TEXARKANA
REGIONAL AIRPORT

Chapter Three

FACILITY REQUIREMENTS

FACILITY PLANNING

Proper airport planning requires the translation of forecast aviation demand into the specific types and quantities of facilities that can adequately serve the identified demand. This chapter will analyze the existing capacities of the Texarkana Regional Airport (TXK) facilities. The existing capacities will then be compared to the forecast activity levels prepared in Chapter Two to determine the adequacy of existing facilities, as well as to identify any deficiencies that currently exist or may be expected to materialize in the future. This chapter will present the following elements:

- Demand Based Planning Horizons
- Airfield Capacity
- Airside Facility Requirements
- Landside Facility Requirements

The objective of this effort is to identify, in general terms, the adequacy of existing airport facilities, outline what new facilities may be needed, and determine when these may be needed to accommodate forecast demands. Having established these facility requirements, alternatives for providing these facilities will be evaluated to determine the most practical, cost-effective, and efficient means for implementation.

The facility requirements for TXK were evaluated using guidance contained in several Federal Aviation Administration (FAA) publications, including the following:

- Advisory Circular (AC) 150/5300-13B, *Airport Design*
- AC 150/5060-5, *Airport Capacity and Delay*
- AC 150/5325-4B, *Runway Length Requirements for Airport Design*
- Federal Aviation Regulation (FAR) Part 77, *Objects Affecting Navigable Airspace*
- FAA Order 5090.5, *Formulation of the National Plan of Integrated Airport Systems (NPIAS) and the Airports Capital Improvement Plan (ACIP)*

DEMAND-BASED PLANNING HORIZONS

An updated set of aviation demand forecasts for TXK has been established and was detailed in Chapter Two. These activity forecasts include annual aircraft operations, based aircraft, aircraft fleet mix, and peaking characteristics. With this information, specific components of the airside and landside systems can be evaluated to determine the capacities needed to accommodate future demand.

Cost-effective, efficient, and orderly development of an airport should rely more on actual demand at an airport rather than on a time-based forecast figure. To develop a master plan that is demand-based rather than time-based, a series of planning horizon milestones has been established that takes into consideration the reasonable range of aviation demand projections. The planning horizons are the short term (1-5 years), the intermediate term (6-10 years), and the long term (11-20 years).

It is important to consider that actual activity at the airport may be higher or lower than what the annualized forecast portrays. By planning according to activity milestones, the resultant plan can accommodate unexpected shifts or changes in the area's aviation demand by allowing airport management the flexibility to make decisions and develop facilities based on need generated by actual demand levels. The demand-based schedule provides flexibility in development, as development schedules can be slowed or expedited according to demand at any given time over the planning period. The resultant plan provides airport officials with a financially responsible and needs-based program. **Table 3A** presents the short-, intermediate-, and long-term planning horizon milestones for each aircraft activity level forecasted in Chapter Two.

TABLE 3A | Planning Horizon Activity Levels

		PLANNING HORIZON		
	Base Year (2022)	Short Term (1-5 Years)	Intermediate Term (6-10 Years)	Long Term (11-20 Years)
ENPLANEMENTS	35,699	39,080	42,412	48,789
ANNUAL OPERATIONS				
Itinerant				
Air Carrier	386	1,983	2,001	2,099
Air Taxi	5,361	3,583	3,746	4,094
General Aviation	11,724	12,955	13,500	14,634
Military	841	841	841	841
Local				
General Aviation	11,507	12,873	13,449	14,664
Military	926	926	926	926
Total Annual Operations	**30,745**	**33,161**	**34,463**	**37,258**
BASED AIRCRAFT	**63**	**67**	**73**	**84**

Source: Coffman Associates analysis

AIRFIELD CAPACITY AND DELAY

Airfield capacity is measured in a variety of different ways. The **hourly capacity** of a runway measures the maximum number of aircraft operations that can take place in an hour. The **annual service volume** (ASV) is an annual level of service that may be used to define airfield capacity needs and is a reasonable estimate of the maximum level of aircraft operations that can be accommodated in a year without incurring significant delay factors. **Aircraft delay** is the total delay incurred by aircraft using the airfield during a given timeframe. FAA AC 150/5060-5, *Airport Capacity and Delay*, provides a methodology for examining the operational capacity of an airfield for planning purposes.

FACTORS AFFECTING ANNUAL SERVICE VOLUME

This analysis considers specific factors about the airfield, such as airfield layout, weather conditions, aircraft mix, and operations in order to calculate the airport's ASV. These factors are depicted in **Exhibit 3A**. The following describes the input factors as they relate to TXK.

- **Runway Configuration –** The existing runway configuration consists of a primary runway (Runway 4-22) and an intersecting crosswind runway (Runway 13-31), each supported by full - or partial- parallel taxiways. Runway 4-22 is 6,601 feet long and is used by all airport users including commercial service operators, military, and general aviation (GA) aircraft. Runway 13-31 is 5,200 feet long and is used primarily by GA aircraft.

- **Runway Use –** Runway use in capacity conditions will be controlled by wind and/or airspace conditions. The direction of takeoffs and landings are generally determined by the direction of the wind. It is generally safest for aircraft to depart and land into the wind in order to avoid crosswind (wind blowing perpendicular to the aircraft) or tailwind components. According to the historical wind conditions, Runway 13 is the favorable runway 27.1 percent of the time, and Runway 4 is favorable 24.2 percent of the time. Runway 22 is the favorable runway approximately 22 percent of the time, with Runway 31 being the favorable runway 12.9 percent of the time. Calm wind conditions (0-3 knots) occur the remaining 13.8 percent of the time, during which Runway 4-22 is most likely to be used.

  The availability of instrument approaches is also considered. While each runway at TXK provides instrument approach capabilities, Runway 22 is primarily used in instrument weather conditions since it is the only runway with an approach with visibility minimums less than one mile and is equipped with an approach lighting system which aids in identifying, aligning to, and approaching the runway. Runways 13 and 31 have instrument approaches and do provide opportunities for operations during poor weather conditions, but the visibility minimums do not permit anything below one mile; therefore, only Runway 4-22 is considered useful during instrument conditions for the purposes of this capacity analysis.

- **Exit Taxiways –** Exit taxiways impact airfield capacity as the number and location of exits directly determine the occupancy time of an aircraft on the runway. The airfield capacity analysis gives credit to taxiway exits located within a prescribed range from a runway's threshold. This range is based on the mix index of the aircraft that use the runways. For Runway 4-22, only exit taxiways located between 3,500 and 6,500 feet from the threshold count in the capacity determination. For Runway 13-31, exits that are located between 2,000 and 4,000 feet from the threshold count. Exits must also be at least 750 feet apart to count as separate exits. Under these criteria, the average exit factor for each runway is between one and two.

AIRFIELD LAYOUT

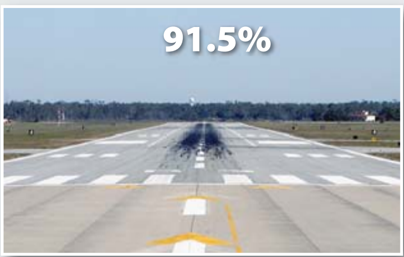
Runway Configuration

Runway Use

Number of Exits

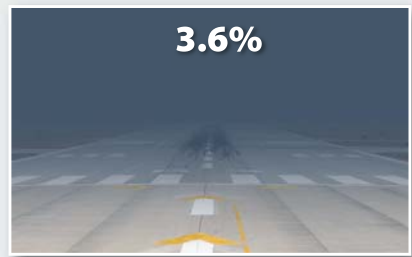
WEATHER CONDITIONS

VMC (VFR)
Visual Meteorological Conditions



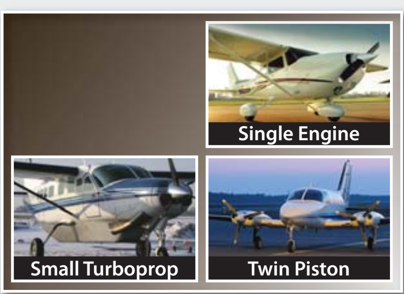
IMC (IFR)
Instrument Meteorological Conditions

PVC
Poor Visibility Conditions



AIRCRAFT MIX

Category A & B Aircraft



Category C Aircraft

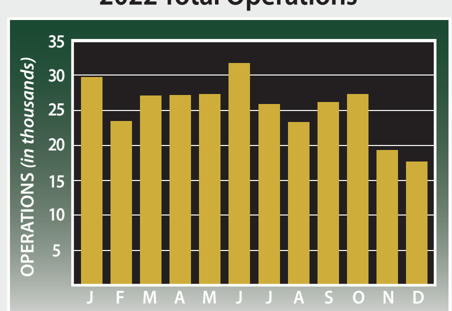
Category D Aircraft

OPERATIONS

Arrivals

Departures

2022 Total Operations



Touch-and-Go Operations

Exhibit 3A
AIRFIELD CAPACITY FACTORS

- **Weather Conditions –** Weather conditions can have a significant impact on airfield capacity. Airfield capacity is usually highest in clear weather when flight visibility is at its best. Airfield capacity is diminished as weather conditions deteriorate and cloud ceilings and visibility are reduced. As weather conditions deteriorate, the spacing of aircraft must increase to provide allowable margins of safety and air traffic vectoring. The increased distance between aircraft reduces the number of aircraft which can operate at the airport during any given period, thus reducing overall airfield capacity.

  According to the meteorological data collected from the automated surface observation system (ASOS), the airport experiences visual flight rule (VFR) conditions approximately 91.53 percent of the time. VFR conditions exist whenever the cloud ceiling is greater than or equal to 1,000 feet above ground level (AGL) and visibility is greater than three statute miles. Instrument flight rule (IFR) conditions are defined when cloud ceilings are between 500 and 1,000 feet AGL or visibility is between one and three miles. The ASOS at TXK reported IFR conditions 4.85 percent of total time. Poor visibility conditions (PVC) apply for cloud ceilings below 500 feet and visibility minimums below one mile. During PVC, the only runway available for use is Runway 22 due to its instrument landing system (ILS) approach. PVC constituted 3.61 percent of total time over the 10-year time period recorded. **Table 3B** summarizes the weather conditions and runway use scenarios experienced at TXK that apply to the capacity analysis.

TABLE 3B | Runway Use Percentages

Runways In-Use	Operating Conditions	Percent by Time
4-22 / 13-31	VFR	91.53%
4-22	IFR	4.85%
22 only	PVC	3.61%

VFR - Visual Flight Rules: > 3 miles visibility and ≥ 1,000-foot cloud ceilings
IFR - Instrument Flight Rules: Visibility > 1-mile and < 3 miles and/or clouds > 500 feet but < 1,000 feet
PVC - Poor Visibility Conditions: Visibility < 1-mile and/or clouds < 500 feet
AGL - Above Ground Level

Source: National Oceanic and Atmospheric Administration (NOAA) - National Climatic Data Center. Airport observations from 2013-2022.

- **Aircraft Mix –** The aircraft mix for the capacity analysis is defined in terms of four aircraft classes, per FAA AC 150/5060-5. Classes A and B consist of small- and medium-sized propeller-driven aircraft and some smaller business jets, all weighing 12,500 pounds or less. These aircraft are associated primarily with GA activity but do include some air taxi, air cargo, and commuter aircraft. Class C consists of aircraft weighing between 12,500 pounds and 300,000 pounds. These aircraft include most business jets and commercial passenger aircraft operating at TXK. Class C operations at TXK are anticipated to grow because of growth in the business jet, air charter, and commercial airline segments over the forecast period. Class D consists of large aircraft weighing more than 300,000 pounds. In 2022, no operations were conducted by aircraft in the Class D group.

  A description of the classifications and the percentage of operational mix for each planning horizon is presented in **Table 3C**.

TABLE 3C | Operational Classifications – Airfield Capacity Analysis

Aircraft Class	2022	%	Short Term	%	Intermediate Term	%	Long Term	%
A&B	22,461	73.1%	23,591	71.1%	24,119	70.0%	25,921	69.6%
C	8,284	26.9%	9,570	28.9%	10,344	30.0%	11,337	30.4%
D	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Totals	**30,745**	**100%**	**33,161**	**100%**	**34,463**	**100%**	**37,258**	**100%**

Class A - Small single engine aircraft with gross weights of 12,500 pounds or less
Class B - Small multi-engine aircraft with gross weights of 12,500 pounds or less
Class C - Large aircraft with gross weights over 12,500 pounds up to 300,000 pounds
Class D - Large aircraft with gross weights over 300,000 pounds

Source: Coffman Associates analysis

- **Percent Arrivals vs. Departures –** The aircraft arrival/departure split is typically 50/50 in the design hour. At TXK, traffic information indicated no major deviation from this pattern.

- **Touch-And-Go Activity –** A touch-and-go operation involves an aircraft making a landing and then an immediate takeoff without coming to a full stop or exiting the runway. As previously discussed in Chapter Two, these operations are normally associated with GA and military training activity and classified as a local operation. A high percentage of touch-and-go traffic normally results in a higher operational capacity because one landing and one takeoff occur within a shorter time than individual operations. According to operations reported by the TXK airport traffic control tower (ATCT), touch-and-go operations account for approximately 37 percent of total annual operations. This ratio is expected to remain relatively steady through the duration of the planning period.

- **Peak Period Operations –** Typical operations activity is important in the calculation of an airport's ASV as "peak demand" levels occur sporadically. The peak periods used in the capacity analysis are representative of normal operational activity and can be exceeded at various times throughout the year. For the airfield capacity analysis, average daily operations and average peak hour operations during the peak month are used.

CALCULATION OF ANNUAL SERVICE VOLUME

The preceding information was used in conjunction with the airfield capacity methodology developed by the FAA to determine airfield capacity for TXK.

Hourly Runway Capacity

The first step in determining ASV involves the computation of the hourly capacity of the runway configuration. The percentage use of the runway, the amount of touch-and-go activity, and the number and locations of runway exits are the important factors in determining hourly capacity.

Based on these factors, the current and future hourly capacities for TXK were determined. As the operational mix of aircraft at the airport changes to include a higher percentage of large aircraft weighing over 12,500 pounds, the hourly capacity of the system varies slightly through the planning period. This is a result of the additional spacing and time required by larger aircraft in the traffic pattern and on the runway. As indicated in **Table 3C**, the percentage of Class C aircraft is projected to increase in each planning horizon activity milestone.

The current and future weighted hourly capacities are presented in **Table 3D**. Weighted hourly capacity is the measure of the maximum number of aircraft operations that can be accommodated on the airfield in a typical hour. It is a composite of estimated hourly capacities for different airfield operating configurations adjusted to reflect the percentage of time in an average year that the airfield operates under each specific configuration. The weighted hourly capacity on the airfield is projected to remain at 76 operations for the duration of the planning period.

TABLE 3D | Airfield Capacity Summary

	Base Year (2022)	Short Term (1-5 Years)	Intermediate Term (6-10 Years)	Long Term (11-20 Years)
OPERATIONAL DEMAND				
Annual	30,745	33,161	34,463	37,258
CAPACITY				
Annual Service Volume	93,000	97,000	97,000	94,000
Percent Capacity	33.1%	34.2%	35.5%	39.6%
Weighted Hourly Capacity	76	76	76	76

Source: FAA AC 150/5060-5, Airport Capacity and Delay

Annual Service Volume

The ASV is determined by the following equation:

Annual Service Volume = C x D x H

C = weighted hourly capacity
D = ratio of annual demand to the average daily demand during the peak month
H = ratio of average daily demand to the design hour demand during the peak month

The current ASV for the airfield has been estimated at 93,000 operations. The ASV will fluctuate only slightly over the planning period as the operational fleet mix transitions to include more Class C aircraft. With 2022 operations at 30,745, the airport is currently at 33.1 percent of its ASV. Long-range annual operations are forecast to reach 37,258, which would equate to 39.6 percent of the airport's ASV.

A second capacity analysis was conducted to incorporate the potential of air cargo operations, discussed in Chapter Two, as well as developing aviation business interests at the airport. These additional entities would increase the number of operations at TXK, including operations conducted by Class C and Class D aircraft, and the increase in operations could increase the capacity to 42.2 percent of ASV in the long term.

AIRCRAFT DELAY

The effect that the anticipated ratio of demand to capacity will have on users of TXK can be measured in terms of delay. As the number of annual aircraft operations approaches the airfield's capacity, increasing operational delays begin to occur. Delays occur due to arriving and departing aircraft in all weather conditions. Arriving aircraft delays result in aircraft holding outside the airport traffic pattern area. Departing aircraft delays result in aircraft holding at the runway end until they can safely takeoff.

Aircraft delay can vary depending on different operational activities at an airport. At airports where large air carrier aircraft dominate, delay can be greater given the amount of time these aircraft require in the traffic pattern and on approach to land. For airports that accommodate primarily small GA aircraft, experienced delay is typically less since these aircraft are more maneuverable and require less time in the airport traffic pattern.

Table 3E summarizes the potential aircraft delay for TXK. Estimates of delay provide insight into the impacts that the steady increases in aircraft operations have on the airfield and signify the airport's ability to accommodate projected annual aircraft operations. The delay per operation represents an average delay per aircraft. As an airport's percentage capacity increases toward the ASV, delays increase exponentially. Furthermore, complexities in the airspace system that surrounds an airport can also factor into additional delay experienced at the facility.

TABLE 3E | Airfield Delay Summary

	Base Year (2022)	Short Term (1-5 years)	Intermediate Term (6-10 years)	Long Term (11-20 years)
Percent Capacity	33.1%	34.2%	35.5%	39.6%
DELAY				
Per Operation (Minutes)	0.20	0.23	0.27	0.30
Total Annual (Hours)	102	129	153	186

Source: FAA AC 150/5060-5, Airport Capacity and Delay

The current annual delay is estimated at 0.20 minutes per aircraft operation or 102 annual hours. Analysis of delay factors for the long-term planning horizon indicates that annual delays can be expected to reach 0.30 minutes per aircraft operation, or 186 annual hours.

CAPACITY ANALYSIS CONCLUSION

Exhibit 3B compares ASV to existing and forecast operational levels at TXK. The 2022 operations level equates to 33.1 percent of the airfield's ASV. By the long-term planning horizon, total annual operations are expected to represent 39.6 percent of ASV but could rise as high as 42.2 percent with cargo operations.

FAA Order 5090.3C, *Field Formulation of the National Plan of Integrated Airport Systems*, indicates that improvements for airfield capacity purposes should be considered when operations reach 60 to 75 percent of the ASV. This is an approximate level to begin the detailed planning of capacity improvements. When 80 percent of the ASV is reached, capacity improvement projects should become higher priority capital improvements. According to this analysis, operations levels at TXK are not anticipated to reach these percentages in the next 20 years. **The conclusion of the capacity analysis is that the existing airfield capacity at TXK is sufficient to meet operational demand levels forecasted for the next 20 years.**

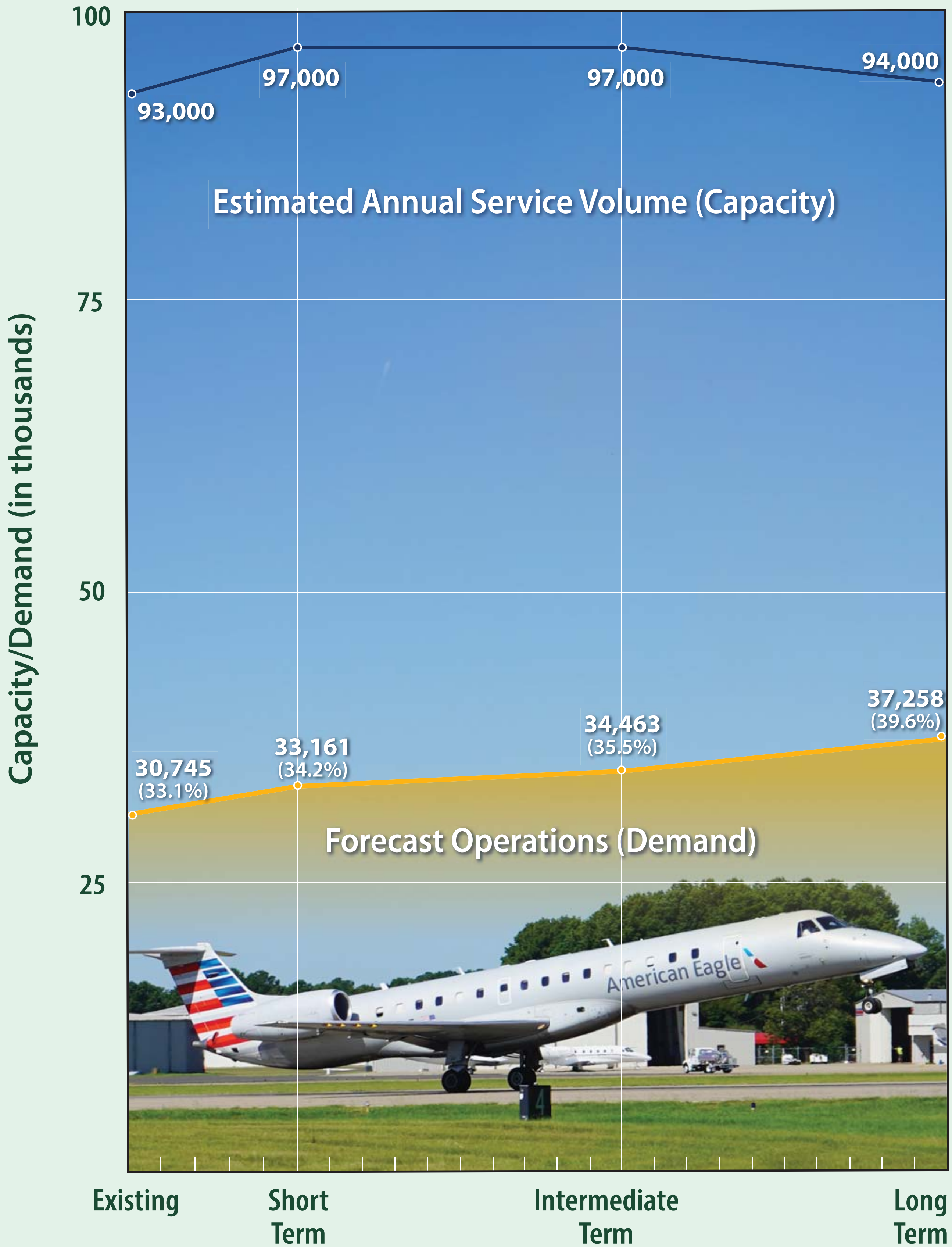


Exhibit 3B
DEMAND/CAPACITY ANALYSIS

AIRFIELD REQUIREMENTS

Analyses of the operational capacity and the critical design aircraft are used to determine airfield needs. This includes runway configuration, dimensional standards, and pavement strength, as well as lighting, marking, and navigational aids.

RUNWAY CONFIGURATION

Key considerations in the runway configuration of an airport involve the orientation for wind coverage and the operational capacity of the runway system. FAA AC 150/5300-13B, *Airport Design*, recommends that a crosswind runway should be made available when the primary runway orientation provides less than 95 percent wind coverage for any aircraft forecast to use the airport on a regular basis.

The 95 percent wind coverage is computed on the bases of the crosswind component not exceeding 10.5 knots (12 mph) for ARC A-I and B-I; 13 knots (15 mph) for ARC A-II and B-II; 16 knots (18 mph) for ARC A-III, B-III, and C-I through D-II; and 20 knots (23 mph) for ARC C-III through D-IV.

The previous 10 years of wind data was obtained from the on-airport ASOS and has been analyzed to identify wind coverage provided by the existing runway orientations. **Exhibit 3C** presents the wind coverage of the runways at TXK for both visual and instrument flight rules (VFR and IFR). At TXK, the orientation of Runway 4-22 provides 95.89 percent coverage for a 10.5 knot crosswind, and greater than 97 percent coverage for 13 knots and greater. Runway 13-31 only provides 94.62 percent coverage for a 10.5 knot crosswind; since the primary runway at TXK exceeds the 95 percent coverage threshold, Runway13-31 does not qualify as a crosswind runway.

To qualify as a second runway, the airfield must be operating at 60 percent or greater of its ASV. It was stated previously that TXK will be operating at between 33 and 43 percent of its ASV over the course of the planning period. As a result, Runway 13-31 does not qualify as a second runway.

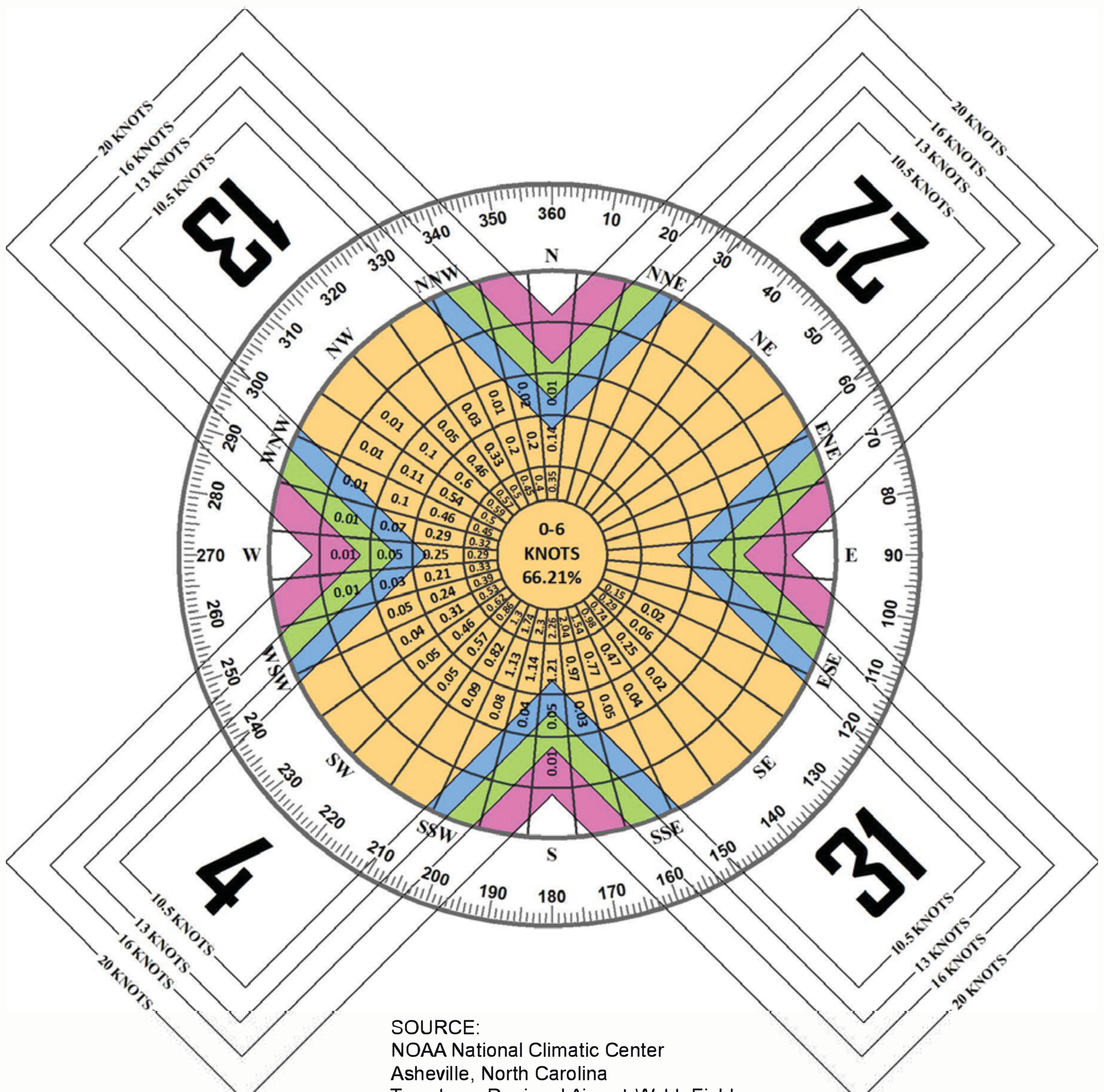
By default, Runway 13-31 is classified as an additional runway and is ineligible for funding under the Airport Improvement Program (AIP) unless the FAA's Airport Planning and Environmental Division (APP-400) determines that it is a required element of the airfield. If Runway 13-31 is determined to be ineligible for AIP funding by APP-400, the Texarkana Regional Airport Authority will have the choice to allow the runway pavement to live out its useful life and then decommission the runway or continue to maintain the runway using its own funding.

RUNWAY DESIGNATIONS

A runway's designation is based on its magnetic headings, which are determined by the magnetic declination for the area. The magnetic declination in the area of TXK is 1° 25'E. Runway 4-22 is oriented northeast-southwest and has true headings of 45°/225° respectively. Runway 13-31 is oriented northwest-southeast with true headings of 135°/315°. Adjusting for the magnetic declination, the current magnetic

ALL WEATHER WIND COVERAGE

Runways	10.5 Knots	13 Knots	16 Knots	20 Knots
Runway 13/31	94.62%	97.26%	99.50%	99.92%
Runway 4/22	95.41%	97.65%	99.45%	99.89%
All Runways	99.54%	99.92%	99.98%	100.00%

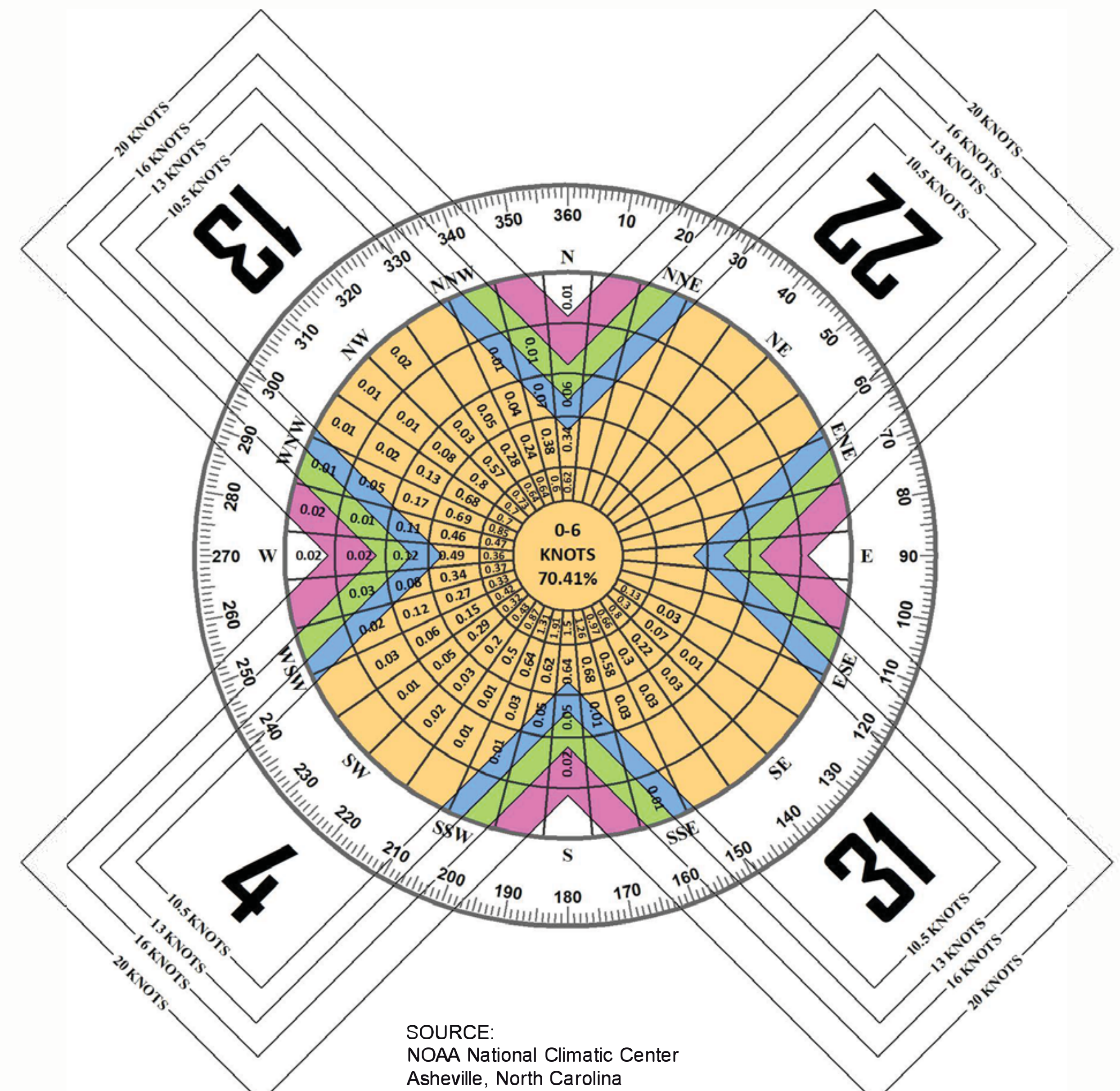


SOURCE:
NOAA National Climatic Center
Asheville, North Carolina
Texarkana Regional Airport-Webb Field
Texarkana, Arkansas

OBSERVATIONS:
111,027 All Weather Observations
Jan. 1, 2012 - Dec, 31 2021

IFR WIND COVERAGE

Runways	10.5 Knots	13 Knots	16 Knots	20 Knots
Runway 13/31	94.99%	97.28%	99.41%	99.87%
Runway 4/22	95.89%	97.81%	99.41%	99.85%
All Runways	99.44%	99.85%	99.96%	99.99%



SOURCE:
NOAA National Climatic Center
Asheville, North Carolina
Texarkana Regional Airport-Webb Field
Texarkana, Arkansas

OBSERVATIONS:
20,568 IFR Observations
Jan. 1, 2012 - Dec, 31 2021

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headings of the runways are 43.97° and 223.97° for Runway 4-22 and 133.97° and 313.97° for Runway 13-31. As such, the current designation for the runways at TXK is appropriate and is not anticipated to change throughout the planning period.

RUNWAY LENGTH REQUIREMENTS

FAA AC 150/5325-4B, *Runway Length Requirements for Airport Design*, provides guidance for determining runway length needs.

The determination of runway length requirements for TXK is based on several factors:

- Mean maximum temperature of the hottest month
- Airport elevation
- Runway gradient
- Critical aircraft type expected to use the runway
- Stage length of the longest nonstop destination (specific to larger aircraft)

Aircraft performance declines as elevations, temperature, and runway gradient factors increase. For TXK, the mean maximum daily temperature of the hottest month is 92.8 degrees Fahrenheit (F), which occurs in August. The airport's elevation is 389.5 feet above mean sea level (MSL). Gradients for each runway are 0.69 percent for Runway 4-22 and 0.48 percent for Runway 13-31.

Airplanes operate on a wide variety of available runway lengths. Many factors will govern the suitability of those runway lengths for aircraft, such as elevation, temperature, wind, aircraft weight, wing flap settings, runway condition (wet or dry), runway gradient, vicinity airspace obstructions, and any special operating procedures. Airport operators can pursue policies that can maximize the suitability of the runway length. Policies such as area zoning and height and hazard restrictions can protect an airport's runway length. Airport ownership (fee simple or easement) of land leading to the runway ends can reduce the possibility of natural growth or man-made obstructions. Planning of runways should include an evaluation of aircraft types expected to use the airport or a particular runway now and in the future. Future plans should be realistic, supported by the FAA approved forecasts, and based on the critical design aircraft (or family of aircraft).

General Aviation Aircraft

Many operations at TXK are conducted using GA aircraft weighing less than 12,500 pounds. Following guidance from AC 150/5325-4B, to accommodate 100 percent of these small aircraft, a runway length of 3,800 feet is recommended. For small aircraft with 10 or more passenger seats, 4,300 feet of runway length is recommended.

For aircraft weighing more than 12,500 pounds but less than 60,000 pounds, including most small to mid-sized business jet aircraft, runway length requirements have also been calculated. These calculations take into consideration the runway gradient and landing length requirements for contaminated runways (wet).

Business jets tend to need greater runway length when landing on a wet surface because of their increased approach speeds. AC 150/5325-4B stipulates that runway length determination for business jets should consider a grouping of airplanes with similar operating characteristics. The AC provides two separate "family groupings of airplanes," each based upon their representative percentage of aircraft in the national fleet. The first grouping is those business jets that make up 75 percent of the national fleet (examples: Cessna Citation I/II/III, XL, Sovereign, Dassault Falcon 10/20/50/900, Learjet 35/36/40/45, Hawker 400/600), and the second group is those making up 100 percent of the national fleet (examples: Bombardier Challenger 600, Cessna Citation X, Learjet 55/60, Hawker 800/1000). A third group considers business jets weighing more than 60,000 pounds. Runway length determination for these aircraft must be based on the performance characteristics of the individual aircraft.

Table 3F presents the results of the runway length analysis for business jets developed following the guidance provided in AC 150/5325-4B. To accommodate 75 percent of the business jet fleet at 60 percent useful load, a runway length of 5,500 feet is recommended. This length is derived from a raw length of 4,752 feet that is adjusted, as recommended, for runway gradient (increase runway length by 10 feet for every foot of runway end elevation difference) and consideration of landing length needs on a contaminated runway (wet and slippery). The adjustments are <u>not cumulative</u> since the first length adjustment applies to takeoffs and the latter to landings. Any final runway length obtained is rounded to the nearest hundred if above 30 feet, otherwise the length is rounded down to the nearest hundred. Once the adjustments are made, the higher of the two is the recommended runway length. To accommodate 100 percent of the business jet fleet at 60 percent useful load, a runway length of 6,100 feet is recommended.

TABLE 3F | Small Aircraft and Business Jet Runway Length Requirements

Airport Elevation:	389.5 feet above MSL			
Average High Monthly Temp:	92.8 degrees (August)			
Runway Gradient:	46.2' elevation difference on Runway 4-22 (max difference of all runways)			
Fleet Mix Category	**Raw Runway Length from FAA AC**	**Runway Length with Gradient Adjustment**	**Wet Surface Landing Length for Jets (+15%)[1]**	**Final Runway Length**
100% of small airplanes	3,800	N/A	N/A	3,800
100% of small airplanes (10+ seats)	4,300	N/A	N/A	4,300
75% of fleet at 60% useful load	4,752	5,214	5,464	5,500
100% of fleet at 60% useful load	5,628	6,090	5,500	6,100
75% of fleet at 90% useful load	6,908	7,370	7,000	7,400
100% of fleet at 90% useful load	8,848	9,310	7,000	9,300

[1]Max 5,500' for 60% useful load and max 7,000' for 90% useful load in wet conditions
Note: All lengths are in feet

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

Utilization of the 90 percent category for runway length determination is generally not considered by the FAA unless there is a demonstrated need at an airport. This could be documented activity by a business jet operator that flies out frequently with heavy loads. To accommodate 75 percent of the business jet fleet at 90 percent useful load, a runway length of 7,400 feet is recommended. To accommodate 100 percent of business jets at 90 percent useful load, a runway length of 9,300 feet is recommended.

Supplemental Runway Length Analysis for Specific GA Aircraft Operating at TXK

Another method to determine runway length requirements for jet aircraft at TXK is to examine aircraft flight planning manuals under conditions specific to the airport. **Exhibit 3D** provides a detailed runway takeoff length analysis for the most common business jet and turboprop aircraft in the national fleet. This data was obtained from Ultranav software which computes operational parameters for specific aircraft based on flight manual data. The analysis includes the maximum takeoff weight (MTOW) allowable and the percent useful load from 60 percent to 100 percent. Some aircraft are subject to climb limitations at higher useful loads and would be unable to takeoff at TXK under the conditions evaluated.

The exhibit is color coded to illustrate the effectiveness of the runway system at TXK. Those lengths in green represent takeoff length requirements that can be met by the existing length of Runway 13-31 at 5,200 feet. Yellow values are those that would still be able to operate at TXK but would require the use of Runway 4-22. Red lengths are those that exceed the available runway length on Runway 4-22. As can be seen from the exhibit, the critical design aircraft (Citation Excel/XLS) can safely operate at TXK up to 100 percent of its useful load. Many business jets, however, become restricted to only using the longer runway and become weight limited at higher useful loads. At 80 percent useful load, the average takeoff length required by the analyzed aircraft is 5,490 feet; the maximum length required at the same weight is 7,375 feet.

Exhibit 3D also presents the runway length required for landing under three operational categories: Title 14 Code of Federal Regulations (CFR) Part 25, CFR Part 135, and CFR Part 91k. CFR Part 25 operations are those conducted by individuals or companies which own their aircraft. CFR Part 135 applies to all for-hire charter operations, including most fractional ownership operations. CFR Part 91k includes operations in fractional ownership which utilize their own aircraft under direction of pilots specifically assigned to said aircraft. Part 91k and Part 135 rules regarding landing operations require operators to land at the destination airport within 60 percent of the effective runway length. An additional rule allows operators to land within 80 percent of the effective runway length if the operator has an approved destination airport analysis in the airport's program operating manual. The landing length analysis conducted accounts for both scenarios.

Following the same three-color key as before, it can be seen that the runways at TXK are adequate for Part 25 operations in dry conditions and gradually become more restrictive under Part 91/135 rules and when the runway is contaminated. The Citation Excel/XLS cannot operate at all at TXK under either the 80 or 60 percent rule under wet conditions; a runway length of up to 9,900 feet would satisfy the landing requirements of the Excel.

Commercial Aircraft

Runway length needs for commercial service aircraft must factor the local operating conditions described above and the load carried. The aircraft load is dependent upon the payload of passengers and/or cargo, plus the amount of fuel it has on board. For departures, the amount of fuel varies depending upon the length of non-stop flight or trip length.

Aircraft	MTOW	Runway Length (ft.) Needed At % Useful Load				
		60%	70%	80%	90%	100%
Pilatus PC-12	9,921	2,119	2,292	2,473	2,663	2,861
Citation V	15,900	3,168	3,445	3,742	4,054	4,383
Citation CJ3	13,870	3,179	3,429	3,718	4,016	4,371
Citation Mustang	8,645	3,272	3,654	4,134	4,780	5,519
Citation Encore	16,630	3,316	3,685	4,030	4,445	4,915
King Air 200 GT	12,500	3,447	3,560	3,680	3,804	3,935
Citation CJ2	12,375	3,487	3,775	4,094	4,412	4,701
Citation II	13,300	3,499	3,871	4,248	4,646	5,063
King Air 350	15,000	3,617	3,776	3,966	4,275	4,656
Citation Sovereign	30,300	3,653	3,762	3,968	4,270	4,623
Citation Excel/XLS	**20,200**	**3,768**	**4,072**	**4,412**	**4,744**	**5,141**
Lear 31A	17,000	4,237	4,604	5,008	5,450	5,933
Beechjet 400A	16,300	4,250	4,574	4,893	5,227	5,714
Citation Bravo	14,800	4,292	4,617	4,980	5,399	5,862
Lear 40XR	21,000	4,353	4,655	5,039	5,454	5,836
Falcon 900EX	49,200	4,370	4,950	5,650	6,360	7,000
Premier 1A	12,500	4,419	4,945	5,563	6,241	6,945
Lear 45XR	21,500	4,490	4,846	5,272	5,715	6,151
Gulfstream V	90,500	4,522	5,072	5,899	6,901	8,050
Citation CJ1	10,600	4,527	5,297	6,162	7,113	8,127
Gulfstream 280	39,600	4,536	5,004	5,542	6,128	6,838
Global 5000	92,500	4,548	5,066	5,608	6,175	6,768
Hawker 4000	39,500	4,599	5,021	5,470	6,001	6,744
Falcon 7X	70,000	4,649	5,220	5,837	6,523	7,260
Lear 40	21,000	4,684	5,154	5,684	6,089	6,999
Gulfstream 450	74,600	4,684	5,161	5,702	6,277	6,904
Falcon 50 EX	41,000	4,690	5,199	5,737	6,304	6,826
Hawker 800/850 XP	28,000	4,722	5,166	6,141	Climb Limited	Climb Limited
Gulfstream IV	74,600	4,783	5,095	5,683	6,228	Climb Limited
Gulfstream 550	91,000	4,803	5,507	6,223	7,013	7,964
Challenger 300	38,850	4,866	5,336	5,825	6,338	6,873
Global Express	98,000	4,956	5,560	6,196	6,860	7,558
Lear 45	21,500	4,976	5,496	5,891	6,617	7,802
Falcon 2000	35,800	5,113	5,729	6,593	7,217	8,202
Gulfstream 650	99,600	5,119	5,639	6,236	6,926	7,719
Challenger 604/605	48,200	5,170	5,724	6,348	7,013	7,688
Citation III	21,500	5,170	5,743	6,366	Climb Limited	Climb Limited
CRJ-200	53,000	5,237	5,831	6,522	7,293	8,211
Challenger 601	45,100	5,240	5,850	6,520	7,400	8,470
Gulfstream 150	26,100	5,251	5,536	5,800	6,359	Climb Limited
Lear 55	21,500	5,270	5,878	6,670	7,741	Field Limited
Citation X	35,700	5,295	5,799	6,382	6,992	7,681
Citation VII	23,000	5,300	5,735	6,206	6,730	Climb Limited
Lear 60	23,500	5,606	6,212	6,857	7,521	8,358
Hawker 1000	31,000	5,610	6,290	6,970	Climb Limited	Climb Limited
Embraer 135	49,604	5,717	6,336	6,704	7,188	7,925
Lear 35A	19,600	5,765	6,541	7,375	Climb Limited	Climb Limited
Average Takeoff Length		**4,518**	**4,973**	**5,490**	**5,928**	**6,476**

Calculation assumptions: 389.5' MSL field elevation; 0.7% runway grade; 98.2°F ambient temperature.

Green figures are less than Runway 13-31.

Yellow figures are those that are greater than Runway 13-31 but less than Runway 4-22.

Red figures are greater than the available runway lengths at TXK.

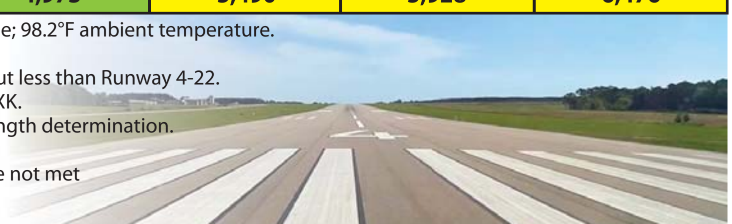
Boldface indicates current critical design aircraft for Runway 13-31 length determination.

MTOW: Maximum Takeoff Weight

Climb Limited: Minimum required one engine out climb performance not met

Field Limited: Takeoff field length limited

Source: Ultranav software; Coffman Associates analysis



Aircraft	MLW	Dry Runway Condition			Wet Runway Condition		
		Part 25	80% Rule	60% Rule	Part 25	80% Rule	60% Rule
King Air 200 GT	12,500	1,218	1,523	2,030	N/A		
Pilatus PC-12	9,921	2,372	2,965	3,953	N/A		
Citation II	12,700	2,467	3,084	4,112	5,961	7,451	9,935
Challenger 300	33,750	2,626	3,283	4,377	5,033	6,291	8,388
Hawker 800/850 XP	23,350	2,675	3,344	4,458	4,219	5,274	7,032
Global 5000	78,600	2,690	3,363	4,483	3,093	3,866	5,155
Global Express	78,600	2,690	3,363	4,483	3,093	3,866	5,155
Embraer 135	40,785	2,705	3,381	4,508	3,101	3,876	5,168
Gulfstream 550	75,300	2,794	3,493	4,657	5,380	6,725	8,967
Challenger 604/605	38,000	2,808	3,510	4,680	4,378	5,473	7,297
Gulfstream V	75,300	2,809	3,511	4,682	3,230	4,038	5,383
Citation Mustang	8,000	2,811	3,514	4,685	3,967	4,959	6,612
Lear 40	19,200	2,891	3,614	4,818	3,727	4,659	6,212
Lear 40XR	19,200	2,893	3,616	4,822	3,727	4,659	6,212
Lear 45	19,200	2,893	3,616	4,822	3,727	4,659	6,212
Lear 45XR	19,200	2,893	3,616	4,822	3,727	4,659	6,212
CRJ-200	47,000	2,930	3,663	4,883	5,616	7,020	9,360
Hawker 1000	25,000	2,934	3,668	4,890	4,014	5,018	6,690
Falcon 7X	62,400	2,944	3,680	4,907	3,386	4,233	5,643
Falcon 50 EX	35,715	2,949	3,686	4,915	3,392	4,240	5,653
King Air 350	15,000	3,002	3,753	5,003	3,452	4,315	5,753
Lear 31A	16,000	3,084	3,855	5,140	4,317	5,396	7,195
Falcon 2000	33,000	3,149	3,936	5,248	3,621	4,526	6,035
Citation Sovereign	27,100	3,216	4,020	5,360	4,174	5,218	6,957
Gulfstream 280	32,700	3,245	4,056	5,408	3,731	4,664	6,218
Citation CJ1	9,800	3,246	4,058	5,410	4,419	5,524	7,365
Gulfstream 450	66,000	3,285	4,106	5,475	5,964	7,455	9,940
Lear 35A	15,300	3,305	4,131	5,508	4,627	5,784	7,712
Citation V	15,200	3,307	4,134	5,512	4,897	6,121	8,162
Gulfstream 150	21,700	3,331	4,164	5,552	4,917	6,146	8,195
Challenger 601	36,000	3,349	4,186	5,582	4,019	5,024	6,698
Citation CJ3	12,750	3,368	4,210	5,613	4,600	5,750	7,667
Citation Encore	15,200	3,387	4,234	5,645	5,127	6,409	8,545
Lear 55	18,000	3,423	4,279	5,705	5,478	6,848	9,130
Citation VII	20,000	3,440	4,300	5,733	4,691	5,864	7,818
Hawker 4000	33,500	3,455	4,319	5,758	3,974	4,968	6,623
Premier 1A	11,600	3,464	4,330	5,773	4,497	5,621	7,495
Citation CJ2	11,500	3,549	4,436	5,915	5,113	6,391	8,522
Gulfstream IV	66,000	3,653	4,566	6,088	7,002	8,753	11,670
Lear 60	19,500	3,668	4,585	6,113	5,006	6,258	8,343
Citation Excel/XLS	**18,700**	**3,714**	**4,643**	**6,190**	**5,921**	**7,401**	**9,868**
Beechjet 400A	15,700	3,800	4,750	6,333	5,748	7,185	9,580
Citation Bravo	13,500	3,964	4,955	6,607	6,241	7,801	10,402
Gulfstream 650	83,500	4,086	5,108	6,810	5,301	6,626	8,835
Citation III	19,000	4,180	5,225	6,967	6,063	7,579	10,105
Falcon 900EX	44,500	4,251	5,314	7,085	4,251	5,314	7,085
Citation X	31,800	4,296	5,370	7,160	6,169	7,711	10,282
Average Landing Length		**3,175**	**3,968**	**5,291**	**4,580**	**5,725**	**7,633**

Calculation assumptions: 389.5' MSL field elevation; 0.7% runway grade; 98.2°F ambient temperature.
Green figures are less than Runway 13-31.
Yellow figures are those that are greater than Runway 13-31 but less than Runway 4-22.
Red figures are greater than the available runway lengths at TXK.
Boldface indicates current critical design aircraft for Runway 13-31 length determination.
MLW: Maximum Landing Weight
N/A: Aircraft landing length not adjusted for wet runway conditions
Source: Ultranav software; Coffman Associates analysis

The current TXK commercial fleet mix includes primarily regional jet aircraft such as the Bombardier CRJ-700. An analysis in Chapter Two projected that TXK commercial operations should continue to be dominated by these type of regional jet aircraft and may transition to the larger Embraer E175 regional jet. The cargo analysis completed in Chapter Two also provided support for the possibility of more frequent narrowbody operations supporting air cargo operations by aircraft such as the Boeing 757 and 767F. For this reason, a variety of commercial aircraft were evaluated at useful loads ranging from 60 percent up to 100 percent (maximum takeoff weight). The results of the commercial aircraft takeoff length requirements are presented in **Table 3G**. The analysis used each aircraft's operating manual and allows for only pre-defined parameters, specifically a dry, zero-grade runway, no wind, and ambient temperatures published in the manual; in this case, an average of 86 degrees Fahrenheit. The lengths were adjusted for the airport's elevation of 389.5 feet MSL.

TABLE 3G | Commercial Aircraft Takeoff Length Requirements

Aircraft	MTOW	Runway Length (ft) Needed At % Payload				
		60%	70%	80%	90%	100%
Embraer E170	79,344	3,500	3,900	4,400	4,900	5,300
Embraer E190	110,892	3,900	4,500	5,200	6,600	7,600
Boeing 737-600	144,500	4,100	5,000	5,900	6,600	7,600
Bombardier CRJ-700	**75,000**	**4,300**	**4,800**	**5,400**	**5,600**	**6,000**
Boeing 767-200	315,000	4,400	4,900	5,300	5,800	6,300
Boeing 757-200	240,000	4,800	5,300	5,800	6,500	7,800
Boeing 737-500	133,500	4,800	5,300	6,000	7,000	9,000
Bombardier CRJ-900	82,500	5,000	5,700	6,100	6,500	7,000
Boeing 737-700	154,500	5,000	5,900	6,800	8,000	10,100
Boeing 777-200	508,000	5,000	5,500	6,100	6,800	7,100
Boeing 757-300	255,000	5,100	5,800	6,300	7,000	7,800
Boeing 737-800	174,200	5,100	5,900	6,500	7,100	8,100
Boeing 747-SP	670,000	5,500	5,800	6,100	6,600	7,400
Boeing 767-300F	412,000	6,000	6,800	7,400	7,900	11,500
Boeing 767-400	450,000	6,800	7,800	8,500	9,600	11,700

Boldface indicates current critical design aircraft for Runway 4-22 length determination.
Calculation assumptions: 389.5' MSL field elevation; zero wind; zero gradient; dry surface; 86°F ambient temperature.
MTOW: Maximum Takeoff Weight
Source: Aircraft Planning Manuals

Runway Length Summary

Runway 4-22 | The current critical design aircraft for runway length purposes on Runway 4-22 is the Bombardier CRJ-700. American Airlines had been operating the Embraer ERJ-145 on the same route schedule up until October 2022. Thus, the 2,508 ERJ-145 operations at TXK in 2022 are expected to be conducted with the CRJ-700; therefore, the CRJ-700 will exceed the 500 operations threshold to be considered the critical design aircraft. The CRJ-700 requires 6,000 feet of runway length to operate safely at its MTOW of 75,000 pounds. Larger commercial service and cargo aircraft with longer runway needs, such as the Boeing 737 series, currently operate on an infrequent basis and do not meet the threshold to be an existing critical design aircraft for runway length purposes. The forecasts presented in the previous chapter outline a transitioning fleet mix of aircraft, including upgauging from the CRJ-700 to the Embraer E175 on commercial service routes, either by American Airlines or the introduction of a second air carrier; however, the bulk of the commercial aircraft fleet at TXK is anticipated to remain within the regional jet category, which would require a runway length up to 7,600 feet to operate safely at their maximum takeoff weight.

The possible introduction of air cargo activities was presented in the previous chapter and could result in a transition to more frequent operations by larger aircraft such as the Boeing 757 or 767. This scenario may be beyond the short- or intermediate-term planning horizons, but facility planning should consider potential runway length needs of between 7,100 feet (Boeing 737-800) and 9,600 feet (Boeing 767-300F) for these aircraft to operate at 90 percent of their respective MTOW.

Additionally, the airport has received letters of intent from two specialized aviation service operators, including a maintenance/repair/overhaul (MRO) and an aircraft paint shop. These companies would introduce operations consisting of large-bodied commercial jets, specifically the Boeing 747 and 777. The companies have indicated a minimum need of 7,101 feet of runway to safely operate at TXK.

Runway 13-31 | The crosswind runway at TXK has been identified as the GA runway and, as such, is planned to the Citation Excel/XLS business jet as its critical design aircraft. Its current length of 5,200 feet is adequate for all small aircraft and several business jet aircraft takeoff needs at MTOW and can accommodate a fair number of business jets when landing during wet runway conditions while operating under Part 25. The runway becomes unusable for many aircraft with higher MTOWs during takeoff or landing operations during wet conditions.

Runway 13-31 does have published declared distances, which limits the use of some runway pavement for landing and takeoff operations. Declared distances are used to define the effective runway length for landing and takeoff when a standard runway safety area (RSA) or runway object free area (ROFA) cannot be achieved, or a runway protection zone (RPZ) needs to be relocated.

The four declared distances include:

- **Takeoff Run Available (TORA) –** the runway length declared available and suitable for the ground run of an aircraft taking off (factors in the positioning of the departure RPZ);
- **Takeoff Distance Available (TODA) –** the TORA plus the length of any remaining runway or clearway beyond the far end of the TORA; the full length of the TODA may need to be reduced because of obstacles in the departure area;
- **Accelerate-Stop Distance Available (ASDA) –** the runway plus stopway length declared available and suitable for the acceleration and deceleration of an aircraft aborting a takeoff (factors in the length of RSA/ROFA beyond the runway end);
- **Landing Distance Available (LDA) –** the runway length declared available and suitable for landing an aircraft (factors in the length of RSA/ROFA beyond the runway end and the positioning of the approach RPZ).

Due to the existing 641-foot displaced threshold on Runway 13, the LDA is reduced to 4,559 feet for both Runways 13 and 31, as well as a reduced ASDA of 4,559 feet for Runway 31. The displaced threshold provides adequate clearance for aircraft landing on Runway 13 to avoid obstacles that may otherwise be present. All other declared distances for Runway 13-31 are the full length of 5,200 feet. In the course of this master plan, however, it was revealed that the primary reason for the displaced threshold – maintaining an outdated RSA standard – no longer exists; therefore, the alternatives chapter will explore removing the displaced threshold from Runway 13.

The existing length of Runway 13-31 is sufficient to accommodate all small aircraft as well as the identified critical design aircraft, the Cessna Citation Excel/XLS, at its MTOW during takeoff. The Excel is capable of landing on Runway 13-31 during dry Part 25 and some Part 91/135 operations but is restricted to using Runway 4-22 under wet runway conditions, and only then while operating under Part 25 rules. The existing runway length is adequate for lighter business jets during takeoff but becomes prohibitive for aircraft with higher MTOWs or when landing during wet conditions. If GA aircraft require additional runway length, Runway 4-22 is available; therefore, no change to the length of Runway 13-31 is recommended.

RUNWAY WIDTH

Runway width standards are a function of the established runway design code (RDC) and instrument visibility minimums for a given runway. At TXK, Runway 4-22 is served by instrument approach procedures with visibility minimums down to ½-mile. The current RDC has been established as C-II, and the future RDC is established as C-III. The FAA design standard width for C-III runways is 100 feet unless the MTOW of the critical aircraft is over 150,000 pounds; the existing and future critical aircraft have MTOW less than 150,000 pounds. Thus, the current surface width of 150 feet exceeds the design standard. It should be noted that typically the FAA may only support maintaining the design width of 100 feet when major rehabilitation projects are completed. The additional width would either have to live out its useful life or continue to be maintained by the airport using its own funding.

Runway 13-31 is currently 100 feet wide. The runway has an established and future RDC of B-II and is equipped with instrument approach procedures with visibility minimums as low as 1-mile. The current runway width exceeds the design standard of 75 feet. Just as the case with Runway 4-22, maintaining the runway at its current width may not be supported by the FAA and left to the airport to either maintain or allow it to be reduced to 75 feet wide.

PAVEMENT STRENGTH

An important feature of airfield pavement is its ability to withstand repeated use by aircraft. The FAA reports the pavement strength for runways based on the configuration of the aircraft landing gear. For example, (S) indicates an aircraft with a single wheel on each landing gear, (D) is aircraft with two wheels on each landing gear, and (2D) is aircraft with four wheels on each landing gear in a "two-by-two" configuration. The previous chapter identified the critical design aircraft for each runway, and for this analysis the heaviest critical aircraft is used to determine runway pavement strength needs.

The current strength rating on Runway 4-22 is 50,000 pounds single wheel loading (S), 86,000 pounds dual wheel loading (D), and 120,000 pounds dual tandem wheel loading (2D). The existing critical design aircraft is the Bombardier CRJ-700, which has a dual (D) landing gear configuration and an MTOW of approximately 78,000 pounds. The future critical aircraft is the Embraer E175, which also has a dual (D) gear and an MTOW of approximately 80,000-90,000 pounds, depending on the aircraft configuration. This indicates that the runway strength rating is adequate for the existing critical aircraft but could be improved up to 100,000 pounds to ensure compatibility with the E175 as well as heavier business jets, such as the Gulfstream G550/650.

An additional consideration for long-term strength planning for Runway 4-22 is the possibility of larger commercial airline and/or cargo aircraft, as discussed previously and in the last chapter. Aircraft such as the Boeing 757 and 767 are generally equipped with dual tandem gears and can weigh as much as 270,000 pounds and 450,000 pounds, respectively. The Boeing 737-series have dual (D) gears and weigh less than their larger versions but still tip the scale up to 190,000 pounds. Furthermore, larger business jets such as the Gulfstream G550/G650 and Bombardier Global models can weigh 100,000 pounds on a dual (D) gear system; therefore, long-term planning for Runway 4-22 should consider improving the dual strength rating (D) to 200,000 pounds and the dual tandem (2D) up to 400,000 pounds. When considering the possibility of larger Boeing jets (747 and 777) operating at TXK, additional consideration of improvement up to 600,000 pounds triple dual tandem (3D) and 900,000 pounds double dual tandem (2D2) should be made.

Runway 13-31 is used more often by GA aircraft and business jets, including the identified current and future critical design aircraft, the Cessna Citation Excel. With a single wheel (S) strength rating of 25,000 pounds, the runway can accommodate the Citation Excel, but is lacking when evaluating larger business jet aircraft. Several larger jets, such as the Citation Sovereign/Latitude, Hawker 850XP, and Dassault Falcon 900 have double gear (D) configurations and can weigh up to 70,000 pounds; therefore, it is recommended to consider improving the strength rating of Runway 13-31 to 30,000 pounds (S) and 70,000 pounds (D).

It should be noted that the strength rating of a runway does not preclude aircraft weighing more than the published strength rating from using the runway. The strength is based on design parameters which support a high volume of aircraft at or below the published weight, allowing the pavement to survive its intended useful life. Aircraft weighing more than the published weight could damage the runway in severe conditions, but more likely will simply reduce the life cycle of the pavement.

TAXIWAYS

The design standards associated with taxiways are determined by both the taxiway design group (TDG) and the airplane design group (ADG) of the critical design aircraft. As determined previously, the applicable ADG for TXK is II in the current and III in the future conditions, based on the CRJ-700 and E175, respectively. **Table 3H** presents the taxiway design standards related to ADG II and III.

The table also shows those taxiway design standards related to the TDG. The TDG standards are based on the main gear width (MGW) and the cockpit-to-main gear (CMG) distance of the critical design aircraft expected to use the taxiways. The existing TDG at TXK is 2B and is based on the CRJ-700, while the future TDG is 3 and based on the E175. Different taxiway/taxilane surfaces can and should be designed to meet the most appropriate TDG design standards.

Many GA aircraft, such as the Citation CJ-series business jets and the Beechcraft King Air 200/300/350, a turboprop aircraft commonly used by private businesses and charter operations, will have a TDG classification of 2A. The design standards for TDG 2A and 2B differ only slightly; thus, facility planning will focus on TDG 2B and 3 moving forward.

The table also presents the taxiway/taxilane design standards for ADG IV/V and TDG 4/5. Several specialized aviation service operators (SASOs) have expressed interest and plans to establish locations at TXK.

These SASOs would provide services to a variety of customers whose fleets include large-bodied aircraft, such as the Boeing 757, 767, 777, and 747. Furthermore, the cargo analysis prepared in the previous chapter discussed the potential of increased operations in the long term by larger cargo aircraft, including the Boeing 757 and 767; therefore, it is prudent to understand the possible need to plan certain portions of the airfield to accommodate these larger aircraft now.

The taxiway system at TXK ranges in width from 50 to 60 feet, exceeding TDG 2B standards and meets TDG 3 standards.

TABLE 3H | Taxiway Dimensions and Standards

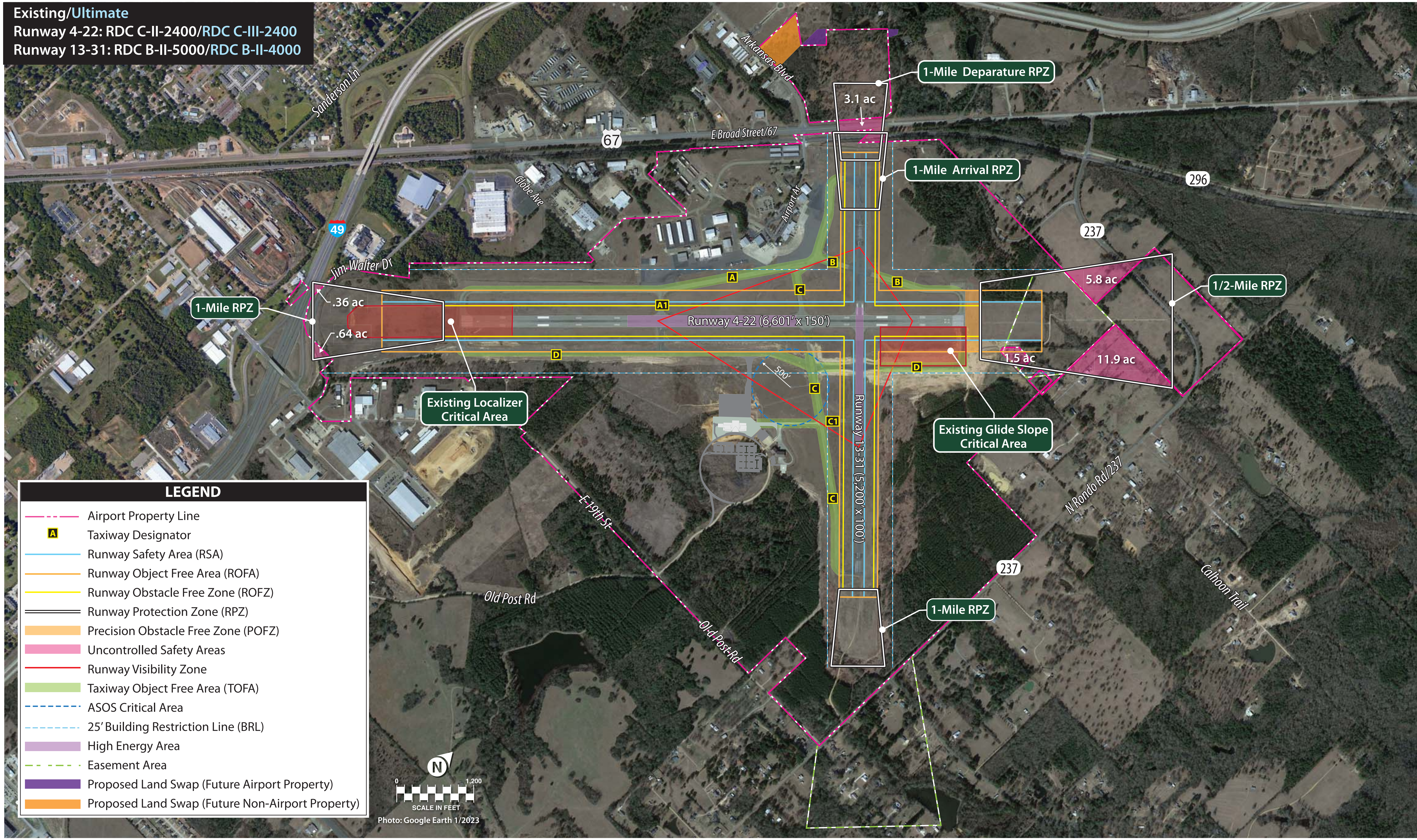
STANDARDS BASED ON ADG	ADG II	ADG III	ADG IV	ADG V
Taxiway Protection				
Taxiway Safety Area (TSA) Width	79	118	171	214
Taxiway Object Free Area (TOFA) Width	124	171	243	285
Taxilane Object Free Area (TLOFA) Width	110	158	224	270
Taxiway Separation				
Taxiway Centerline to:				
Fixed or Movable Object	62	85.5	121.5	142.5
Parallel Taxiway/Taxilane	101.5	144.5	207	249.5
Taxilane Centerline to:				
Fixed or Movable Object	55	79	112	135
Parallel Taxilane	94.5	138	197.5	242
Wingtip Clearance				
Taxiway Wingtip Clearance	22.5	26.5	36	35.5
Taxilane Wingtip Clearance	15.5	20	26.5	28
STANDARDS BASED ON TDG	**TDG 2A/2B**	**TDG 3**	**TDG 4**	**TDG 5**
Taxiway Width Standard	35	50	50	75
Taxiway Edge Safety Margin	7.5	10	10	14
Taxiway Shoulder Width	15	20	20	30

ADG: Airplane Design Group
TDG: Taxiway Design Group

Source: FAA AC 150/5300-13B, Airport Design

Aircraft traveling on taxiways are protected by a Taxiway Safety Area (TSA) and a Taxiway Object Free Area (TOFA). The TSA must be (1) cleared and graded and have no potentially hazardous ruts, humps, depressions, or other surface variations; (2) it must be drained by grading or storm sewers to prevent water accumulation; (3) it must be capable of supporting firefighting equipment and the occasional passage of aircraft without causing structural damage to the aircraft; and (4) it must be free of objects except for those needed for navigational functions.

TOFA clearing standards prohibit service vehicle roads, parked aircraft, and other objects, except for objects that need to be located in the TOFA for air navigation or aircraft ground maneuvering purposes. The ADG II TSA has a width of 79 feet, and the TOFA has a width of 124 feet, both centered on the taxiway centerline. **Exhibit 3E** presents the various safety areas on the airfield and shows that there are no conflicts within either the TSA or the TOFA, and they should be maintained as such through the planning period as these safety areas increase in size in the ultimate condition.


Existing/Ultimate
Runway 4-22: RDC C-II-2400/RDC C-III-2400
Runway 13-31: RDC B-II-5000/RDC B-II-4000
1-Mile Deparature RPZ
3.1 ac
1-Mile Arrival RPZ
1/2-Mile RPZ
5.8 ac
11.9 ac
1.5 ac
1-Mile RPZ
.36 ac
.64 ac
Runway 4-22 (6,601' x 150')
Runway 13-31 (5,200' x 100')
Existing Localizer Critical Area
Existing Glide Slope Critical Area
500'
A
A1
B
C
C1
D
Sanderson Ln
E Broad Street/67
67
296
237
49
Globe Ave
Airport Ar
Arkansas Blvd
Jim Walter Dr
E 19th St
Old Post Rd
N Rondo Rd/237
Calhoon Trail
LEGEND
Airport Property Line
Taxiway Designator
Runway Safety Area (RSA)
Runway Object Free Area (ROFA)
Runway Obstacle Free Zone (ROFZ)
Runway Protection Zone (RPZ)
Precision Obstacle Free Zone (POFZ)
Uncontrolled Safety Areas
Runway Visibility Zone
Taxiway Object Free Area (TOFA)
ASOS Critical Area
25' Building Restriction Line (BRL)
High Energy Area
Easement Area
Proposed Land Swap (Future Airport Property)
Proposed Land Swap (Future Non-Airport Property)
N
0
1,200
SCALE IN FEET
Photo: Google Earth 1/2023

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TAXIWAY DESIGN CONSIDERATIONS

FAA AC 150/5300-13B, *Airport Design*, provides guidance on recommended taxiway and taxilane layouts to enhance safety by avoiding runway incursions. A runway incursion is defined as "any occurrence at an airport involving the incorrect presence or an aircraft, vehicle, or person on the protected area of a surface designated for the landing and takeoff of aircraft."

The taxiway system at TXK generally provides for the efficient movement of aircraft; however, AC 150/5300-13B, *Airport Design*, provides recommendations for taxiway design. The following is a list of the taxiway design guidelines and the basic rationale behind each recommendation:

1. **Taxi Method:** Taxiways are designed for "cockpit over centerline" taxiing with pavement being sufficiently wide to allow a certain amount of wander. On turns, sufficient pavement should be provided to maintain the edge safety margin from the landing gear. When constructing new taxiways, upgrading existing intersections should be undertaken to eliminate "judgmental oversteering," which is where the pilot must intentionally steer the cockpit outside the marked centerline in order to assure the aircraft remains on the taxiway pavement.
2. **Steering Angle:** Taxiways should be designed such that the nose gear steering angle is no more than 50 degrees, the generally accepted value to prevent excessive tire scrubbing.
3. **Three-Node Concept:** To maintain pilot situational awareness, taxiway intersections should provide a pilot with a maximum of three choices of travel. Ideally, these are right and left angle turns and a continuation straight ahead.
4. **Intersection Angles:** Turns should be designed to 90 degrees wherever possible. For acute angle intersections, standard angles of 30, 45, 60, 120, 135, and 150 degrees are preferred.
5. **Runway Incursions:** Taxiways should be designed to reduce the probability of runway incursions.
    - *Increase Pilot Situational Awareness*: A pilot who knows where they are at on the airport is less likely to enter a runway improperly. Complexity leads to confusion. Keep taxiway systems simple using the "three-node" concept.
    - *Avoid Wide Expanses of Pavement*: Wide pavements require placement of signs far from a pilot's eye. This is especially critical at runway entrance points. Where a wide expanse of pavement is necessary, avoid direct access to a runway.
    - *Limit Runway Crossings*: The taxiway layout can reduce the opportunity for human error. The benefits are two-fold, through simple reduction in the likelihood and number of occurrences and through a reduction in air traffic controller workload.
    - *Avoid "High Energy" Intersections*: These are intersections in the middle third of runways. By limiting runway crossings to the first and last thirds of the runway, the portion of the runway where a pilot can least maneuver to avoid a collision is kept clear.
    - *Increase Visibility*: Right-angle intersections, both between taxiways and runways, provide the best visibility. Acute angle runway exits provide for greater efficiency in runway usage but should not be used as runway entrance or crossing points. A right-angle turn at the end of a parallel taxiway is a clear indication of approaching a runway.
    - *Avoid "Dual Purpose" Pavements*: Runways used as taxiways, and taxiways used as runways, can lead to confusion. A runway should always be clearly identified as a runway and only a runway.

  - *Indirect Access*: Do not design taxiways to lead directly from an apron to a runway. Such configurations can lead to confusion when a pilot typically expects to encounter a parallel taxiway.
  - *Hot Spots*: Confusing intersections near a runway are more likely to contribute to runway incursions. These intersections must be redesigned when the associated runway is subject to reconstruction or rehabilitation. Other hot spots should be corrected as soon as practicable.

6. **Runway/Taxiway Intersections:**
   - *Right Angle*: Right-angle intersections are the standard for all runway/taxiway intersections, except where there is a need for a high-speed exit. Right-angle taxiways provide the best visual perspective to a pilot approaching an intersection with the runway to observe aircraft in both the left and right directions. They also provide optimal orientation of the runway holding position signs, so they are visible to pilots.
   - *Acute Angle*: Acute angles should not be larger than 45 degrees from the runway centerline. A 30-degree taxiway layout should be reserved for high-speed exits. The use of multiple intersecting taxiways with acute angles creates pilot confusion and improper positioning of taxiway signage.
   - *Large Expanses of Pavement*: Taxiways must never coincide with the intersection of two runways. Taxiway configurations with multiple taxiway and runway intersections in a single area create large expanses of pavement, making it difficult to provide proper signage, marking, and lighting.

7. **Taxiway/Runway/Apron Incursion Prevention:** Apron locations that allow direct access into a runway should be avoided. Increase pilot situational awareness by designing taxiways in such a manner that force pilots to deliberately make turns. Taxiway originating from aprons and forming a straight line across runway at mid-span should be avoided.
   - *Wide Throat Taxiways*: Wide throat taxiway entrances should be avoided. Such large expanses of pavement may cause pilot confusion and make signage, marking, and lighting more difficult.
   - *Direct Access from Apron to a Runway*: Avoid taxiway connectors that cross over a parallel taxiway and directly onto a runway. Consider a staggered taxiway layout that forces pilots to make a deliberate decision to turn.
   - *Apron to Parallel Taxiway End*: Avoid direct connection from an apron to a parallel taxiway at the end of a runway.

FAA AC 150/5300-13B, *Airport Design*, states that "existing taxiway geometry should be improved whenever feasible, with emphasis on designated 'hot spots.'" To the extent practicable, the removal of existing pavement may be necessary to correct confusing layouts. TXK does not have any identified "hot spots;" however, Taxiways B and C intersect their respective runways at acute angles less than 90 degrees, and the holding bay on Taxiway B at the Runway 22 entrance is of non-standard design. Previously the FAA permitted a wide expanse of pavement as an acceptable form of a holding bay. The new design standard outlined in *Airport Design*, however, recommends for holding bays to follow a bypass taxiway style designed to applicable ADG and TDG standards. Additionally, Taxiway A1/D1 intersects Runway 4-22 within the "high energy" area of the runway surface.

In the alternatives chapter (Chapter Four), solutions to these non-standard taxiway conditions will be presented. Analysis in the next chapter will also consider future taxiway design to minimize runway incursion potential, improve efficiency, and conform to FAA standards for taxiway design.

TAXILANE DESIGN CONSIDERATIONS

Taxilanes are distinguished from taxiways in that they do not provide access to or from the runway system directly. Taxilanes typically provide access to hangar areas. As a result, taxilanes can be designed to varying design standards depending on the type of aircraft using, or expected to use, the taxilane. For example, a taxilane leading to a T-hangar area only needs to be designed to accommodate those aircraft accessing the T-hangar area.

The taxilane separating T-hangar buildings may need to only meet clearance standards for ADG I aircraft which has a Taxilane Object Free Area (TLOFA) requirement of 79 feet. Currently, the separation between the T-hangars buildings is approximately 83 feet with the centerline markings roughly centered within the area. As additional hangar developments materialize, the applicable TLOFA standard for the planned ADG should be met.

SAFETY AREA DESIGN STANDARDS

The FAA has established several safety surfaces to protect aircraft operational areas and keep them free from obstructions that could affect their safe operation. These include the Runway Safety Area (RSA), Runway Object Free Area (ROFA), Obstacle Free Zone (OFZ), and Runway Protection Zone (RPZ).

The entire RSA, ROFA, and ROFZ must be under the direct ownership of the airport sponsor to ensure these areas remain free of obstacles and can be readily accessed by maintenance and emergency personnel. RPZs should also be under airport ownership. An alternative to outright ownership of the RPZ is the purchase of avigation easements (acquiring control of designated airspace within the RPZ) or having sufficient land use control measures in place which ensure the RPZ remains free of incompatible development.

Dimensional standards for the various safety areas associated with the runway are a function of the type of aircraft using or expected to use each runway as well as the instrument approach capability. The RDC applicable for each runway, along with the various airport safety areas, are presented on **Exhibit 3E**.

Runway Safety Area (RSA)

The RSA is defined in FAA AC 150/5300-13B, *Airport Design*, as a "surface surrounding the runway prepared for or suitable for reducing the risk of damage to airplanes in the event of undershoot, overshoot, or excursion from the runway." The RSA is centered on the runway and dimensioned in accordance with the approach speed of the critical design aircraft using the runway. The FAA requires the RSA to be cleared and graded, drained by grading or storm sewers, capable of accommodating the design aircraft – as well as fire and rescue vehicles – and free of obstacles not fixed by navigational purposes, such as runway edge lights or approach lights.

The FAA has placed a higher significance on maintaining adequate RSAs at all airports. Under Order 5200.8, effective October 1, 1999, the FAA established the *Runway Safety Area Program*. The Order states, "the objective of the Runway Safety Area Program is that all RSAs at federally obligated airports...shall conform to the standards contained in Advisory Circular 150/5300-13B, *Airport Design*, to the extent practicable." Each Regional Airports Division of the FAA is obligated to collect and maintain data on the RSA for each runway at an airport and perform airport inspections.

Runway 4-22

For RDC C-II/III design, the FAA calls for the standard RSA to be 500 feet wide and extend 1,000 feet beyond the runway ends. Only 600 feet of RSA is needed prior to the landing threshold on each runway end. Based on these dimensions, the Runway 4-22 RSA remains entirely on airport property with no known obstructions.

Runway 13-31

The RSA for the crosswind runway at TXK should be 150 feet wide and extend 300 feet beyond the runway ends; the 300-foot distance should also exist prior to the threshold. While published declared distances (discussed in detail earlier in the Runway Length section) can change the overall dimension of the RSA, the applicable distance of the RSA applies because the entire length of the runway is usable in one direction or the other. Therefore, the RSA for Runway 13-31 extends 300 feet beyond the physical end of the runway pavement. Based on this, the Runway 13-31 RSA also remains entirely on airport property and has no known obstructions.

Runway Object Free Area (ROFA)

The ROFA is a "two-dimensional ground area, surrounding runways, taxiways, and taxilanes, which is clear of objects except for objects whose location is fixed by function (i.e., airfield lighting)." The ROFA does not have to be graded and level as the RSA does; instead, the primary requirement of the ROFA is that no object in the ROFA penetrates the lateral elevation of the RSA. The ROFA is centered on the runway, extending out in accordance with the critical aircraft design category using the runway.

The standard ROFA dimensions for Runway 4-22 are 800 feet wide and extending 1,000 feet beyond the runway end, while the ROFA for Runway 13-31 is 500 feet wide and extends 300 feet beyond the runway end. Both ends of Runway 4-22 have considerable vegetation and trees within the ROFA that should be cleared to ensure safety standards are met.

Obstacle Free Zones (OFZ)

The OFZ is an imaginary surface which precludes object penetration, including taxiing and parked aircraft. The only allowance for OFZ obstructions is for navigational aids mounted on frangible bases which are fixed in their location by function, such as airfield lighting or signage. The OFZ is established to ensure the safety of aircraft operations. If the OFZ is obstructed, the airport's approaches could be removed or approach minimums could be increased.

For runways utilized by aircraft weighing more than 12,500 pounds, the FAA requires a clear ROFZ to extend 200 feet beyond the runway ends and be 400 feet wide (200 feet on either side of the runway centerline). These ROFZ standards apply to each runway at TXK. There are no known penetrations or non-standard ROFZ conditions at TXK.

A precision obstacle free zone (POFZ) is further defined for runway ends with a precision approach, such as the ILS approach to Runway 22. The POFZ is 800 feet wide, centered on the runway, and extends out from the runway's threshold to a distance of 200 feet. The POFZ is in effect when the following conditions are met:

a) The runway supports a vertically guided approach;
b) The reported ceiling is below 250 feet or visibility is less than ¾-mile; and
c) An aircraft is on final approach within two miles of the runway threshold.

When the POFZ is in effect, a wing of an aircraft holding on a taxiway may penetrate the POFZ; however, neither the fuselage nor the tail may infringe on the POFZ. POFZ standards currently apply to Runway 22, as it allows for a vertically guided approach with instrument approach minimums below 250 feet or visibility minimums below ¾-mile. There are no known obstructions or non-standard POFZ conditions.

Runway Protection Zones (RPZ)

An RPZ is a trapezoidal area centered on the extended runway centerline, typically beginning 200 feet from the end of the runway. The RPZ has been established to provide an area clear of obstructions and incompatible land uses in order to enhance the safety and protection of people and property on the ground. The optimal method of ensuring the public's safety in these areas is airport ownership and/or control of the RPZ with implementation of compatible land use principles. The RPZ dimensions vary based on the visibility minimums serving the runway and the RDC (design aircraft) operating on the runway.

While the RPZ is intended to be clear of incompatible objects or land uses, some uses are permitted with conditions and other land uses are prohibited. According to AC 150/5300-13B, the following land uses are permissible within the RPZ:

- Farming that meets the minimum buffer requirements
- Irrigation channels, as long as they do not attract birds
- Airport service roads, as long as they are not public roads and are directly controlled by the airport operator
- Underground facilities, as long as they meet other design criteria, such as RSA requirements, as applicable
- Unstaffed navigational aids (NAVAIDs) and required facilities that are fixed-by-function in regard to the RPZ
- Aboveground fuel tanks associated with backup generators for unstaffed NAVAIDS

In September 2022, the FAA published AC 150/5190-4B, *Airport Land Use Compatibility Planning*, which states that airport owner control over RPZs is preferred. Airport owner control over RPZs may be achieved through:

- Ownership of the RPZ property in fee simple;
- Possessing sufficient interest in the RPZ property through easements, deed restrictions, etc.;
- Possessing sufficient land use control authority to regulate land use in the jurisdiction containing the RPZ;
- Possessing and exercising the power of eminent domain over the property; or
- Possessing and exercising permitting authority over proponents of development within the RPZ (e.g., where the sponsor is a state).

AC 150/5190-4B further states that "control is preferably exercised through acquisition of sufficient property interest and includes clearing RPZ areas (and keeping them clear) of objects and activities that would impact the safety of people and property on the ground." The FAA does recognize that land ownership, environmental, geographical, and other considerations can complicate land use compatibility within RPZs. Regardless, airport sponsors are to comply with FAA Grant Assurances, including, but not limited to, Grant Assurance 21, *Compatible Land Use*, which states that airports are expected to take appropriate measures to "protect against, remove, or mitigate land uses that introduce incompatible development within RPZs." For proposed projects that would shift an RPZ into an area with existing incompatible land uses, such as a runway extension or construction of a new runway, the sponsor is expected to have or secure sufficient control of the RPZ, ideally through fee simple ownership.

Where existing incompatible land uses are present, the FAA expects sponsors to "seek all possible opportunities to eliminate, reduce, or mitigate existing incompatible land uses" through acquisition, land exchanges, right-of-first-refusal to purchase, agreement with property owners on land uses, easements, or other such measures. These efforts should be revisited during master plan or ALP updates, and periodically thereafter, and documented to demonstrate compliance with FAA Grant Assurances. If new or proposed incompatible land uses impact an RPZ, the FAA expects the airport to take the above actions to control the property within the RPZ, along with adopting a strong public stance opposing the incompatible land uses.

For new incompatible land uses that result from a sponsor-proposed action (e.g., an airfield project such as a runway extension, a change in the critical aircraft that increases the RPZ dimension, or lower minimums that increase the RPZ dimension), the airport sponsor is expected to conduct an Alternatives Evaluation. The intent of the Alternatives Evaluation is to "proactively identify a full range of alternatives and prepare a sufficient evaluation to be able to draw a conclusion about what is 'appropriate and reasonable.'" For incompatible development off-airport, the sponsor should coordinate with the Airports District Office (ADO) as soon as they are aware of the development and should conduct the Alternatives Evaluation within 30 days of becoming aware of the development within the RPZ. The following items are typically necessary in an Alternatives Evaluation:

- Sponsor's statement of the purpose and need of the proposed action (airport project, land use change, or development)
- Identification of any other interested parties and proponents

- Identification of any federal, state, and local transportation agencies involved
- Analysis of sponsor control of the land within the RPZ
- Summary of all alternatives considered, including:
    - Alternatives that preclude introducing the incompatible land use within the RPZ (e.g., zoning action, purchase, and design alternatives such as implementation of declared distances, displaced thresholds, runway shift or shortening, raising minimums)
    - Alternatives that minimize the impact of the land use in the RPZ (e.g., rerouting a new roadway through less of the RPZ, etc.)
    - Alternatives that mitigate risk to people and property on the ground (e.g., tunnelling, depressing, and/or protecting a roadway through the RPZ, implementing operational measures to mitigate any risks, etc.)
- Narrative discussion and exhibits or figures depicting the alternative
- Rough order of magnitude cost estimates associated with each alternative, regardless of potential funding sources
- A practicability assessment based on the feasibility of the alternative in terms of cost, constructability, operational impacts, and other factors

Once the Alternatives Evaluation has been submitted to the ADO, the FAA will determine whether the sponsor has made an adequate effort to pursue and give full consideration to appropriate and reasonable alternatives.

The FAA will not approve or disapprove the airport sponsor's preferred alternative; rather, the FAA will only evaluate whether an acceptable level of alternatives analysis has been completed before the sponsor makes the decision to allow or disallow the proposed land use within the RPZ.

In summary, the RPZ guidance published in September 2022 places the responsibility of protecting the RPZ on the airport sponsor. The airport sponsor is expected to take action to control the land uses within the RPZ or demonstrate that appropriate actions have been taken. It is ultimately up to the airport sponsor to permit existing and prevent new incompatible land uses within an RPZ, with the understanding that they have grant assurance obligations and the FAA retains the authority to review and approve or disapprove portions of the ALP that would adversely impact the safety of people and property within the RPZ.

Each runway end has both an approach and a departure RPZ. The departure RPZ is contained within the approach RPZ unless declared distances have been applied to the runway. This is the case with Runway 13-31, where the approach RPZ for Runway 13 is not co-located with the Runway 31 departure RPZ. For a particular runway end, the more stringent RPZ requirements (usually associated with the approach RPZ) will govern the property interests and clearing requirements that the airport sponsor should pursue. For planning purposes, the approach RPZ was used to create the most restrictive condition.

The RPZs associated with each runway are depicted on **Exhibit 3E** and described in **Table 3J**.

TABLE 3J | Runway Protection Zones Summary

RPZ	Total Acres	Airport-Owned Acres	Uncontrolled Acres	Notes/Incompatibilities
RUNWAYS 4/22				
4 Approach RPZ	29.47	28.47	1.0	Jim Walter Drive and Interstate 49 pass through the Runway 4 RPZ. The departure RPZ is encompassed by the approach RPZ.
22 Approach RPZ	78.91	61.21	17.7	Approximately 17.7 acres of the RPZ extend outside airport property and over adjacent residential land uses. North Rondo Road also passes through the RPZ. The departure RPZ is contained within the approach RPZ. Approximately 1.5 acres of the RPZ is controlled by an existing avigation easement.
RUNWAYS 13/31				
13 Approach RPZ	13.77	13.16	0.6	A section of the rail line runs within the outer width of the RPZ.
13 Departure RPZ	13.77	13.77	0.0	No conflicts present.
31 Approach RPZ	13.77	13.77	0.0	No conflicts present.
31 Departure RPZ	13.77	10.67	3.1	U.S. Highway 67 runs through the middle section of the RPZ. Public roadways can remain if no runway changes are made.

Source: Coffman Associates analysis

If, in the future, the runways were equipped with lower instrument visibility minimums, then the area contained within the applicable RPZs would increase; thus, the level of potentially incompatible land uses within the larger RPZ would also increase. To lower the visibility minimums, the airport will have to develop a plan of action to mitigate the newly introduced incompatible land uses and work in consultation with the FAA to determine if the additional incompatible land is acceptable.

Instrument Landing System (ILS) Critical Areas

Runway 22 is equipped with an ILS. The ILS components include glideslope and localizer antennas which combine to provide vertical descent and lateral guidance to a pilot to land at a designated point on the runway. Both the glideslope and localizer have associated critical areas that must remain clear of objects to properly function. These areas are shown on **Exhibit 3E**. The glideslope and localizer critical areas for both runway ends are free of obstructions. In addition, the northern portion of Taxiway D has been constructed with a greater separation distance from the Runway 4-22 centerline in order to avoid aircraft penetrating the glide slope critical area.

RUNWAY SEPARATION STANDARDS

There are several other standards related to separation distances from runways. Each of these is designed to enhance the safety of the airfield.

Runway/Taxiway Separation

The design standard for the required separation between a runway and a parallel taxiway is a function of the critical design aircraft and the instrument approach visibility minimum. The separation standard for RDC C-II-2400 and C-III-2400 is 400 feet from the runway centerline to the parallel taxiway centerline. For RDC B-II-5000, the separation standard is 240 feet, and remains this distance even when the runway visibility range (RVR) is reduced to 4000. For Runway 4-22, any parallel taxiway should be located 400 feet from the runway (centerline to centerline), and for Runway 13-31, any parallel taxiway should be 240 feet from the runway.

Runway 4-22 has parallel taxiways on either side of it, designated Taxiways A, B, and D. At their closest locations to the runway, the taxiways are 400 feet from the runway centerline, meeting the design standard. Runway 13-31 has a partial-parallel taxiway to the west, designated Taxiway C, which is located 300 feet from the runway at its closest position. Thus, the airfield currently meets applicable runway/taxiway separation design standards for both the existing and ultimate conditions.

Holding Position Separation

Holding position markings are placed on taxiways leading to runways. When instructed, pilots should stop short of the holding position marking line. At an airport with a tower that closes at certain times, such as TXK, it is common practice for pilots to stop short of the markings before moving onto the active runway. According to FAA AC 150/5300-13B, *Airport Design*, the holding position marking line locations may need to be increased based on an airport's elevation and the RDC for the runway.

For RDC C-II/III, the holding position marking line should be located 250 feet from the runway centerline, while runways designed to B-II standards should have holding position markings located 200 feet from their respective runway centerline. The holding positing markings leading to Runway 4-22 (RDC C-II/III) are located at least 250 feet from the centerline and should be maintained through the planning period.

The holding position markings prior to Runway 13-31 exceed the 200-foot standard; however, the holding position markings prior to Runway 13-31 are located along a turn in the taxiway and are not parallel to the runway centerline. It is recommended that these markings be relocated to the proper 200-foot distance and oriented parallel to the runway to provide pilots with greater visibility to the ends of the runway.

Runway Visibility Zone (RVZ)

The RVZ is an area formed by imaginary lines connecting the line-of-sight points of intersecting runways at airports without an airport traffic control tower (ATCT) or with a part-time ATCT. Since the ATCT at TXK is closed between 10 p.m. and 6 a.m. daily, the RVZ is in effect during this period. The purpose of the RVZ is to facilitate coordination among aircraft and between aircraft and vehicles that are operating on active runways. Having a clear line of sight allows departing and arriving aircraft to verify the locations and actions of other aircraft and vehicles on the ground that could create a conflict. Within the RVZ, any point five feet above the runway centerline must be mutually visible with any other point five feet above the centerline of the crossing runway. The RVZ at TXK associated with Runways 4-22 and 13-31 is depicted on **Exhibit 3E**. Currently, the ASOS and segmented circle/wind cone are located within the RVZ and should be relocated outside the RVZ. As construction and rehabilitation projects occur, consideration should be given to maintaining a positive sight picture within the RVZ.

Building Restriction Line (BRL)

The BRL identifies suitable building area locations on the airport. The BRL encompasses the RPZs, the ROFA, navigational aid critical areas, areas required for terminal instrument procedures, and other areas necessary for meeting airport line-of-sight criteria, such as the RVZ.

Two primary factors contribute to the determination of the BRL: type of runway ("utility" or "other-than-utility") and the capability of the instrument approaches. Both runways at TXK are "other-than-utility" runways since they both regularly serve aircraft weighing over 12,500 pounds. Runway 4-22 is considered a precision instrument runway with a CAT-I ILS with visibility minimums down to ½-mile, while Runway 13-31 is considered a non-precision instrument runway with visibility minimums down to 1-mile.

The BRL is the product of the CFR Part 77 transitional surface clearance requirements. These requirements stipulate that no object can be located within the primary surface, defined as being 500 feet wide for other-than-utility runways with visibility minimums greater than ¾-mile, and 1,000 feet wide for precision instrument runways. From the primary surface, the transitional surface extends outward at a slope of one vertical foot to every seven horizontal feet.

A common BRL identifies the 25-foot clearance line for the transitional surface. For Runway 4-22, the 25-foot BRL is set at 675 feet from the runway centerline. For Runway 13-31, the 25-foot BRL is set at 425 feet from the runway centerline. As shown on **Exhibit 3E**, the BRL is also adjusted to coincide with the RPZs, RVZ, and the ASOS critical area. The BRL only indicates where structures should be below the designated height at that point. Buildings can be in front of the BRL if they remain lower than the transitional surface and outside other safety areas, such as the RVZ.

NAVIGATIONAL AND APPROACH AIDS

Navigational aids are devices that provide pilots with guidance and position information when utilizing the runway system. Electronic and visual guidance to arriving aircraft enhances the safety and capacity of the airfield. Such facilities are vital to the success of an airport and provide additional safety to passengers using the air transportation system. While instrument approach aids are especially helpful during poor weather, they are often used by pilots conducting flight training and operating larger aircraft when visibility is good. TXK employs the following navigational and approach aids.

Instrument Approach Aids

TXK currently has seven published instrument approach procedures, including the CAT-I precision ILS approach to Runway 22, a localizer back course (LOC BC) and a VOR approach to Runway 4, and GPS-based approaches to all runway ends. The CAT-I approach available on the primary runway provides down to ½-mile visibility minimums, which is sufficient for the commercial, GA, and military operations it serves. Runway 13-31, which also serves commercial, military, and GA aircraft, has one-mile visibility minimums. The alternatives chapter will consider lower visibility options for the crosswind runway.

Runway 22 is equipped with a medium-intensity approach lighting system with runway alignment indicator lights (MALSR). This approach lighting system enhances safety at the airport, especially during inclement weather or nighttime activity. The MALSR, in conjunction with the ILS equipment (localizer and glide slope antennae), allows for approach minimums on Runway 22 down to ½-mile with a 200-foot decision height.

Visual Approach Aids

In most instances, the landing phase of any flight is conducted in visual conditions. To provide pilots with visual guidance information during landings on the runway, electronic visual approach aids are commonly provided at airports. Currently, Runway 4 has a four-light (box) visual approach slope indicator (VASI), while Runways 13 and 31 are served by a four-box precision approach path indicator (PAPI-4) system. PAPI and VASI systems are very similar, with the primary difference being the orientation of the lights: a VASI has two separate light banks, while a PAPI has its lights installed in a single row. A VASI is not considered as precise as a PAPI but is better than no visual aid at all. No visual approach aids are provided on Runway 22. PAPI-4s are recommended for runways that are used by jet aircraft; therefore, consideration should be given to installing a PAPI-4 on Runway 22. The VASI on Runway 4 should also be updated to a PAPI-4 system.

Runway end identifier lights (REILs) are flashing lights located at the runway threshold end that facilitate rapid identification of the runway end at night and during poor visibility conditions. REILs provide pilots with the ability to identify the runway thresholds and distinguish the runway end lighting from other lighting on the airport and in the approach areas. The FAA states that REILs should be considered for all runway ends where a more sophisticated approach lighting system is not planned. The installation of REILs at TXK will be presented in each alternative in the next chapter for any runway without a planned approach lighting system.

Weather Reporting Aids

TXK is equipped with an ASOS, which provides weather observations 24 hours per day. The system updates weather observations every minute, reporting significant weather changes as they occur. This information is transmitted on radio frequency 120.2 MHz. Additionally, pilots can call a published telephone number (870-774-0404) and receive the information via an automated voice recording. This system should be maintained throughout the planning period. The ASOS equipment is not currently protected with security fencing. Consideration should be given to adding security fencing around the station in order to protect the equipment from wildlife, as well as relocating the station outside the RVZ, as mentioned previously.

The airport also has a lighted wind cone and segmented circle adjacent to Taxiway C near the Runway 4-22/Runway 13-31 intersection. The segmented circle consists of a system of visual indicators designed to provide traffic pattern information to pilots. The wind cones provide information to pilots regarding wind speed and direction. There are two supplemental cones located at the ends of Runway 31 and Runway 4. These should be maintained throughout the planning period, while two additional cones for Runway 13 and Runway 22 should be considered. Just as with the ASOS, the segmented circle/wind cone is located within the RVZ and should be relocated.

Communication Facilities

TXK has an operational airport traffic control tower (ATCT) located between the existing terminal and FBO buildings. The ATCT is staffed from 6:00 a.m. to 10:00 p.m. daily. The ATCT enhances the safe operations of aircraft at and within the airport's airspace and should be maintained through the planning period.

AIRFIELD LIGHTING, MARKING, AND SIGNAGE

There are several lighting and pavement marking aids serving pilots using TXK. These aids assist pilots in locating the airport and runway at night or in poor visibility conditions. They also assist in the ground movement of aircraft.

Airport Identification Lighting

The location of the airport at night is universally indicated by a rotating beacon. For civil airports, a rotating beacon projects two beams of light, one white and one green, 180 degrees apart. The existing beacon at TXK, located on a standalone pole along the tree line at the northern section of the airfield, should be maintained through the planning period.

Runway and Taxiway Lighting

Runway lighting provides the pilot with positive identification of the runway and its alignment. Runway 13-31 is equipped with medium-intensity runway lighting (MIRL), while Runway 4-22 – due to the available ½-mile instrument approaches on Runway 22 – has high-intensity runway lights (HIRL). The taxiways at TXK are equipped with medium-intensity taxiway lighting (MITL). This system is vital for safe and efficient ground movements and should be maintained in the future.

It should be noted that many airports are transitioning to light emitting diode (LED) pavement edge lighting technology. LEDs have many advantages, including lower energy consumption, longer lifespan, increased durability, reduced size, greater reliability, and faster switching. While a larger initial investment is required upfront, the energy savings and reduced maintenance costs will outweigh any additional costs overall. Consideration should be given to gradually replacing all pavement edge lighting with LED systems.

Pavement Markings

Runway markings are typically designed for the type of instrument approach available on the runway. FAA AC 150/5340-1M, *Standards for Airport Markings*, provides guidance necessary to design airport markings. Runway 13-31 has non-precision markings, which are adequate for a runway served by instrument approach procedures providing visibility minimums down to ¾-mile. The existing runway markings are sufficient for the existing instrument approaches but will need to be improved if a lower approach minimum is established. Runway 4-22 is equipped with precision instrument markings, which are adequate for runways with visibility minimums below ¾-mile and should be maintained through the planning period.

Airfield Signs

Airfield identification signs assist pilots in identifying their location on the airfield and directing them to their desired location. Lighted signs are installed on the runway and taxiway system on the airfield. The signage system includes runway and taxiway designations, directional/information signage, and runway distance remaining signs. All signs should be maintained throughout the planning period, and consideration should be given to gradually replacing all lighted signs with LED technology.

AIRFIELD FACILITY REQUIREMENTS SUMMARY

A summary of the airside facilities at TXK, as previously discussed, is presented on **Exhibit 3F**.

PASSENGER TERMINAL COMPLEX REQUIREMENTS

TERMINAL REQUIREMENTS

The following resources were consulted to identify existing and future terminal building needs:

- Airport Cooperative Research Program (ACRP) Report 25, *Airport Passenger Terminal Planning and Design*
- ACRP, Project Number 07-04, *Spreadsheet Models for Terminal Planning and Design*
- FAA AC 150/5360-13, *Planning and Design Guidelines for Airport Terminal Facilities*
- International Air Transport Association (IATA), *Airport Development Reference Manual*

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RUNWAYS

AVAILABLE	SHORT TERM	LONG TERM
	Runway 4-22	
RDC C-II-2400	Maintain	RDC C-III-2400
6,601' x 150'	7,101' x 150'	Consider extensions up to 10,001' x 150' Consider width reduction to 100' if AIP funding is unavailable
50,000 lbs. S | 86,000 lbs. D | 120,000 lbs. 2D	Maintain	Consider 200,000 lbs. D | 400,000 lbs. 2D | 600,000 lbs. 3D | 900,000 lbs. 2D2
Standard RSA; Standard ROFZA; Foliage within ROFA	Remove foliage within ROFA; Mitigate incompatibilities with extension	Maintain corrected condition
RPZs partially owned, extends over private property, public roads	Mitigate RPZ incompatibilities	Maintain corrected condition
	Runway 13-31	
RDC B-II-5000	Maintain	RDC B-II-4000
5,200' x 100'	Maintain	Consider width reduction to 75' if AIP funding is unavailable
25,000 lbs. S	Maintain	30,000 lbs. SWL | 70,000 lbs. DWL
Standard RSA; Standard ROFA; Standard ROFZ	Maintain	Maintain
RPZs partially owned, extends over public roads	Mitigate RPZ incompatibilities	Mitigate new RPZ incompatibilities with upgrading to RDC B-II-4000 standards

TAXIWAYS

AVAILABLE	SHORT TERM	LONG TERM
TDG 2B	Maintain	TDG 3
All taxiways at least 50' wide	Maintain	Maintain
Main ramp provides direct access to runways	Consider corrective measures	Maintain corrected condition
Acute angle runway intersections - TWYs B, C	Consider corrective measures	Maintain corrected condition
Non-standard holding bay - TWY B	Consider corrective measures	Maintain corrected condition
High-energy runway crossings - TWYs A1, D1	Consider corrective measures	Maintain corrected condition

NAVIGATIONAL AND APPROACH AIDS

AVAILABLE	SHORT TERM	LONG TERM
ILS or LOC - RWY 22	Maintain	Maintain
RNAV (GPS) with ½-mile Visibility Minimum - RWY 22	Maintain	Maintain
RNAV (GPS) with 1-mile Visibility Minium - RWYs 4, 13, 31	Maintain	Consider ¾-mile Visibility Minimums - RWYs 4, 13, 31
LOC BC - RWY 4	Maintain	Maintain
VOR - RWY 13	Maintain	Maintain
MALSR - RWY 22	Maintain	Maintain
VASI-4 - RWY 4	Consider PAPI-4	Maintain
PAPI-4 - RWYs, 13, 31	Maintain	Maintain
REILs - None	Consider REILs for RWYs 4, 13, 31	Maintain
ATCT	Maintain	Maintain
ASOS	Relocate ASOS outside RVZ	Maintain corrected condition
Segmented Circle/Lighted Windcones	Relocate Segmented Circle/Wind Cone outside RVZ	Maintain corrected condition

LIGHTING, MARKING, AND SIGNAGE

AVAILABLE	SHORT TERM	LONG TERM
Rotating Beacon	Maintain	Maintain
Precision Markings - RWY 4-22	Maintain	Maintain
Non-Precision Markings - RWY 13-31	Maintain	Maintain
HIRL - RWY 4-22	Maintain	Consider replacement with LED technology
MIRL - RWY 13-31	Maintain	Consider replacement with LED technology
RWY 4-22 Holding Position Markings, located 250' from centerline	Maintain	Maintain
RWY 13-31 Holding Position Markings - located on turns, not parallel	Consider corrective measures	Maintain corrected condition
Lighted airfield location, directional, distance remaining signage	Maintain	Consider replacement with LED technology

KEY

- AIP - Airport Improvement Program
- ATCT - Airport Traffic Control Tower
- DME - Distance Measuring Equipment
- DOD - Department of Defense
- DWL - Dual Wheel Loading
- DTWL - Dual Tandem Wheel Loading
- HIRL - High Intensity Runway Lighting
- HI-ILS - High Altitude Instrument Landing System
- LED - Light Emitting Diode
- LOC - Localizer
- MALSR - Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights
- NDB - Nondirectional Radio Beacon
- PAPI - Precision Approach Path Indicator
- PFC - Passenger Facility Charge
- RDC - Runway Design Code
- REIL - Runway End Identification Light
- RNAV - Area Navigation
- RSA - Runway Safety Area
- ROFA - Runway Object Free Area
- ROFZ - Runway Obstacle Free Zone
- S - Single Wheel Loading
- SWL - Single Wheel Loading
- TACAN - Tactical Air Navigational Aid
- TDG - Taxiway Design Group
- TRACON - Terminal Radar Approach Control
- VOR - Very High Frequency Omnidirectional Range
- 2D - Dual Tandem Wheel Loading
- 2D2 - Double Dual Tandem Wheel Loading
- 3D - Triple Dual Tandem Wheel Loading

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Components of the passenger terminal complex include aircraft gate positions, departures and arrivals processing, concourse facilities, and public spaces. This section identifies the functional components of the terminal building and offers the required space needed for projected passenger demand levels for each component.

Many aspects of passenger terminal design are based on peaking periods of commercial activity as determined by the flight schedules for TXK. The average peak data from the forecast chapter was used as the basis for this analysis.

Exhibit 3G presents a summary of the terminal building space needs by functional area and by gross terminal area. **These terminal needs were compared to the planned areas within the new terminal facility, which is expected to be operational and in use in 2024**.

Aircraft Gates

Several methods were used to determine aircraft gate requirements for TXK. The first is the Gate Demand model from ACRP Report 25. This model uses two different approaches. The first approach uses the current ratio of annual passengers per gate, adjusted for forecast changes in fleet mix and annual load factors. This methodology assumes that the pattern of gate utilization will remain relatively stable over the 20-year forecast period. The changes in passengers per gate are due to changes in enplanements per departure (due to forecasted increases in seating capacity and load factors), as opposed to increasing or decreasing the number of departures per gate. The second ACRP method considers increases in the number of departures per gate. Both methods are then averaged to arrive at the aircraft gate forecast: in each of the forecast periods, a single gate is estimated to be needed.

FAA AC 150/5360-13, *Planning and Desing Guidelines for Airport Terminal Facilities,* was also consulted. The AC provides three methodologies: one based on the peak hour utilization rate, the second using the daily departure for a daily utilization rate, and the third considering an annual utilization rate. Each of these were found to be consistent with the ACRP methodology. Therefore, the two gates available in the new terminal are sufficient and no additional gates are needed.

Terminal Apron Requirements

There are four primary considerations that govern efficient aircraft apron design: the movement and physical characteristics of the aircraft to be served; the maneuvering, staging, and location of ground servicing equipment and underground utilities; the dimensional relationships of parked aircraft; and the safety, security, and operational practices related to apron control. The optimal apron design will depend on available space, aircraft mix, and terminal configuration.

As of this writing, the new terminal area apron is under development. No additional gates are expected to be needed and the apron space should be sized appropriately to accommodate the larger commercial aircraft anticipated to serve the airport in the future, specifically the Bombardier CRJ-900 or the Embraer ERJ-175. **Figure 3A** depicts two ERJ-175 jets parked at the available gate positions with proper wingtip clearances and space for ground equipment to maneuver safely.

	Unit	Available	Short Term	Intermediate Term	Long Term
Enplanements		**35,699**	**39,080**	**42,412**	**48,789**
DEPARTURE PROCESSING					
Ticket Counters					
Counter Frontage	lf	60	6	18	18
Airline Ticketing	sf	647	70	200	200
Ticketing Queuing	sf	2,237	575	1,104	1,195
Airline Offices	sf	1,013	250	740	740
Agent Positions	#	6	1	3	3
Kiosk Positions	#	4	1	1	2
Outbound Baggage	sf	1,486	290	860	860
EDS Automated Machines	#	1	1	1	1
Security					
Security Queuing	sf	1,232	130	280	310
Security Screening Lanes	#	1	1	1	1
Security Screening	sf	2,223	875	875	875
TSA Office Space	sf	736	700	700	700
Walk-thru Metal Detectors (WTMD)	#	1	1	1	1
Whole Body Imagers (WBI)	#	1	1	1	1
Bag X-Ray Machines	#	1	1	1	1
CONCOURSE FACILITIES					
Passenger Holdrooms					
Gates	#	2	2	2	2
Gate Check-In	sf	1,000	584	584	584
Holdroom	sf	2,260	1,000	1,000	1,100
Concourse Circulation	sf	1,651	924	1,414	1,498
ARRIVALS PROCESSING					
Inbound Baggage	sf	1,420	366	915	1,098
Baggage Claim Display Frontage	lf	80	20	50	60
Claim Device Floor Area	sf	480	100	250	300
Baggage Claim Lobby	sf	1,650	830	1,780	1,940
PUBLIC SPACES					
Greeting Lobby/Circulation	sf	10,021	3,280	7,040	7,680
Restrooms	sf	1,928	530	1,140	1,250
Food/Beverage/Retail	sf	798	710	760	880
Rental Car Counter Frontage	lf	36	10	20	20
Rental Car Counter & Office Space	sf	435	150	300	300
Rental Car Queuing	sf	450	80	160	160
ADDITIONAL OFFICE SPACES					
Administrative Offices	sf	1,798	1,798	1,798	1,798
FUNCTIONAL AREA TOTAL	**sf**	**33,465**	**13,242**	**21,900**	**23,468**
Building Systems/Support					
HVAC/Mechanical/Server Room	sf	1,738	1,059	1,752	1,877
TOTAL TERMINAL	**sf**	**35,203**	**14,301**	**23,652**	**25,345**

Note: **Red** indicates demand is greater than available capacity

Exhibit 3G
TERMINAL REQUIREMENTS

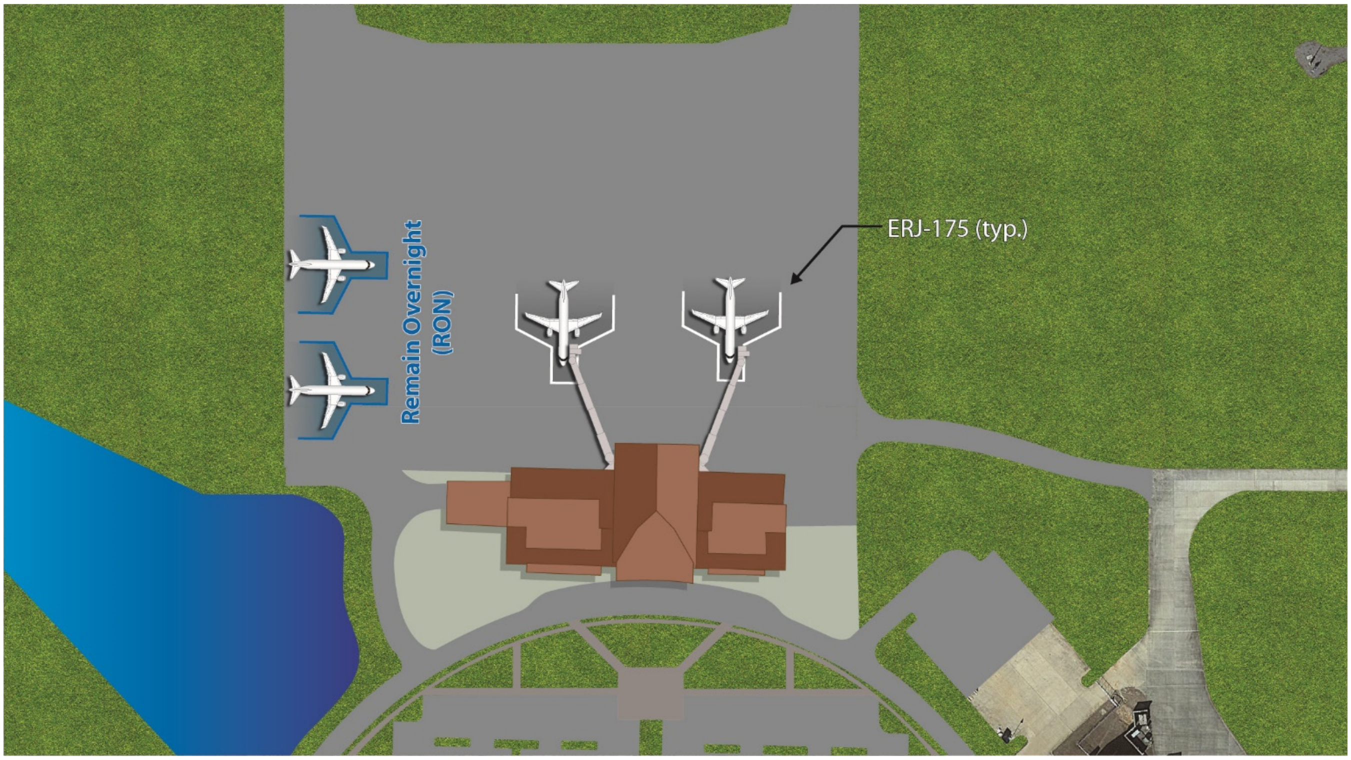


Figure 3A: Terminal Apron Parking

Currently, TXK's flight schedule has an aircraft arriving in the evening to remain overnight (RON) on the apron for a morning departure. As shown on the figure, it is possible to plan for additional apron space to accommodate additional RON aircraft if the schedule dictates more in the future.

Terminal Building Requirements

The requirements for the passenger terminal building begin with a demand/capacity analysis of the new terminal facility which identifies the capacity of key processing areas for comparison to the passenger demand at TXK. The purpose of this analysis is to quantify and qualify the ability of the new terminal to satisfy the current and future demand of the traveling public at the airport.

A spreadsheet model based on industry standards and calibrated for TXK based on passenger activity levels and terminal design was used in this analysis. The model uses the standard queuing theory, which can be defined as: passengers arriving minus passengers processed equals passengers in queue. The evaluation of individual processing elements is based on industry standards and formulas.

The model considers the level of service standards established by the International Air Transport Association (IATA). Level of service (LOS) defines the comfort and quality of the passenger experience. Some are related to crowding in queuing areas, while others define the amount of time a passenger must wait for processing. **Table 3K** outlines the basic level of service standards, while **Exhibit 3G** outlines space requirements for each functional element of the passenger terminal building.

In general, LOS C is a typical design goal for most airports. LOS B would be a preferred goal if the budget allows. LOS A is generally too expensive to achieve, and thus prohibitive to implement. For the purposes of this analysis, a LOS C+ was used to represent a median between LOS B and C.

TABLE 3K | IATA Level of Service (LOS) Standards

	AREA PER OCCUPANT (ft²)							
Level of Service Standards	**A**	**B**	**C+**	**C**	**C-**	**D**	**E**	**F**
Check-in Queue Area	19.4	17.2	16.1	15.1	14	12.9	10.8	-
Wait/Circulate	29.1	24.8	22.6	20.4	18.3	16.1	12.8	-
Holdroom	15.1	13.5	12.8	12	11.3	10.5	8	-
Bag Claim Area (excl. claim device)	21.5	19.4	18.3	17.2	16.1	15.1	12.9	-

A: Excellent levels of service; conditions of free flow; excellent level of comfort.
B: High level of service; condition of stable flow; very few delays; high level of comfort.
C: Good level of service; condition of stable flow; acceptable delays; good level of comfort.
D: Adequate level of comfort and service; condition of unstable flow; acceptable delays for short periods.
E: Inadequate level of service; condition of unstable flow; unacceptable delays; inadequate levels of comfort.
F: Unacceptable levels of service; conditions of cross flows, system breakdown and unacceptable delays; applies to areas below LOS E.

Departures Processing

The first destination for most enplaning passengers in the terminal building is the ticketing area, which includes the counters, queuing area and lobby, ticket offices, and outbound bag screening and processing. Security screening is also included in the departures processing element.

Ticket Counters | The percentage of the departing passenger peak hour demand that checks in at the ticket counters is estimated at 70 percent. The remainder are assumed to check in prior to arriving at the terminal and do not have checked baggage. The capacity at the ticket counters was calculated based on the passenger processing rate derived from IATA averages. The ticket counter and kiosk functions appear to be adequate through the long-term planning period.

Ticket Queuing | The adequacy of the ticket queueing area is also evaluated to determine whether demand levels result in an acceptable level of service. Industry standards assume that some passengers enter the queue with their friends or family for assistance. The evaluation was based on a service goal of a three-minute maximum wait in queue and LOS C+ of 16.1 square feet (sf) per person in queue with baggage.

The available ticketing queuing area is adequate through the long-term planning horizon.

Bag Screening and Processing | The Transportation Security Administration (TSA) must inspect every checked bag that is to be put on an aircraft. Each airline contracts with TSA for this service. The airport has one planned Explosive Detection System (EDS) machine located adjacent to the ticketing area in a dedicated screening room. Baggage is moved from the airline ticket counters to the screening area. The total area for outbound baggage handling exceeds the projected long-term area demand.

Passenger Security Screening | The required queuing area for the checkpoint was determined using an area of 10.8 sf per person at an LOS C. Across the country, TSA is making efforts to help streamline the screening process. Efforts are being made to provide additional staff during peak periods, install new equipment, and open pre-check lanes. The security screening at TXK will consist of one X-ray machine for bags, one walk-through metal detector (WTMD), and a whole-body imager (WBI).

Overall, the TSA security checkpoint is adequately sized for each of the planning horizon milestones. Even when considering the possibility of increased or additional commercial air service, the security checkpoint area within the terminal should be able to accommodate any increase in demand for the foreseeable future.

Concourse

The concourse consists primarily of the gate check-in, secure passenger holdroom, and circulation areas. While holdrooms and circulation are calculated separately, it is common for actual usage to include both these elements. For example, while passengers are waiting, they will typically disperse throughout the secure concourse. As boarding time approaches, passengers tend to gather in the gate area. As a result, it is common to consider holdroom and concourse capacity in aggregate.

Holdrooms/Circulation | The holdroom capacity is based upon available seats for the design aircraft for each gate and average load factor at TXK. Gate check-in spaces, which include podium space and queuing/exit space, are also considered. Circulation is generally considered the open walkways between the holdroom seating areas. Circulation requirements are based upon the number of gates and the total aircraft frontage required by the design aircraft. The requirements summary shows that the new terminal concourse space is adequate to meet forecasted demand.

Arrivals Processing

The passenger arrivals process consists primarily of those facilities and functions that provide means to reunite the arriving passenger with items that were checked at the origin of the flight.

Baggage Claim | It is estimated that 85 percent of arriving peak hour passengers claim checked baggage. The remaining 15 percent of the passengers bypass the baggage claim areas and go directly to the curb or to other ground transportation related facilities. An industry standard of 1.3 checked bags per passenger is utilized. The baggage claim capacity is based on the device frontage per person.

Claim Lobby | Claim lobby area requirements are based on meeting LOS C+ and are calculated as 18.3 sf per person. This evaluation determined that the baggage claim device and lobby area are generally sized appropriately. Additional baggage claim lobby and inbound baggage delivery space could be needed in the long term as enplanement levels grow and/or new airline service is introduced.

Public Spaces

Public spaces include restrooms, restaurant/concessions areas, rental car counters, and other public greeting areas.

Restrooms | Restrooms are strategically located prior to the security checkpoint and within the secured area of the terminal. Restroom capacity is calculated based on square footage per peak hour passenger, as provided in FAA AC 150/5360-13, *Planning and Design Guidelines for Airport Terminal Facilities*. Current restroom capacity is adequate through the long-term planning horizon.

Restaurant/Concessions | While planning standards and demand are an important consideration in the adequacy of restaurants or concessions in a terminal, there are marketing considerations that determine the capacity and economic viability of airport food/beverage services and retail concessions. A restaurant will be available in the terminal pre-security. The secured area of the terminal does not have available concessions or restaurant services. Food and beverage concessions are based on providing 15 sf per 1,000 annual enplaned passengers and concession seating area is based upon 20 percent of the total concessions area. It was determined that food and beverage concessions and retail space may become undersized in the long term, and consideration should be given to adding these facilities to the secured area of the terminal. Local economies will heavily influence the actual space needed for these functions.

Rental Car | The rental car area located in the exit hall opposite the baggage claim lobby includes office space, counters, and a queuing area. The counter frontage is based upon 10 percent of the peak hour passengers or providing a minimum of 10 feet per agency. Three different rental car companies currently offer service at TXK. This results in a minimum need for 30 linear feet of counter frontage. The office space and queuing spaces are functions of the projected counter frontage with estimated depths of 15 feet and eight feet, respectively. The need for rental car space is not projected to change over the course of the planning period. Available rental space is more than adequate to meet long-term horizon demands.

Greeting Lobby/Circulation | The greeting lobby and circulation areas make up the remainder of the pre-security area, allowing people to move from the airline ticket counters to the security checkpoint and from the secured holdroom area to the rental car counters and baggage claim area. These areas may have seating for passengers and greeters on the non-secure side of the terminal. Forecasted demand for this area is based on providing 50 sf per design hour passenger with an 80 percent utilization factor. Available pre-security circulation space is adequate to meet the long-term demand.

Additional Office Spaces

TXK Administrative Spaces | Airport administrative offices are often located within an airport terminal building. At TXK, administrative staff will occupy a wing on the second level. The space should adequately serve airport administration needs through the long-term horizon.

HVAC/Mechanical | The systems and support functions include mechanical rooms, heating and air conditioning (HVAC), custodial space, and server rooms. These elements are necessary for the continued efficiency of the TXK terminal building. These elements are forecasted to be approximately eight percent of the total programmed functional area. This analysis shows a need for additional building systems space by the long-term planning horizon. If the building is expanded in the future, these elements should also be considered.

Total Terminal Building Requirements

At approximately 39,300 sf, with approximately 35,203 sf of functional area space, the current terminal building is adequately sized for the activity it currently serves. However, certain functional elements may become constrained toward the end of the 20-year planning horizon of the master plan, resulting in lower levels of service. For example, the requirements evaluation identified a need for expansion of the baggage claim area, additional food/beverage and concessions services, and additional facility support spaces.

TERMINAL CURB

The terminal curb element is the direct interface between the terminal building and the ground transportation system. The length of curb available for loading and unloading passengers and baggage is determined by the type and volume of ground vehicles anticipated during the peak period on the design day. TXK has approximately 285 feet of dedicated passenger enplaning/departure curb along the roadway fronting the terminal, which accommodates all private and commercial vehicles. A shade canopy is expected to cover some (if not all) of the curb sidewalk.

ACRP's terminal planning and design spreadsheet model was used to estimate the terminal curb requirements for TXK based on the design hour passenger demand. The output from the model is the curb length required to maintain a LOS C. A terminal traffic study was not conducted for this master plan; therefore, an estimated 60 percent of design hour arriving and departing passengers are assumed to use the terminal curb in either a private auto, taxi/rideshare, limousine, or public bus. The remaining 40 percent of travelers are assumed to use public parking.

Table 3L provides the curb length analysis for the departure/enplanement and arrival/deplanement curb. The terminal curb is adequately sized through the long-term planning period.

TABLE 3L | Terminal Curb Requirements – Level of Service (LOS) C

	Available	Short Term	Inter. Term	Long Term
Annual Enplanements	35,699	39,080	42,412	48,789
Terminal Curb Front				
Departure/Arrival Curb (lf)	285	55	115	125
lf: Linear Feet				

Source: ACRP, Project Number 07-04, Spreadsheet Models for Terminal Planning and Design

VEHICLE PARKING

Vehicle parking associated with TXK includes spaces used by public passengers/visitors, employees, and rental car companies. Parking needs are generally established by taking into consideration peak hour passengers, peak hour visitors, and the travel mode split. Since TXK does not segregate short- and long-term parking areas, the entirety of the public terminal lot is considered as a single public lot. The existing and long-term parking needs for TXK are shown in **Table 3M**. This analysis shows that the public lot has adequate capacity to meet long-term demand.

TABLE 3M | Vehicle Parking Requirements

	Available	Short Term	Inter. Term	Long Term
Parking Requirements				
Public Spaces	383	138	176	199
Rental Car Ready/Return		21	23	27
Employee Spaces	42	20	21	24
Total Parking Spaces	**425**	**179**	**220**	**250**

Source: Coffman Associates analysis

Employee parking is estimated at 500 spaces per one million enplaned passengers. The current capacity of employee parking is sufficient in the long term. Future rental car ready/return needs are calculated at 550 spaces per one million originating passengers. This analysis shows the current capacity is adequate to meet and exceed long-term demand. Combined, TXK's available vehicle parking more than meets the long-term needs identified in this analysis.

GENERAL AVIATION FACILITY REQUIREMENTS

GA facilities are those necessary to accommodate airport activity by all aviation segments except commercial passenger service. This includes recreational flying, business aviation, charter, and some portions of air cargo and air ambulance activity. These airport users require a variety of services, such as fueling, terminal services, maintenance, and aircraft storage. The primary components considered for GA needs include:

- Aircraft Hangars
- Aircraft Parking Aprons
- GA Terminal Facilities
- Auto Parking and Access

The future need for each of these components has been analyzed based on the aviation demand forecasts.

GENERAL AVIATION TERMINAL FACILITIES

GA terminal facilities have several functions. Space may be provided for a pilots' lounge, flight planning, concessions, management offices, storage, restrooms, and various other needs. This space is not necessarily limited to a single, separate terminal building, but can include space offered by fixed base operators (FBOs) for these functions and services. At TXK, GA terminal services are provided by Signature Flight Support with an estimated 2,000 sf of terminal space.

The methodology used in estimating GA terminal facility needs is based on the number of airport users expected to utilize GA facilities during the design hour. Space requirements for terminal facilities are based on providing 90 sf per design hour itinerant passenger. A multiplier of 1.5 in the short term, increasing to 2.0 in the long term, is also applied to terminal facility needs to better determine the number of passengers associated with each itinerant aircraft operation. This increasing multiplier indicates an expected increase in passengers per business and recreational operations throughout the long term. These operations often support larger turboprop and jet aircraft, which accommodate an increasing passenger load factor.

Table 3N outlines the space requirements for GA terminal services at TXK through the planning period. As shown in the table, the existing FBO terminal building is deficient in meeting current and future demand. It should be noted, however, that once the new terminal is operational, the existing commercial passenger terminal building (approximately 20,000 sf) may be redesigned and partially or completely repurposed as a GA terminal, providing more than enough GA space for the foreseeable future.

TABLE 3N | General Aviation Service Facilities

	Available	Short Term	Inter. Term	Long Term
Peak Hour GA Itinerant Operations		24	25	28
Passenger Multiplier		1.5	1.8	2.0
Peak Hour GA Passengers		36	45	56
GA Services Facility Area (sf)	2,000	3,200	4,100	5,000
Total GA Parking Spaces	200+	102	123	148

Source: Coffman Associates analysis

GENERAL AVIATION VEHICLE PARKING

GA vehicular parking demands have also been determined for TXK and are shown on **Table 3N**. Space determinations for itinerant passengers were based on an evaluation of existing airport use, as well as standards set forth to help calculate projected terminal facility needs.

The parking requirements of based aircraft owners should also be considered. Although some owners prefer to park their vehicles in their hangar, safety can be compromised when automobile and aircraft movements are mixed. For this reason, separate parking requirements, which consider one half of the based aircraft at the airport, were applied to GA automobile parking space requirements. Using this methodology, parking requirements for GA activity call for approximately 102 spaces in the short term, increasing to approximately 148 spaces in the long term.

Signature Flight Support has a 40-spot lot for passengers (employees have a separate lot) and there are approximately 160 other parking positions throughout the GA facilities at TXK. Thus, the available parking is adequate for GA activities in the long term. As new GA facilities are developed, however, it will be important to consider expanding vehicle parking lots accordingly.

AIRCRAFT HANGARS

Utilization of hangar space varies as a function of local climate, security, and owner preferences. The trend in GA aircraft, whether single- or multi-engine, is toward more sophisticated (and, consequently, more expensive) aircraft; therefore, many aircraft owners prefer enclosed hangar space to outside tiedowns.

The demand for aircraft storage hangars is dependent on the number and type of aircraft expected to be based at TXK in the future. For planning purposes, it is necessary to estimate hangar requirements based on forecasted operational activity. However, actual hangar construction should be based on actual demand trends and financial investment conditions.

It is important to note that the types of hangars detailed in this section are categorized based on the proposed size and layout of the facility and do not necessarily correspond with the locally designated hangar facility categories. For example, certain categories, such as T-hangars and linear box hangars, may be grouped into the same category. Other hangar types, such as condominium box hangars, aircraft storage hangars, FBO hangars, and specialized aviation service operator (SASO) hangars, all typically correspond to conventional style hangars detailed in this section.

There are a variety of aircraft storage options typically available at an airport, including T-hangars, linear box hangars, executive/box hangars, and conventional hangars. T-hangars are intended to accommodate one small single-engine piston aircraft or, in some cases, one multi-engine piston aircraft. T-hangars are so named because they are in the shape of a "T," providing a space for the aircraft tail and wings, but no space for turning the aircraft within the hangar. Aircraft can be parked in only one position: backed ("pushed back") into the hangar. T-hangars are commonly "nested" with several individual storage units to maximize hangar space. In these cases, taxilane access is needed on both sides of the nested T-hangar facility. T-hangars are popular among aircraft owners with tighter budgets as they tend to be the least expensive enclosed hangar space to build and lease. There are currently 43 T-hangar units at TXK, totaling approximately 55,900 sf of aircraft storage capacity.

Box hangars, sometimes referred to as executive hangars, are mid-sized hangar facilities of up to 3,000 sf that often include space reserved for non-aircraft storage needs. These are usually owned by private companies with land leases on the airport who operate their business from the hangar or lease the hangars to other businesses. Currently, TXK does not have such smaller hangars; however, it is prudent to plan for these types of hangars. The majority of the hangar space at the airport is comprised of conventional hangar space.

Conventional hangars are the large, clear span hangars typically located facing the main aircraft apron at airports. These hangars provide for bulk aircraft storage and are often used by airport businesses, such as FBOs and/or SASOs (e.g., an aircraft maintenance business). Conventional hangars generally range in size from 3,500 sf to more than 20,000 sf. Often, a portion of a conventional hangar is utilized for non-aircraft storage needs, such as maintenance or office space. The conventional hangars at TXK encompass approximately 125,600 sf and could accommodate up to 42 aircraft. The estimate of 42 conventional hangar positions is an ideal situation and does not take into consideration the actual function of each hangar. For example, a large 10,000-sf hangar could house four or more aircraft, or the owner might house one aircraft.

Planning for future aircraft storage needs is based on typical owner preference and industry standard sizes for hangar space. For determining future aircraft storage needs, a planning standard of 1,400 sf per T-hangar, 2,200 sf per box hangar, and 3,000 sf per conventional hangar space is used. With the trend toward aircraft owners preferring enclosed aircraft storage space, no growth is projected for aircraft that utilize outside tiedowns. Providing a mix of aircraft storage options is preferred when planning hangars to meet the varied needs of aircraft owners. **Table 3P** provides a summary of the aircraft storage needs through the long-term planning horizon.

The analysis shows that there is a potential need for nearly 30,000 sf of new hangar storage capacity through 2042. The airport maintains a waitlist for aircraft owners looking to base their aircraft at TXK, which also indicates strong demand for hangar space. This includes a mixture of T-hangar, box hangar, and conventional hangar capacity. Service/maintenance needs are factored within conventional hangar areas. Due to the projected increase in based aircraft, annual GA operations, and hangar storage needs, facility planning will consider additional hangars at the airport. It is expected that the aircraft storage hangar requirements will continue to be met through a combination of hangar types. The largest need could involve the construction of conventional hangars which are better suited to accommodate larger turboprop and jet aircraft. T-hangar storage space requirements will also grow over time as new piston-driven aircraft base at TXK.

TABLE 3P | Aircraft Hangar Requirements

	Available	Short Term	Inter. Term	Long Term
Based Aircraft	**63**	**67**	**73**	**84**
T-Hangar Positions	43	28	29	31
Box/Conventional Hangar Positions	42	39	44	53
Total Positions	**85**	**67**	**73**	**84**
HANGAR AREA REQUIREMENTS				
T-Hangar Area	55,900	55,900	57,300	58,700
Box/Conventional Hangar Area	125,600	137,600	140,600	152,600
Total Storage Area (sf)	**181,500**	**193,500**	**197,900**	**211,300**

Notes:
Future T-hangars estimated at 1,400 sf per aircraft parking space
Future box/conventional hangars estimated at 3,000 sf per aircraft parking space
Source: Coffman Associates analysis

It should be noted that hangar requirements are general in nature and based on the approved aviation demand forecasts. The actual need for hangar space will further depend on the actual usage within hangars. For example, some hangars may be utilized entirely for non-aircraft storage, such as maintenance, although – from a planning standpoint – they have an aircraft storage capacity. Therefore, the needs of an individual used may differ from the calculated space necessary.

AIRCRAFT PARKING APRONS

FAA AC 150/5300-13B, *Airport Design*, suggests a methodology by which transient apron requirements can be determined from knowledge of busy-day operations. At TXK, the number of itinerant spaces required was determined to be approximately 50 percent of the busy-day itinerant operations for GA operations. A planning criterion of 800 square yards (sy) per aircraft was applied to determine future transient apron requirements for turbine aircraft; a planning criterion of 500 sy per piston-powered aircraft is used since they are generally not as large as turbine aircraft. For local apron needs, the 500 sy criterion was applied since most local operations are conducted by piston aircraft. Apron parking requirements are presented in **Table 3Q** and are separated into local and transient needs, as well as the total apron needs.

TABLE 3Q | Aircraft Parking Apron Requirements

	Available	Short Term	Inter. Term	Long Term
Local Apron Area (sy)	41,400	6,500	7,000	7,000
Transient Apron Area (sy)	13,000	32,600	33,600	36,400
Total Apron Area (sy)	**54,400**	**39,100**	**40,600**	**43,400**

Note: Area measurements include taxilanes.
Source: Coffman Associates analysis

Currently, the GA aprons at TXK encompass approximately 54,400 sy of space at the airport; however, this includes associated taxilanes and vast amounts of apron space dedicated to hangars and local operations. The amount of apron space dedicated to transient aircraft is approximately 13,000 sy. Based on calculations derived from *Airport Design* and a tool for estimating apron space provided by FAA, approximately 23,400 sy of additional apron space may be required to satisfy itinerant GA operations through the long term. As landside facilities are developed, it is important to include additional apron space in order to meet long-term demand.

AIRPORT SUPPORT FACILITIES

Various facilities that do not logically fall within classifications of airside or landside facilities have also been identified. These other areas provide certain functions related to the overall operation of the airport.

Fuel Storage

The fuel storage facilities, colloquially called a "fuel farm," are owned by Texarkana Regional Airport Authority and are managed by Signature Flight Support, the airport's only FBO. The self-serve fuel tank adjacent to the T-hangars is owned and maintained entirely by Signature Flight Support. Jet fuel is stored in two 20,000-gallon tanks, while AvGas is stored in a 12,000-gallon tank at the fuel farm with an additional 1,200 gallons within the self-serve tank, totaling 13,200 gallons of AvGas storage. While the FBO may provide full-service fueling via fuel trucks with onboard tanks, only static fuel storage capacity is considered for this study.

Records of fuel sales were provided by Signature Flight Support. Based on the fuel sales receipts from 2022, the FBO pumped 790,590 gallons of Jet A and 47,338 gallons of AvGas. Operational data were drawn from the FAA's Traffic Flow Management System Counts (TFMSC) database for the airport, which provides a count of aircraft type and operations at TXK. Using the available TFMSC data from 2022, it is estimated that 23 percent of all operations were conducted by turbine aircraft, with the remaining 77 percent occurring from piston operations. Dividing the total fuel flowage by the total number of operations provides a ratio of fuel flowage per operation. In 2022, the airport pumped approximately 113 gallons of Jet A per turbine operation and two gallons of AvGas per piston operation. It is anticipated that the ratio of aircraft operations will shift toward higher turbine counts through the planning period, and the forecast factored this expectation. This is due to a change in fleet mix toward larger turbine aircraft (both commercial airlines and business jets) with larger fuel capacities throughout the next 20 years.

Fuel storage forecasts were produced using the calculated ratios above with the projected number of annual operations for each planning horizon. The forecasted fuel storage requirements are summarized in **Table 3R**. Maintaining a 14-day fuel supply would allow the airport to limit the impact of a disruption of fuel delivery. Currently, the airport has enough fuel storage to meet the 14-day supply criterion for AvGas through the long term, while the 14-day supply of Jet A would fall short in the long term.

TABLE 3R | Fuel Storage Requirements

	Current Capacity	Baseline[1]	Short Term	Inter. Term	Long Term
Jet A					
Daily Usage	**40,000**	2,166	2,361	2,668	3,115
14-Day Supply		30,324	33,054	37,352	43,610
Annual Usage		790,590	861,927	973,694	1,136,881
AvGas					
Daily Usage	**13,200**	130	140	142	149
14-Day Supply		1,820	1,960	1,988	2,086
Annual Usage		47,388	51,068	51,694	54,396

[1] Baseline data derived from 2022 fuel flowage amounts.
Note: All values are in gallons.

Sources: Airport Records; Coffman Associates analysis

Perimeter Fencing

The entire airfield is equipped with a perimeter fence. Secured access gates provide vehicular access to the apron, hangar facilities, fuel farm, and various locations around the airfield. The secured gates are accessible only to airport tenants and employees. The only airside facility not protected with additional fencing is the ASOS equipment. Consideration should be given to adding security fencing to protect the weather station.

Aircraft Rescue and Firefighting (ARFF)

Part 139 airports are required to provide ARFF services during air carrier operations. Each certificated airport maintains equipment and personnel based on an ARFF index established according to the length of aircraft and scheduled daily flight frequency. In terms of flight frequency, an airport's ARFF index is determined to be the longest aircraft conducting at least five or more daily departures. In terms of aircraft length, there are five indices – A through E – with A applicable to the smallest aircraft and E applicable to the largest. **Table 3S** presents the vehicle requirements and capabilities for each index level.

TABLE 3S | ARFF Index Requirements

Index	Aircraft Length	Requirements
A	**<90'**	**1. One ARFF vehicle with 500 lbs. of sodium-based dry chemical; or** **2. One vehicle with 450 lbs. of potassium-based dry chemical and 100 lbs. of water and AFFF for simultaneous water and foam application**
B	90'-126'	1. One vehicle with 500 lbs. of sodium-based dry chemical and 1,500 gallons of water and AFFF; or 2. Two vehicles, one with the requirements for Index A and the other with enough water and AFFF for a total quantity of 1,500 gallons
C	126'-159'	1. Three vehicles, one with Index A requirements and two with enough water and AFFF for all three vehicles to total at least 3,000 gallons of agent combined; or 2. Two vehicles, one with Index B requirements and one with enough water and AFFF for both vehicles to total 3,000 gallons

TABLE 3S | ARFF Index Requirements (continued)

D	159'-200'	1. One vehicle carrying agents required for Index A; and 2. Two vehicles carrying enough water and AFFF for a total quantity of at least 4,000 gallons carried by the three vehicles combined
E	>200'	1. One vehicle with Index A requirements; and 2. Two vehicles with enough water and AFFF for a total quantity of 6,000 gallons carried by the three vehicles combined

AFFF: Aqueous Film-Forming Foam
ARFF: Aircraft Rescue and Firefighting
Source: Title 14 CFR Part 139

The current ARFF equipment and staffing available at TXK meet ARFF Index A; however, the existing and ultimate critical design aircraft have lengths over 90 feet. Therefore, the ARFF Index for TXK should be improved to Index B standards to maintain an adequate level of fire protection. In the future, the airport may experience an increase in operations by larger aircraft, which may also prompt a change to the ARFF Index. **Table 3T** presents the various aircraft in different scenarios previously discussed and what ARFF Index would be required to ensure adequate protection.

TABLE 3T | Aircraft and ARFF Indices

Aircraft	Length	Scenario	ARFF Index
CRJ-700	106'	Existing Critical Design Aircraft	B
ERJ-175	103'	Ultimate Critical Design Aircraft	B
Boeing 737	94'-117'	Air Cargo or Commercial Air Service	B
Boeing 757	155'-178'	Air Cargo	C/D
Boeing 747	184'-250'	Specialized Aviation Service Operator	D/E
Boeing 777	209'	Specialized Aviation Service Operator	E

FAA design standards recommend ARFF station facilities and equipment to be located so that equipment can respond to emergencies on the terminal apron without having to cross an active runway. The ARFF station at TXK is located immediately adjacent to the new terminal building and apron, from where equipment can quickly respond to emergencies without crossing an active runway. It is also located on the airfield in such a position that it can respond to emergencies throughout the airport within standard response times.

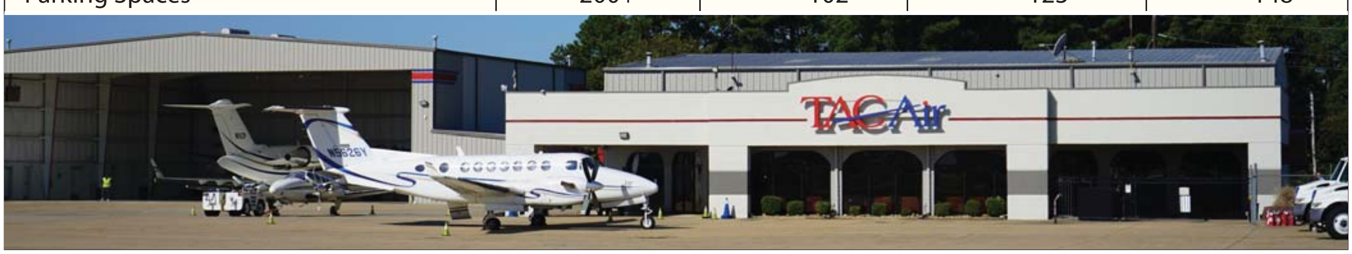
LANDSIDE FACILITY REQUIREMENTS SUMMARY

A summary of the landside facilities previously discussed at TXK is presented on **Exhibit 3H**.

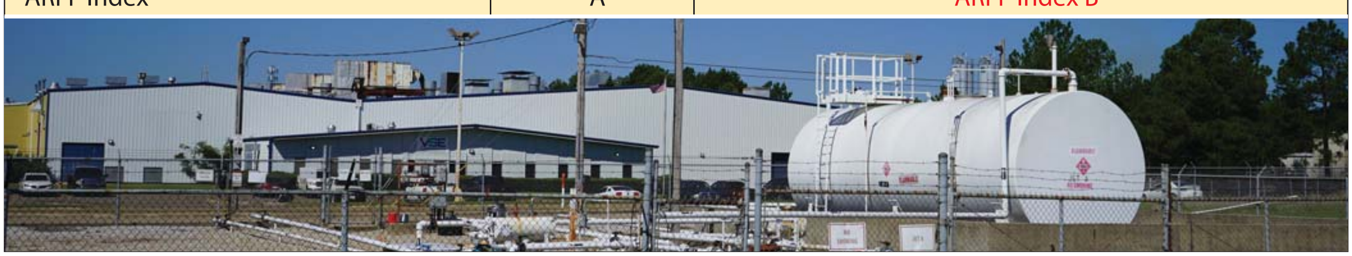
	AVAILABLE	SHORT-TERM	INTERMEDIATE TERM	LONG-TERM
AIRCRAFT STORAGE HANGARS				
T-Hangar Area (sf)	55,900	55,900	57,300	58,700
Conventional Hangar Area (sf)	125,600	137,600	140,600	152,600
Total Hangar Storage Area (sf)	**181,500**	**193,500**	**197,900**	**211,300**

AIRCRAFT PARKING APRON				
Local Apron Area (sy)	41,400	6,500	7,000	7,000
Transient Apron Area (sy)	13,000	32,600	33,600	36,400
Total Apron Area (sy)	**54,400**	**39,100**	**40,600**	**43,400**

GENERAL AVIATION TERMINAL FACILITY AND AUTOMOBILE PARKING				
Building Space (sf)	2,000	3,200	4,100	5,000
Parking Spaces	200+	102	123	148



SUPPORT FACILITIES				
14-Day Fuel Storage, Jet A	40,000	33,054	37,352	43,610
14-Day Fuel Storage, AvGas (100LL)	13,200	1,960	1,988	2,086
ARFF Index	A	ARFF Index B		



Red numbers indicate a deficiency in meeting demand.

Exhibit 3H
LANDSIDE FACILITIES SUMMARY

SUMMARY

The intent of this chapter has been to outline the facilities required to meet potential aviation demands projected for TXK through the planning horizon. To provide a more flexible master plan, the yearly forecasts from Chapter Two have been converted to planning horizon levels. The short term roughly corresponds to a five-year period, the intermediate term is approximately 10 years, and the long term is 20 years. By using planning horizons, airport management can focus on demand indicators for initiating projects and grant requests rather than on specific dates in the future.

Currently, Runway 4-22 should be designed to meet FAA standards associated with RDC C-II-2400. This category includes smaller commercial airliner regional jets, such as the Bombardier CRJ-700. Ultimately, the runway should be planned to meet RDC C-III-2400 design standards to accommodate more frequent operations by larger commercial service aircraft, such as the Embraer ERJ-175 or Boeing 737, and larger business jets, such as the Gulfstream G550/650.

Runway 13-31 is currently expected to meet FAA design standards associated with RDC B-II-5000, which includes most small- and medium-sized business jets, such as the Citation Excel/XLS, as well as most turboprop aircraft, including the Beechcraft King Air 300 and Pilatus PC-12. Runway 13-31 is planned to continue to meet these design standards and may be modified to RDC B-II-4000 to reflect a ¾-mile instrument approach on one or both ends of the runway.

The existing runways have been adequately serving a wide range of aircraft fleet mix, including commercial aircraft, business jets, and smaller GA aircraft. However, to accommodate larger and faster jets flying longer stage lengths, additional runway length is needed. Therefore, runway extension alternatives will be considered in the next chapter. Improvements to the runway strength will also be addressed. Taxiway geometry improvements will be considered to mitigate the potential for runway incursions to the greatest possible extent. The analysis in the next chapter will also address improvements to lighting and instrument approach capabilities at the airport.

On the landside, planning calculations show a need for expanding aircraft storage hangar capacity as more sophisticated aircraft (i.e., business jets, turboprops, and helicopters) base at the airport. Hangar space will largely depend on the needs of individual aircraft owners and developers and may not precisely follow the forecast. For example, if demand indicates a desire for additional T-hangars, then they should be the first priority. The availability of additional hangar space is a significant factor as to whether the airport will experience and can accommodate the forecast growth in based aircraft.

The next chapter will examine potential improvements to the airfield system and landside facilities. Several development alternatives will be presented that meet the needs outlined in this chapter. On the landside, several facility layouts that meet the forecast demands over the next 20 years will be presented. On the airside, several options for extending the runway and meeting more restrictive safety area design standards will be presented.