAA AC 150/5300-13, Airport Design, states that when design peak hour traffic is less than 30 operations, properly located right-angled exit taxiways achieve an efficient flow of traffic. The FAA AC also recommends bypass taxiways be considered to provide flexibility in runway use and notes that holding bays should be provided when runway operations reach a level of 30 per hour.

Runway 7-25 has four exit taxiways, and an entrance taxiway at each end of the runway, while Runway 1-19 has three connector taxiways, and an entrance taxiway at each end of the runway. This is sufficient, and no further exit taxiways are planned.

3. Airspace Capacity

As detailed in Chapter Two, the Fort Smith Regional Airport is surrounded by Class D and E airspace, and to the southeast there are several military operation areas (MOA). Additionally, there is a Terminal Radar Service Area (TRSA) surrounding FSM. The airspace in a five-nautical mile radius surrounding FSM (the primary airport in this TRSA) is classified as Class D airspace. Pilots operating within Class D airspace are required to have an operational two-way radio, unless otherwise authorized by FAA Air Traffic Control (ATC), while Class E airspace requires no specific certification or equipment. Pilots operating under Visual Flight Rules (VFR) are encouraged to contact the radar approach control and avail themselves of the TRSA services. However, participation is voluntary on the part of the pilot. The Airport has an FAA Air Traffic Control Tower (ATCT) and Terminal Radar Approach Control (TRACON). The facility is located southeast of the intersection of Runway 7-25 with Runway 1-19 and is in operation from 5:30 a.m. to 11:00 p.m. daily. The field is uncontrolled between 11:00 p.m. and 5:30 a.m. Instrument operations to and from the Fort Smith Regional Airport are supported by the Memphis Center Approach Control. **No airspace capacity deficiencies were identified during this evaluation.**

D. AIRSIDE FACILITY REQUIREMENTS

The airport facility requirements are based upon FAA AC 150/5300-13, *Airport Design,* as it relates to the current and future critical aircraft. As discussed previously, the critical aircraft determines the airport reference code from which the airside geometrics are evaluated.

1. Runway Analysis

This section evaluates the runway length, width, safety areas, and object free areas based on the existing and future aircraft expected to use this facility. The recommendations stated herein are based on FAA advisory circulars and specific manufacturers' aircraft performance data.

a. Runway Length and Width

The determination of runway length required for an airport is based on standards presented in FAA AC 150/5300-13, Chapter 3 and FAA AC 150/5325-4A, Runway Length Requirements for Airport Design. The recommended length for a primary runway at an airport is determined by considering either the family of airplanes having similar performance characteristics or a specific aircraft requiring the longest runway. This need is based on the aircraft or family of aircraft that use the airport on a regular basis, where regular basis is typically defined as a minimum 500 itinerant operations per year. Additional factors considered include critical aircraft approach speed, its maximum certificated takeoff weight, useful load and length of haul, the airport's field elevation above sea level, the mean daily maximum temperature at the airfield, and typical runway surface conditions, such as dry or wet and slippery.

The runway length analysis for the Fort Smith Regional Airport was performed using FAA Airport Design Computer Program 4.2D and procedures outlined in FAA AC 150/5300-13, "Airport Design". The program includes an aircraft fleet profile designed to be representative of the small and large aircraft that comprise the general aviation aircraft fleet in the United States. **Table 4-5** defines the runway length requirements developed using the FAA program and notes runway lengths and useful loads.

The critical aircraft for runway length at FSM is the Bombardier Aerospace CRJ-700 or Embraer's EMB-170 for airline use, the Gulfstream V for general aviation, and the C-130 for the military. All three of these aircraft types weigh more than 60,000 pounds. Based on this analysis, a runway length range of 6,150 feet to 8,700 feet should be considered. Runway 7-25 is 8,000 feet in length and 150 feet wide, and is considered to be adequate to serve the civilian sectors' critical aircraft throughout the planning period. However, the Arkansas Air National Guard has expressed a need for a longer runway. Summertime temperatures force T-38 military training aircraft to operate at other airports. A runway extension of 1,000 to 2,000 feet was requested by the Air Guard for the primary runway. After evaluating obstructions in the approach to Runway 25 it is recommended that an extension of 1,000 feet be planned.

b. Runway Safety Areas (RSA)

FAA AC 150/5300-13, *Airport Design,* designates a minimum runway safety area based on the airport reference code of the runway. A runway safety area is defined as a surface surrounding the runway which is suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot or excursion from the runway.

Runway 7-25

As discussed previously, Runway 7-25 is expected to remain classified as ARC D-III. For Category D runways, such as Runway 7-25, the standard runway safety area standard width is 500 feet centered on the runway and extends 1,000 feet beyond each runway end. The RSA for Runway 7-25 meets the standard design criteria.

Runway 1-19

Runway 1-19 is expected to remain classified as ARC B-II. For Category B runways, such as Runway 1-19, the standard runway safety area standard width is 150 feet centered on the runway and extends 300 feet beyond each runway end. The RSA for Runway 1-19 meets the standard design criteria.

Table 4-5
Fort Smith Regional Airport
Runway Length Requirements

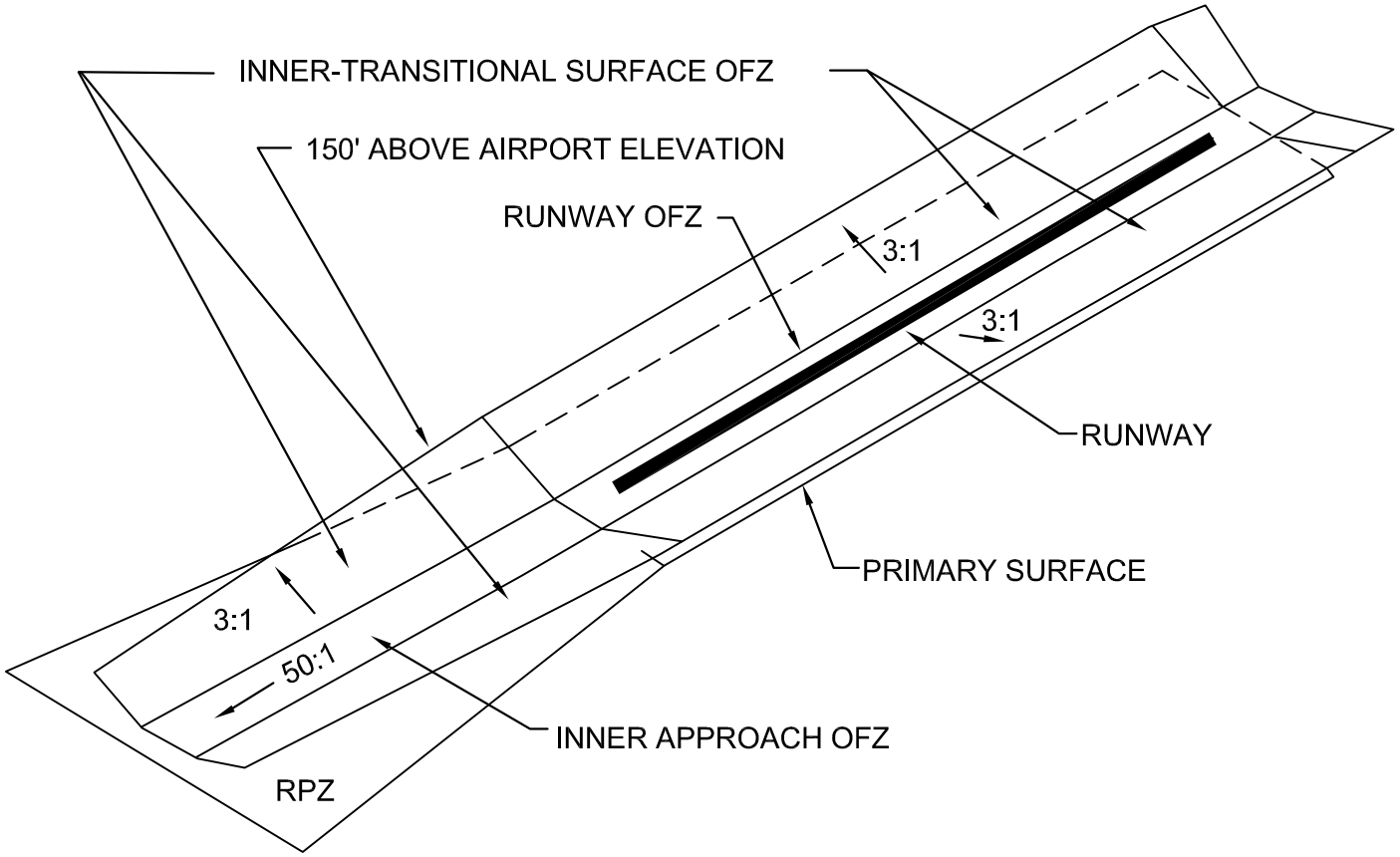
AIRPORT RUNWAY DATA	
Airport Elevation (MSL)	469’
Mean daily temperature of the hottest month	91° F
Maximum difference in runway centerline elevation	7’
Length of haul for airplanes of more than 60,000 pounds	1,000 miles
Runway Length Recommended for Airport Design	
Small airplanes with approach speeds of less than 30 knots	310’
Small airplanes with approach speeds of less than 50 knots	840’
Small airplanes with less than10 passenger seats	
75 percent of these small airplanes...	2,670’
95 percent of these small airplanes...	3,210’
100 percent of these small airplanes...	3,840’
Small airplanes with 10 or more passenger seats	4,370’
Large airplanes of 60,000 pounds or less	
75 percent of these large airplanes at 60 percent useful load	5,450’
75 percent of these large airplanes at 90 percent useful load	7,000’
100 percent of these large airplanes at 60 percent useful load	5,670’
100 percent of these large airplanes at 90 percent useful load	8,700’
Airplanes of more than 60,000 pounds	6,150’

Source: FAA Airport Design Computer Program 4.2D

c. Runway Obstacle Free Zone

The runway obstacle free zone (OFZ) is the volume of airspace centered above the runway centerline and is required to be clear of all objects, except for frangible NAVAIDs. The OFZ is illustrated in **Exhibit 4-1.** NAVAIDs are often located in the OFZ because of their function, in order to provide clearance protection for aircraft landing or taking off from the runway, and for missed approaches, where applicable.

DRAWING: 05018-exh-ofz.dwg LAYOUT: 8x11



SOURCE: FAA ADVISORY CIRCULAR 150/5300 - 13

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OBSTACLE FREE ZONES (OFZ)
FORT SMITH REGIONAL AIRPORT

DRAWN BY:	MLT	CHECKED BY:	DWD	SCALE:	NONE	DATE:	JANUARY 2006

EXHIBIT
4-1

The OFZ is subdivided as follows:

Runway OFZ - The airspace above the runway surface centered on the runway centerline. The elevation of the OFZ is the same as the elevation of the nearest point on the runway centerline. The OFZ extends 200 feet beyond each runway end; however the width may vary depending on the runway classification. The OFZ width for both Runway 7-25 and Runway 1-19 is 400 feet.

Inner-Approach OFZ - The volume of airspace centered on the approach area, and applies only to runways with an approach lighting system (ALS). At the Fort Smith Regional Airport, this condition applies to both Runway 7 and Runway 25 approaches. The zone of airspace begins 200 feet from the runway threshold at the same elevation as the runway threshold and extends 200 feet beyond the last light unit in the ALS. Its width is the same as the runway OFZ and rises at a slope of 50 (horizontal) to 1 (vertical) from its beginning.

- For Runway 7-25 the inner-approach OFZ is 400 feet wide and extends 200 feet beyond the outer most light of the approach light system.
- Inner-Transitional OFZ – Represents the volume of airspace along the sides of the runway OFZ and the inner-approach OFZ, and applies only to runways with approach visibility minimums lower than 3/4 statue miles approach visibility minimums.
- For Runway 7-25 (CAT I-ILS) this airspace begins at the edges of the runway OFZ and inner-approach OFZ, then rises vertically to a height defined by the critical aircraft dimensions (Ref: FAA AC 150/5300-13), then slopes 7 (horizontal) to 1 (vertical) out to a height of 150 feet above the established airport elevation. Runway 7-25 meets the standard design runway obstacle free zone criteria.

d. Runway Object Free Area

The runway object free area (ROFA) is a two dimensional surface centered on the runway centerline. It is provided to enhance the safety of aircraft operations by having the area free of objects except for those that need to be located in the ROFA for air navigation or aircraft ground maneuvering purposes and to taxi and hold aircraft in the OFA. The OFA clearing standard requires clearing the OFA of above ground objects protruding above the runway safety area edge elevation. Object free areas are illustrated on **Exhibit 4-2.**

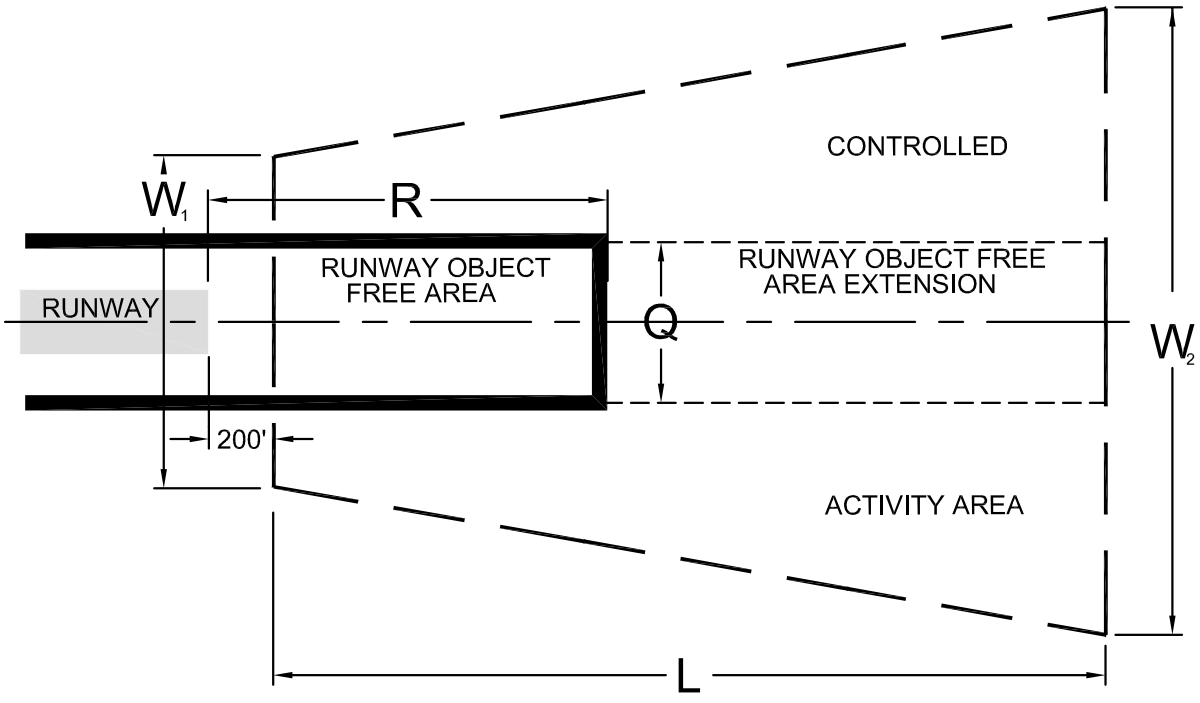
Runway 7-25

The ROFA for Runway 7-25, is 800 feet wide centered on the runway and extending 1,000 feet beyond each runway end. The existing ROFA for Runway 7-25 meets the required FAA criteria.

Runway 1-19

The ROFA for Runway 1-19, is 500 feet wide centered on the runway and extending 300 feet beyond each runway end. The existing ROFA for Runway 1-19 meets the required FAA criteria.

DRAWING: 05018-exh-rpz.dwg LAYOUT: 8x11



RUNWAY	W1	L	R	Q
11	500 ft	700 ft	1,000 ft	1,000 ft	800 ft
29	1,000 ft	1,510 ft	1,700 ft	1,000 ft	800 ft

W1 = RUNWAY PROTECTION ZONE - INNER WIDTH
W2 = RUNWAY PROTECTION ZONE - OUTER WIDTH
L = RUNWAY PROTECTION ZONE - LENGTH
R = OBJECT FREE AREA - LENGTH
Q = OBJECT FREE AREA - WIDTH

SOURCE: FAA ADVISORY CIRCULAR 150/5300 - 13

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RUNWAY PROTECTION ZONES (RPZ)
FORT SMITH REGIONAL AIRPORT

DRAWN BY:	MLT	CHECKED BY:	DWD	SCALE:	NONE	DATE:	JANUARY 2006

EXHIBIT
4-2

e. Runway Protection Zones

Runway protection zones (RPZs) are trapezoidal in shape, centered on the extended runway centerline, and typically begin 200 feet beyond the end of the area usable for take-off and landing. The function of an RPZ is to enhance the protection of people and property on the ground, which is achieved through airport owner control over these land areas. Such control includes clearing RPZ areas (and maintaining them clear) of incompatible objects and activities. Control is preferably exercised through the acquisition of sufficient property interest in the RPZ. Runway protection zones are illustrated in Exhibit 4-2.

Runway 7

The dimensions of the RPZ for Runway 7 are 1,000 feet by 1,750 feet by 2,500 feet. The RPZ for Runway 7 meets FAA criteria dimensionally, but the airport does not have controlling interest of the entire RPZ area. The airport does have avigation easements over 8.83 acres of the RPZ. **It is recommended that the Airport purchase the 8.83 acres via fee simple acquisition to gain complete control over the RPZ**.

Runway 25

The dimensions of the RPZ for Runway 25 are 1,000 feet by 1,750 feet by 2,500 feet. The RPZ for Runway 25 meets FAA criteria dimensionally and is located entirely on airport property.

Runway 1

The dimensions of the RPZ for Runway 1 are 500 feet by 700 feet by 1,000 feet. The RPZ for Runway 1 meets FAA criteria dimensionally, but the Airport does not have controlling interest of the entire RPZ area. The Airport does have avigation easements over 7.11 acres of the RPZ.

Runway 19

The dimensions of the RPZ for Runway 19 are 500 feet by 700 feet by 1,000 feet. The RPZ for Runway 19 meets FAA criteria dimensionally, but the Airport does not have controlling interest of the entire RPZ area. The Airport does have avigation easements over 1.27 acres of the RPZ.

f. Pavement Strength and Condition

The runway pavements at the Fort Smith Regional Airport are a combination of concrete and bituminous (asphalt) pavements. The published runway pavement strengths are shown **Table 4-6. The runway pavement for both runways is adequate to support the existing and future critical aircraft operations, and should be maintained in accordance with the Airport's pavement management plan throughout the planning period.**

Table 4-6
Fort Smith Regional Airport
Pavement Strength

Bearing Capacity	Runway 7-25	Runway 1-19
Single Gear	75,000 lbs	55,000 lbs
Dual Gear	175,000 lbs	70,000 lbs
Dual Tandem	295,000 lbs	120,000 lbs

Source: Airport Facilities Directory

2. Taxiway Analysis

FAA Advisory Circular 150/5300-13, "Airport Design" presents design standards for taxiway and taxilane development. A taxiway is defined as a path established for

the taxiing of aircraft from one part of the airport to another. A taxilane is defined as the portion of the aircraft parking area used for the access between taxiways and aircraft parking positions.

Additions or improvements to an airport taxiway system are typically undertaken to increase airport capacity, for operational efficiency, and to enhance safety. An efficient runway/taxiway will increase an airport's ability to handle arriving and departing aircraft, as well as expedite ground movements between the runway and terminal areas.

Parallel Taxiway 'A'

Taxiway 'A' is 75 feet wide and lighted with medium-intensity edge lighting. The northeast portion of Taxiway 'A' is located 400 feet from the runway centerline, while the southwest portion is separated by 470 feet. Taxiway 'A' provides a dual-use entrance/exit taxiway to each end of

Runway 7-25, with Taxiways 'C', 'D', 'E', and 'F' serving as exit taxiways from Runway 7-25 to Taxiway 'A'. The taxiways serving Runway 7-25 are all bituminous overlay over original concrete construction. Holding aprons are located on each end of Taxiway 'A'.

Parallel Taxiway 'B'

Runway 1-19 is supported by a partial parallel taxiway, Taxiway 'B', which extends from Taxiway 'A', north to the threshold of Runway 19. Taxiway 'B' varies in width from 50 to 80 feet wide and is lighted with medium-intensity edge lighting. Most of taxiway 'B' is located 313 feet west of the Runway 1-19 centerline. The north portion of Taxiway 'B' is located 350 feet from the runway centerline. Taxiways 'A', 'G', and 'H' serve as exit taxiways from Runway 1-19, and are of bituminous over concrete construction, as is Taxiway 'B'.

Diagonal Taxiway 'E'

Taxiway 'E' serves as an entrance/exit taxiway for Runway 1. It extends diagonally from the general aviation ramp and Taxiway 'A', across Runway 7-25 to the Runway 1 threshold. This taxiway is 50 feet wide and is of bituminous construction.

The taxiway pavements are adequate to support the existing and future critical aircraft operations, and should be maintained in accordance with the Airport's pavement management plan throughout the planning period.

3. Navigational Aids (NAVAIDs)

Navigational Aids (NAVAIDs) are a system of electronic and visual aids that assist pilots with navigating their aircraft in a safe and orderly manner during take-off, approach, and landings. **Table 4-6** shows the existing NAVAIDs for Runways 7-25 and 1-19. With the advent of Global Positioning Systems (GPS), air navigation now has an economic and efficient system that can allow every airport in the country to have some type of navigational aid.

It is recommended that PAPIs be added to Runway 7 and to Runway 1 to assist pilots with navigating their aircraft in a safe and orderly manner during landings. In addition, it is recommended that the Runway 25 VASI be replaced with a PAPI.

Table 4-6
Fort Smith Regional Airport
Existing Ground Navigational and Visual Aids

Navigational Aids	Runway			
	7	25	1	19
Instrument Landing System (ILS)	✓	✓		
Approach Lighting System (MALSR)	✓	✓		
Visual Approach Slope Indicator (VASI)		✓		
Runway End Identifier Lights (REIL)				✓
Precision Approach Path Indicators (PAPI)				✓
Non-Directional Beacon (NDB)	✓	✓		
Very High Frequency Omni directional Range Stations (VOR) or GPS	✓	✓	✓	

Source: Delta Airport Consultants, Inc.

4. Instrument Approach Procedures

The Fort Smith Regional Airport has nine published instrument approach procedures. Runway 7 has a precision ILS (Instrument Landing System) approach and three non-precision approaches, Runway 25 has a precision ILS approach and three non-precision approaches, and Runway 1 has a non-precision approach. **No additional procedures are required at this time.**

5. Airfield Lighting System and Visual Approach Aids

a. Airport Beacon

The airport beacon at Fort Smith Regional Airport is mounted atop a tower located east of the airfield maintenance buildings. **The beacon is in excellent condition and should be maintained operational through the planning period.**

b. Runway and Taxiway Lighting

Runway 7-25 is equipped with standard HIRLs, while Runway 1-19 is equipped with MIRLs. The runway lights are in fair to poor condition. The taxiway edge lights are medium intensity taxiway lights (MITLs), and are currently in fair to poor condition. **It is recommended that the runway and taxiway lighting be replaced during the planning period.**

c. Visual Approach Aids

Runway 7-25

As indicated previously, Runway 7-25 is equipped with a medium intensity approach lighting system with runway alignment indicator lights (MALSR) on both ends of the runway. The MALSRs may be activated by keying the aircraft's microphone on the Common Traffic Advisory Frequency (CTAF), 118.3 MHZ when the air traffic

control tower is not in operation. **Both systems are in good condition and should be maintained by the FAA through the planning period.**

Runway 25 is also equipped with a visual approach slope indicator (VASI) light system located on the left side of the runway. It is in good condition, **however, it is recommended that they be replaced with PAPIs during the planning period. A 4-box PAPI system is recommended for Runway 7.**

Runway 1-19

Runway 19 is equipped with a 4-box precision approach path indicator (PAPI) system. The **system is in good condition and should be maintained by FAA throughout the planning period. Runway 1 should be equipped with a 4-box PAPI system.**

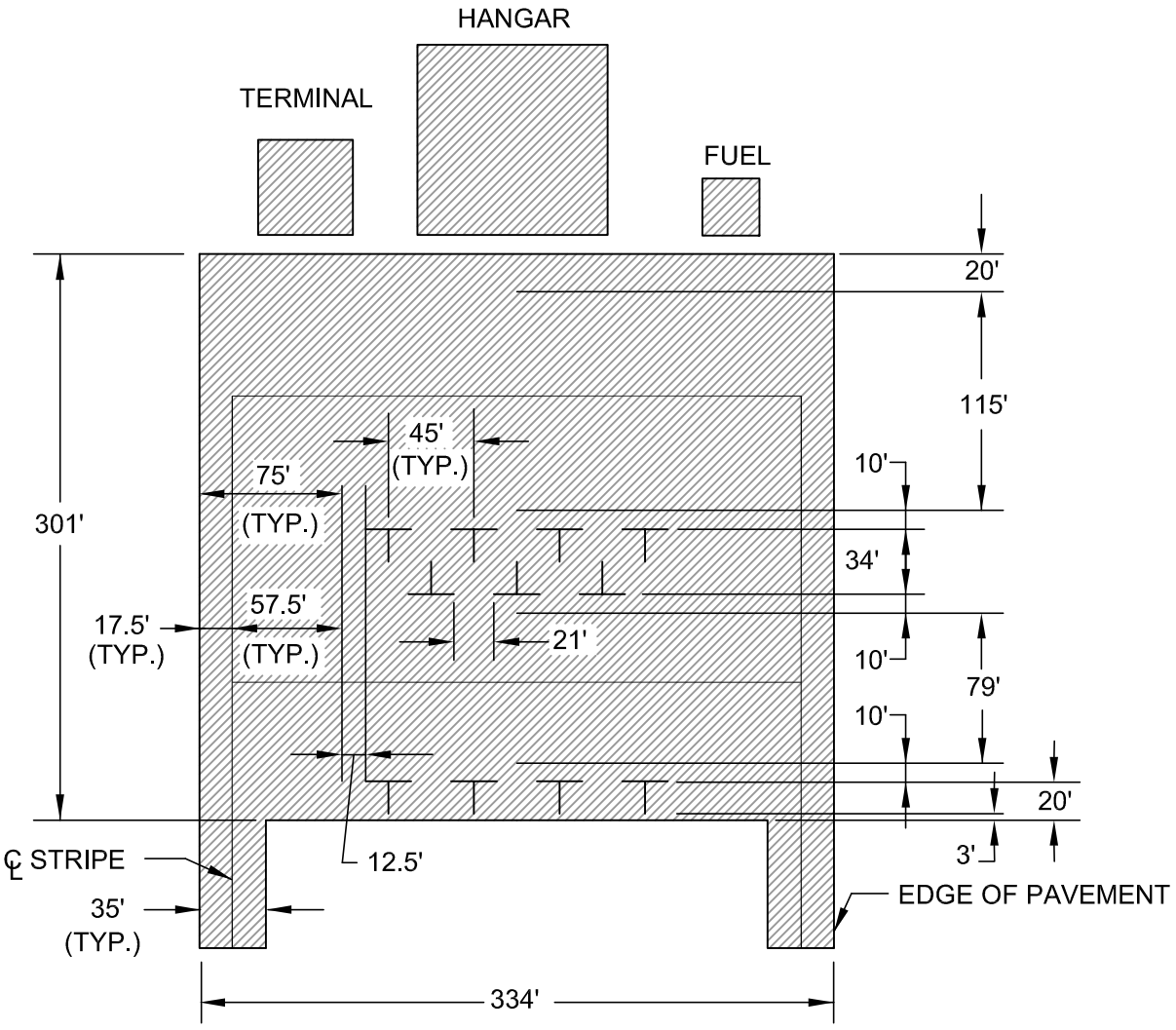
6. General Aviation Aircraft Parking Requirements

General aviation aircraft parking requirements vary widely depending on the percentage of transient aircraft using the airport, as well as the number of based aircraft owners who choose to tie down their aircraft on the ramp in lieu of leasing hangar space. A typical general aviation apron layout for Group I and II aircraft is illustrated in **Exhibit 4-3.**

a. Transient Aircraft Parking Requirements

Transient aircraft parking requirements typically comprise the largest demand for apron space requirements. Transient aircraft are defined as those aircraft not based at the facility. For the purpose of this analysis, peak day transient operations from the forecast chapter were used to determine apron space requirements.

The existing general aviation apron totals approximately 54,000 square yards including transient apron, based aircraft tie-downs and circulation area. Approximately 20,000 square yards are currently used for transient aircraft. This area is located directly in front of the FBO building. Based tie-downs are located behind Hangars 3, 4 and 5. Overflow parking space is in front of Hangars 3, 4, and 5 in a very linear configuration. However, the FBO reports that this apron area is very irregular and not conducive to aircraft parking because of steep gradients in a "washboard" fashion. This apron is used only when other space is not available. Local air traffic control tower activity data indicates that approximately 50 percent of the GA itinerant traffic is transient.



TYPICAL G. A. LAYOUT GROUP I & II AIRCRAFT
FORT SMITH REGIONAL AIRPORT

EXHIBIT
4-3

www.deltaairport.com

DRAWN BY:	MLT	CHECKED BY:	DWD	SCALE:	NONE	DATE:	JANUARY 2006

DRAWING: 05018-exh-apron-layout.dwg LAYOUT: 8.5x11

Taxiway 'A' utilizes the front portion of the GA ramp. This routing eliminates 8,000 square yards of space for GA ramp since it serves the taxiway and its associated taxiway obstacle free area. Relocation of Taxiway 'A' to a 400 foot separation should be considered in the alternatives chapter.

For the purpose of this analysis, it is assumed that as specified in AC 150/5300-13, that 50 percent of the daily transient aircraft operations will be on the apron simultaneously during a busy day. **Table 4-7** details the transient aircraft activity for the planning period. Planning allocations for these aircraft types were 500 square yards (sq. yds.) for single engine aircraft, 700 sq. yds. for multi-engine (piston)/multi-engine (turbine) aircraft, 900 sq. yds. for turbo-jet aircraft and 200 sq. yds. for other aircraft (Rotorcraft). **Table 4-8** presents the apron requirements for transient aircraft for the 20-year planning horizon.

Table 4-7
Fort Smith Regional Airport
Transient Aircraft Activity

	2005	2010	2015	2024
Transient OPS/Average Day	82	94	100	108
Transient Aircraft/Average Day	41	47	50	54
Single Engine	25	27	29	31
Multi-Engine	9	10	10	10
Turbo-Jet	6	9	10	12
Rotorcraft	1	1	1	1

Source: Delta Airport Consultants, Inc. Analysis

Table 4-8
Fort Smith Regional Airport
Transient Aircraft Apron Requirements

Aircraft Types	2005 (SY)	2010 (SY)	2015 (SY)	2024 (SY)
Single Engine	12,500	13,500	14,500	15,500
Multi-Engine	6,300	7,000	7,000	7,000
Turbo-Jet	5,400	8,100	9,000	10,800
Rotorcraft	200	200	200	200
Total Requirements	24,400	28,800	30,700	33,500

Source: Delta Airport Consultants, Inc. Analysis

b. Based Aircraft Apron Parking Requirements

Based aircraft, as opposed to transient aircraft are permanently stored at the airport. For those owners not requiring hangar storage, adequate space for parking and storage of these aircraft on the apron should be provided. These based aircraft storage spaces are part of the total apron tie-down area. Historically, aircraft types which are routinely stored or parked on the apron are the less expensive single engine aircraft types. The larger and more expensive aircraft, such as the multi-engine aircraft types, are normally stored in hangars.

The Airport currently has 15 single engine aircraft using apron tie-downs representing approximately 35 percent of the single engine aircraft based at the airport. The square yardage (SY) per based aircraft is the same as the transient aircraft formula. These space allocations include areas for taxilanes between rows of aircraft and at the ends of each row.

Utilizing the based aircraft forecast, a determination of based aircraft tie-down requirements were forecast for the planning period. These requirements are presented in **Table 4-9**.

Table 4-9

Fort Smith Regional Airport
Based Aircraft Apron Tie-down Requirements (SY)

	2005	2010	2015	2024
Single Engine (spaces)	15	16	16	17
Tie Down Requirements (SY)	7,500	8,000	8,000	8,500

Source: Delta Airport Consultants, Inc. Analysis

c. Total General Aviation Apron Space Requirements

The preceding discussions have identified the total demand for apron space for the planning period. Apron size requirements have been established for both based and transient aircraft. **Table 4-10** presents the area of apron requirements for the planning period. The FBO at FSM has a military fuel contract and is host to a significant number of transient military aircraft. This demand has been estimated to account for another 10,000 square yards.

Table 4-10
Fort Smith Regional Airport
General Aviation Apron Requirements

Aircraft Types	2005 (SY)	2010 (SY)	2015 (SY)	2024 (SY)
Transient Aircraft	24,400	28,800	30,700	33,500
Based Aircraft	7,500	8,000	8,000	8,500
Military Aircraft	10,000	10,000	10,000	10,000
Total Apron Requirements	41,900	46,800	48,700	52,000
Existing Pavement	54,000	54,000	54,000	54,000
Capacity	12,100	7,200	5,300	2,000

Source: Delta Airport Consultants, Inc. Analysis

Although this analysis shows an excess capacity in apron space, the linear configuration does not serve the airport's needs efficiently. In addition, the irregular gradients on the overflow ramp encourage and increase square yardage for aircraft parking. General aviation needs will be reviewed in the alternatives chapter.

E. LANDSIDE FACILITY REQUIREMENTS

Landside facilities include airport buildings, automobile parking areas, fuel farms, passenger and general aviation terminal buildings, hangar space, an Air Traffic Control Tower (ATCT), and fencing. The Landside facility requirements were

developed from a review of the inventory and forecast chapters of this study.

1. Air Carrier Terminal Building

As highlighted in the Inventory Chapter, the Air Carrier Terminal Building was completed in 2002. This modern 52,200 square foot passenger terminal provides a comfortable spacious facility for airline passengers. There is additional space for expansion within the terminal facility for another airline and for additional rental cars. Ticketing counter space is available and additional gate lower use spaces are available in the passenger hold room. Based on forecast presented in chapter 3, this new terminal building should serve the needs of the community throughout the study period.

There are several areas where attention may need to be focused. Passenger screening during the peak periods can be somewhat constrained. Although some of the constraint is necessitated by the process, in the latter stages of the planning period, the airport may want to consider some expansion of this area. There may be a possibility to gain some widening of the corridor on the side opposite the concessions area.

In addition, during the interviews with tenants during the inventory visit, the operators of the airports snack bar expressed a desire for more space for their operation. They were particularly interested in the installation of a grill in order to serve some grilled sandwiches. This area falls within the same corridor mentioned above. With restrooms on both ends of their operation, the only area for expansion is towards the baggage claim cart loop area. It may be possible to claim some space under the canopy overhang in this area.

Otherwise, the new terminal facility is an excellent front door for Fort Smith and the region. The building is new, is comfortable, spacious and should serve throughout the study period.

2. Air Carrier Apron Requirements

As described in the inventory chapter, the 55,000 square yard concrete apron in front of the Air Carrier Terminal will serve comfortably throughout the planning period. With the 50 seat regional jets currently serving the market, ample space is available for aircraft and ramp operations. Future forecast anticipates the advent of some 70 seat aircraft to serve the market. These larger aircraft can be comfortably accommodated at the existing gates and on the existing ramp. Even with the possibility of another airline, the existing ramp can accommodate this occurrence quite comfortably.

During the interviews with airline personnel, there was a question raised about the need for stormwater management controls during deicing operations. These same features could be beneficial during a fuel spill accident on the ramp. It is recommended that the airport confirm the current containment capabilities of a detention basin or oil-water separator facilities prior to downstream-channels.

3. Vehicular Access and Parking

a. Terminal Area Access

Primary access to the airport passenger terminal building is via McKennon Boulevard. This road joins South 66th Street and then splits into a loop around the

parking lot. In front of the terminal the roadway provides one through lane with free drop-off parking provided on both sides for approximately 12 vehicles. Plans are to change to two through lanes with only one curbside drop-off lane next to the building.

A thorough analysis of motor vehicle traffic flows associated with current and projected future air passenger demand is essential to assure ground congestion does not become an unanticipated constraint on a passenger terminal's performance. **It is recommended that airport management continue to work with local and regional planning agencies to improve the ground access and signage to and from Interstate 540 and the future Interstate 49 alignment south of the airport.**

b. Automobile Parking

Short-term and long-term parking is combined in one paved lot conveniently located just north of the passenger terminal. The parking lot is operated by Republic Parking Systems. There are 256 public automobile parking spaces in front of the passenger terminal. A project to expand the public parking by 359 spaces (for a total of 615 public spaces) was recently completed. Rental car parking, to the east of the passenger terminal, consists of 152 parking spaces. The rental car companies have expressed a desire for more vehicle spaces. The airport is currently constructing a common car wash facility. Employee parking, located to the west of the passenger terminal, consists of 58 parking spaces.

4. General Aviation Terminal Building and Auto Parking

a. GA Terminal Building

Total peak hour general aviation operations for the Fort Smith Regional Airport were forecasted to increase from 16 in 2005 to 22 by the end of the planning period. For planning purposes, arrivals and departures are assumed to be equal. A gross area of 100 square feet per peak hour passenger was used in developing total terminal building area requirements. This includes space for airport management offices, FBO operations, pilot and public waiting lounges, restrooms, concessions, and utility and storage areas. The area requirements are presented in **Table 4-13**.

Table 4-13
Fort Smith Regional Airport
General Aviation Terminal Building Area Requirements

	2005	2010	2015	2024
Peak Hour Pilot and Passengers	16	19	20	22
Recommended Area (SF)	1,600	1,900	2,000	2,200
Existing Area (SF)	5,500	5,500	5,500	5,500
Deficiency (-)/Capacity (+) (SF)	+3,900	+3,600	+3,500	+3,300

Source: Delta Airport Consultants, Inc. Analysis

In summary, the recommended building requirements range from 1,600 square feet to 2,000 square feet. **No additional GA terminal space is anticipated to be required during the planning period. However, due to the poor configuration of the buildings in the GA area, it may be prudent to consider alternatives to improve density of facilities with more efficient circulation.**

b. General Aviation Automobile Parking

The existing GA parking area provides an ample number of spaces for current activity. Improvements may be made to the layout, but no additional spaces are required during the planning period. The most significant issue expressed during the interviews was that too much automobile traffic passes through the gate adjacent to the FBO operation. Consideration should be given to studying the need for access and optimizing the location of access controlled gates for GA for the future.

5. Hangar Facilities

There are seven community hangars at FSM ranging from 4,800 square feet to over 13,000 square feet. There are eight corporate hangars ranging in size from 5,000 square feet to over 15,000 square feet. Finally, there are two T-hangar buildings with 14 units.

The inventory documented that 15 single engine aircraft are located on tie-downs on the ramp. The remaining 28 single engine aircraft are in T-hangars or in community hangars. Therefore, the forecast growth of six additional single engine aircraft over the study period will need to be accommodated on the ramp, since there is no available T-hangar space. It is recommended that a 10 unit T-hangar be planned for Phase I of the study period, with the possibility of another 10 unit hangar for Phase III. This may allow some of the single engine aircraft in community hangars to be relocated to T-hangars.

One additional multi-engine aircraft is forecast for the based fleet at FSM. This twin can be accommodated in the T-hangars, if it is in the piston category or may assume a spot in the community hangars vacated by some of the single engines which move to T-hangars.

The biggest challenge in forecast aircraft growth is in turbo-jets, where nine additional jets are indicated over the 20 year period. These aircraft will need to be stored in individual corporate or larger community hangars. For purposes of this study, we will assume one large community hangar housing three turbo-jet aircraft (typically FBO) and six additional stand alone corporate hangars.

6. Air Traffic Control Tower

An Air Traffic Control Tower (ATCT) is a terminal facility, which through the use of air/ground communications, visual signaling and other devices, provides air traffic control services (ATC) to airborne aircraft operating in the vicinity of an airport and to aircraft operating on the ground at the Airport. The Fort Smith Regional Airport

ATCT and TRACON facilities operate daily from 5:30 a.m. to 11:00 p.m.

7. Perimeter Fencing

The Airport property is fenced entirely with an eight foot fence equipped with barbed wire out-riggers. **It is recommended that the fence be maintained throughout the planning period.**

F. SUPPORT FACILITIES

Support facilities play a vital role in the operation of the Fort Smith Regional Airport. The sizing, location and phasing of these facilities must provide flexibility to accommodate the dynamic aviation industry. Support facilities that will be discussed in this section include the following:

- Aviation Fuel Storage
- Aircraft Rescue and Fire Fighting
- Airport Electrical Vault

1. Aviation Fuel

As noted in the Inventory Chapter, Fort Smith Regional Airport has nine above-ground storage tanks (AST) and four tender trucks for aviation fuel. There are six Jet-A tanks, two 100LL AvGas tanks, and one tank for waster oil. Of the 6 Jet-A tanks, four are privately owned and operated by corporate users. Fuel sales to the public are provided by TAC Air. They have 40,000 gallons of Jet-A in two tanks and 12,000 gallons of AvGas in a single 12,000 gallon tank. Fuel is dispensed via three Jet-A tender trucks and 1 AvGas tender truck. There is a 1,000 gallon self service fuel tank available to itinerant and local pilots.

The FBO manager reports that a significant portion of fuel flow at the airport is for military operations. With the Air Guard facility at FSM, the airport is a favored site for fueling associated with training operations. In fact, there is some support equipment stored with the FBO for military operations.

Although the current capacity is reported to be adequate for the future, it would be prudent to reserve space for an additional 20,000 gallon Jet-A tank and for a second 12,000 gallon AvGas tank.

2. Aircraft Rescue and Fire Fighting (ARFF)

The AANG provides all aircraft rescue and firefighting (ARFF) services for the airport, with a staff of 24 firefighters on duty, 24 hours a day, seven days a week. The fire department personnel are trained in Hazardous Material Response. A fire-training facility certified by the FAA and the Department of Defense is located on the airport. The Fort Smith Regional Airport currently meets the FAR Part 139 requirements for Index "B" aircraft. A list of the ARFF equipment currently in use at the Airport is found in Chapter Two of this report. **It is recommended that the Airport maintain sufficient equipment to meet the "Index B" requirements throughout the planning period**.

3. Airfield Electrical Vault

The airport's electrical vault is located on the south side of the airport in the vicinity of the air traffic control tower. The vault contains the airfield's main electrical power supply and controls for the airfield lighting system including runway, taxiway, and apron edge lights. **It is in very good condition and should be expanded as necessary. The airport may be looking for a new location for the vault when the electrical re-build of the system is done.**

G. LAND ACQUISTION

The Airport Commission owns a significant land envelope to serve the airport needs of the community. However, experience shows that development can encroach without adequate assessment and protection. Land acquisition recommended actions are as follows:

- Acquire runway protection zone property in fee simple, wherever possible.
- In order to straighten Savannah Street to State Highway 45 and shift it to the north edge of the runway protection zone for Runway 7, acquire several parcels and relocate businesses, as necessary.
- For the extension of Runway 25, it is recommendations that several parcels with large trees (obstructions) west of Massard Road below the approach surface be purchased.
- As previously discussed, the southwest and northwest quadrants are limited to future development. The northeast quadrant is primarily dedicated to airline service. Therefore, the southwest quadrant is the only area where any significant ultimate development could occur. It is recommended that the Airport Commission consider acquisition of the land north of the railroad tracks and south of airport property, as shown on the previous Airport Layout Drawing.

H. FACILITY REQUIREMENTS SUMMARY

This chapter has presented the facility requirements for the continued development of the Fort Smith Regional Airport. Facility requirements were predicted based on the existing and forecasted aviation demand, and applicable federal aviation regulations and advisory circulars. These facilities are needed to satisfy the short and long term needs of the aviation community. Recommendations contained herein are intended to optimize the operational efficiency, flexibility and safety of the Airport. A summary of facility requirements as presented in this chapter are highlighted in **Table 4-21.**

Table 4-21
Fort Smith Regional Airport
Facility Requirements Summary

Project Description	2005-2009	2010-2014	2015-2024	Ultimate
Extend Runway 25 1000 feet			✓	
Relocate Taxiway A to 400 feet (west)	✓			
Upgrade Runway 7-25 Lighting		✓		
Upgrade Taxiway Lighting		✓		
PAPI Installation Runway 7		✓		
PAPI Installation Runway 1		✓		
PAPI Installation Runway 25			✓	
Access and Signage Improvements	✓			
Construct one T-Hangar (10-unit)	✓		✓	
Construct one Community Hangar			✓	
Construct six Corporate Hangars	✓	✓	✓	
Land Acquisition, RW 7 (8.83 ac)	✓			
Land Acquisition, RW 25 (8.0 ac)			✓	
Land Acquisition, Southeast Quadrant				✓

Source: Delta Airport Consultants, Inc.