CHAPTER THREE

Facility Requirements

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 Cleburne Regional Airport (CPT) 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
- Airfield 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 to providing these facilities will be evaluated to determine the most practical, cost-effective, and efficient means for implementation.

The facility requirements for CPT 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 CPT 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 system can be evaluated to determine their capacity 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 the 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 2021	Short Term (1-5 Years)	Intermediate Term (6-10 Years)	Long Term (11-20 Years)
ANNUAL OPERATIONS				
Itinerant				
General Aviation	10,444	12,100	13,000	13,700
Air Taxi	300	400	550	750
Military	24	24	24	24
Local				
General Aviation	31,132	34,100	36,100	40,300
Military	0	0	0	0
Total Annual Operations (Rounded)	**41,900**	**46,600**	**49,700**	**54,800**
BASED AIRCRAFT	**119**	**128**	**139**	**162**

Source: Coffman Associates analysis

AIRFIELD CAPACITY

An airport's airfield capacity is expressed in terms of its annual service volume (ASV) and is a reasonable estimate of the number of operations that can be accommodated in a year before significant delay occurs. ASV accounts for runway use, aircraft mix, and weather conditions. The airport's ASV was analyzed following guidance from FAA AC 150/5060-5, *Airport Capacity and Delay*.

A single runway with less than 50 percent of operations by aircraft weighing more than 12,500 pounds has an unconstrained ASV of 195,000 annual operations. When factoring in weather conditions at Cleburne, the ASV is no lower than 150,000 annual operations. In 2021, the airport is projected to have approximately 41,900 operations, which is approximately 28 percent of ASV. In the long-term, CPT is forecast to have approximately 54,800 operations which would be 37 percent of ASV. According to FAA Order 5090.5, planning for capacity improvement projects should begin when operations reach approximately 60 percent of ASV. Since this threshold is not projected to be met over the next 20 years, no projects specifically triggered by a capacity deficiency are planned.

AIRFIELD REQUIREMENTS

The 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 navigational aids, lighting, and marking.

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 AWOS and has been analyzed to identify wind coverage provided by the existing runway orientations. At CPT, the orientation of Runway 15-33 provides 96.8 percent coverage for a 10.5 knot crosswind, and greater than 98 percent coverage for 13 knots and greater. Thus, Runway 15-33 provides adequate wind coverage for all weather conditions, and a crosswind runway is not required. Both the visual and instrument flight rules (VFR and IFR) wind roses are shown on **Exhibit 3A**.

RUNWAY LENGTH REQUIREMENTS

Aircraft 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 velocity, aircraft operating weight, wing flap settings, runway condition (wet or dry), runway gradient, vicinity airspace obstructions, and any special operating procedures.

FAA Advisory Circular 150/5325-4B, *Runway Length Requirements for Airport Design*, provides a five-step process for determining runway length needs.

1. Identify the list of critical design airplanes or airplane group.
2. Identify the airplanes or airplane group that will require the longest runway length at maximum certificated takeoff weight (MTOW).
3. Determine which of the three methods described in the AC will be used for establishing the runway length.
4. Select the recommended runway length from the appropriate methodology.
5. Apply any necessary adjustments to the obtained runway length.

The three methodologies for determining runway length requirements are based on the MTOW of the critical design aircraft or the airplane group. The airplane group consists of multiple aircraft with similar design characteristics. The three weight classifications are those with a MTOW of 12,500 pounds or less, those airplanes weighing over 12,500 pounds but less than 60,000 pounds, and those weighing 60,000 pounds or more. **Table 3B** shows these classifications and the appropriate methodology to use in runway length determination.

TABLE 3B | Airplane Weight Classification for Runway Length Requirements

Airplane Weight Category (MTOW)		Design Approach	Methodology
12,500 pounds or less	*Approach speeds of less than 30 knots*	Family grouping of small airplanes	Chapter 2: para. 203
	Approach speeds of at least 30 knots but less than 50 knots	Family grouping of small airplanes	Chapter 2: para. 204
	Approach speeds of 50 knots or more With less than 10 passengers	Family grouping of small airplanes.	Chapter 2: para. 205, Figure 2-1
	Approach speeds of 50 knots or more With 10 or more passengers	Family grouping of small airplanes	Chapter 2: para. 205, Figure 2-1
Over 12,500 pounds but less than 60,000 pounds		Family grouping of large airplanes	Chapter 3: Figures 3-1 or 3-2 and Tables 3-1 or 3-2
60,000 pounds or more or Regional Jets		Individual large airplanes	Chapter 4: Airplane performance manuals

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

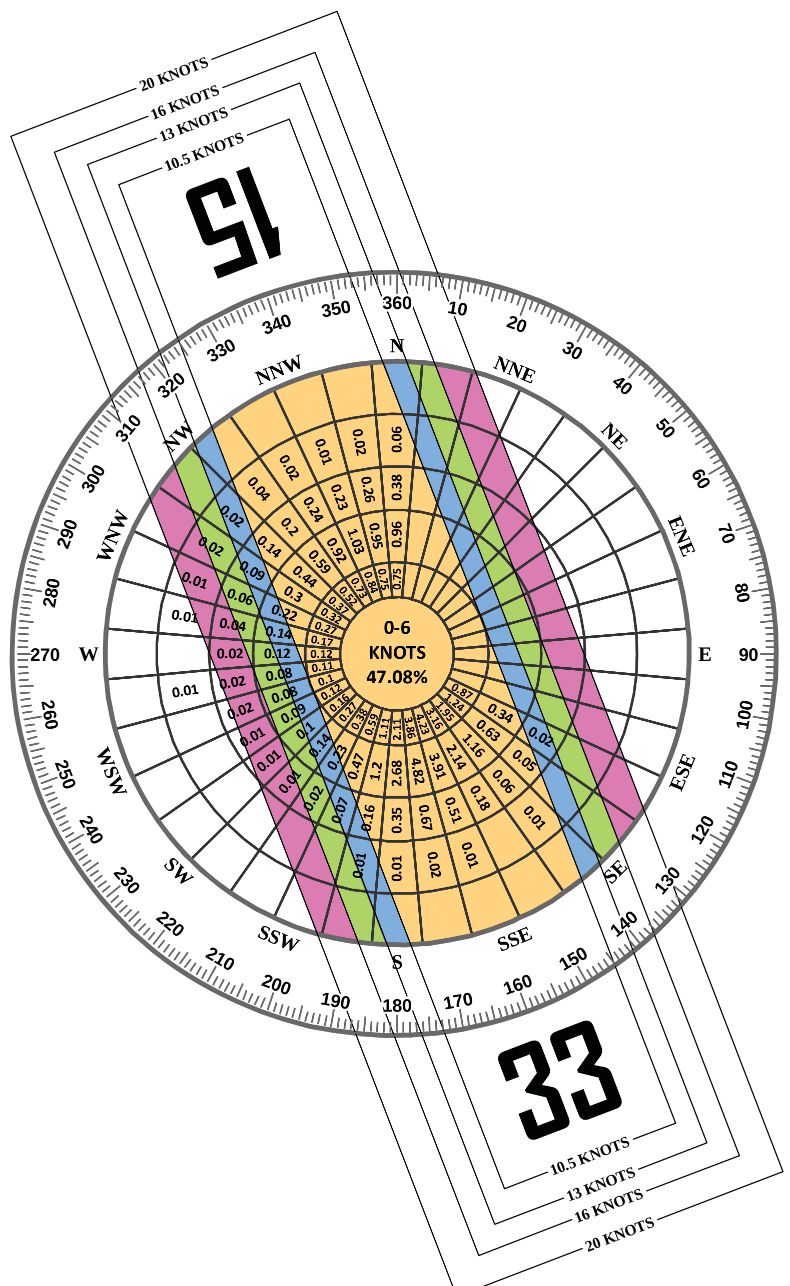
Utilizing FAA AC 150/5325-B, *Runway Length Requirements for Airport Design*, the following presents the five-step process for determining the recommended runway length for Runway 15-33.

Step 1: Identify the critical design airplanes or airplane group.

The first step in determining the recommended runway length for an airport is to identify the critical design aircraft or family grouping of aircraft with similar design characteristics. The critical design aircraft or airplane group accounts for at least 500 annual operations. The FAA's Traffic Flow Management System Counts (TFMSC) database documents those aircraft that fly IFR and/or file a flight plan to or from the airport. Local operations are not captured in the TFMSC. **Table 3C** summarizes the TFMSC data for CPT by weight class. All other operations at the airport are conducted by small piston powered aircraft weighing less than 12,500 pounds.

ALL WEATHER WIND COVERAGE

Runways	10.5 Knots	13 Knots	16 Knots	20 Knots
Runway 15-33	96.80%	98.63%	99.70%	99.94%

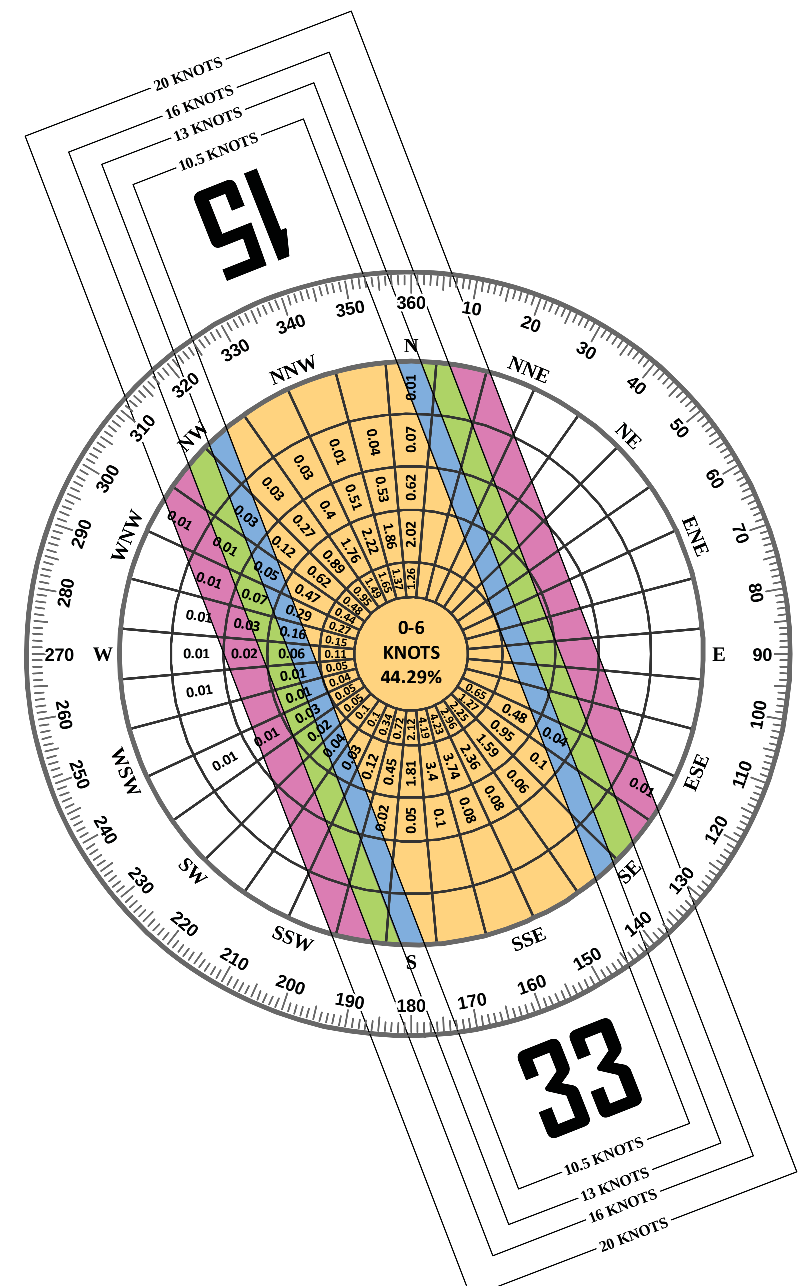


SOURCE:
NOAA National Climatic Center
Asheville, North Carolina
Cleburne Regional Airport,
Cleburne, TX

OBSERVATIONS:
244,943 All Weather Observations
Jan. 1, 2011 - Dec, 31 2020

IFR WIND COVERAGE

Runways	10.5 Knots	13 Knots	16 Knots	20 Knots
Runway 15-33	95.86%	98.15%	99.55%	99.91%



SOURCE:
NOAA National Climatic Center
Asheville, North Carolina
Cleburne Regional Airport
Cleburne, TX

OBSERVATIONS:
20,218 All Weather Observations
Jan. 1, 2011 - Dec, 31 2020

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TABLE 3C | Jet and Turboprop Operations by Weight Class

	OPERATIONS				
Weight Class	**2016**	**2017**	**2018**	**2019**	**2020**
12,500 lbs. or less	390	312	382	256	188
Over 12,500 lbs. but less than 60,000 lbs.	446	478	496	428	374
60,000 lbs. or more	8	8	0	2	8
Total Jets and Turboprops	**844**	**798**	**878**	**686**	**570**
Total Jet Operations	650	618	574	480	328
Total Turboprops Operations	194	180	304	206	242

Source: Traffic Flow Management System Counts

As can be seen in **Table 3C**, there is an average of 444 annual operations by aircraft with a MTOW over 12,500 but less than 60,000 pounds over the last five years. There are very few operations by aircraft with a MTOW greater than 60,000 pounds. Also, over the last five years the airport has averaged 530 business jet operations. Therefore, the appropriate runway length methodology is to examine the general runway length tables from Chapter 3 of AC 150/5325-4B, which apply to airports with a significant level of business jet activity.

Step 2: Identify the airplanes or airplane group that require the longest runway length at maximum certificated takeoff weight (MTOW).

Table 3C distinguishes between operations by jets and turboprops. Jet aircraft typically require the longest runway lengths; therefore, the runway length curves in Chapter 3 of AC 150/5325-4B will be utilized. Exhibit 2H previously documented the specific business jets and turboprops that operate at the airport.

Step 3: Determine which of the three methods described in the AC will be used for establishing the runway length.

The third step in the runway length recommendation guidance is to select the specific methodology to use. Chapter 3 of the AC groups business jets weighing over 12,500 pounds but less than 60,000 pounds into the following two categories:

- 75 percent of the fleet; and
- 100 percent of the fleet.

The AC states that the airplanes in the 75 percent of the fleet category generally need 5,000 feet or less of runway at mean sea level and standard day temperature (59° F), while those in the 100 percent of the fleet category need more than 5,000 feet of runway under the same conditions.

The AC indicates that the airport designer must determine which category to use for runway length determination. According to the AC, if relatively few airplanes under evaluation are in the 100 percent of the fleet category, then this category should be used for runway length determination. It should be noted that there is not a specific operational threshold (such as 500 annual operations) that determines which category to use for runway length determination. **Table 3D** presents the TFMSC operations data at CPT for the 100 percent of the fleet category. For each of the past five years, there has been an average of nearly 200 operations by jet aircraft in 100 percent of the fleet category; therefore, the 100 percent of the fleet category is used to determine runway length for CPT.

TABLE 3D | Jet Operations in the 100 Percent of the Fleet Category

			OPERATIONS[1]				
Aircraft Type	**MTOW**	**ARC**	**2016**	**2017**	**2018**	**2019**	**2020**
Challenger 600/601/604 Series	48,200	C-II	0	0	0	0	0
Citation II/SP/Latitude Series	30,800	B-II	74	120	104	26	38
Citation CJ3/CJ4	17,110	B-II	8	6	12	14	26
Citation X	36,100	B-II	14	4	0	6	4
Falcon 900	49,000	B-II	0	30	62	96	90
Falcon 2000	42,800	B-II	6	2	2	2	8
Learjet 40 XR Series	21,000	C-I	16	10	24	20	4
Lear 50/60/70 Series	19,500	C-I	6	4	2	8	4
Gulfstream 100/150*	26,100	C-II	0	22	0	0	2
Gulfstream 200/450/500/600*	69,700	D-II+	22	14	6	8	8
Hawker 800	28,000	C-II	8	8	4	16	14
Hawker 4000*	39,500	B-II	0	0	0	0	0
		TOTAL	**154**	**220**	**216**	**196**	**198**

[1] Traffic Flow Management System Counts
MTOW: Maximum Take Off Weight
ARC: Airport Reference Code
*Note: FAA AC 150/5325-4B, Runway Length Requirements for Airport Design, identifies the listed aircraft as being in the 75-100% category. Those with an * are identified by the planner as being in this category.*
Source: FAA Traffic Flow Management System Counts (TFMSC)

There are two runway length curves presented in the AC under both the 75 and 100 percent of the fleet category:

- 60 percent useful load; and
- 90 percent useful load.

The useful load is the difference between the maximum allowable structural weight and the operating empty weight (OEW). The useful load consists of passengers, cargo, and usable fuel. The determination of which useful load category to use will have a significant impact on the recommended runway length; however, it is inherently difficult to determine because of the variable needs of each aircraft operator. For shorter flights, pilots may take on less fuel; however, pilots may prefer to ferry fuel so that they do not have to refuel frequently. Because of the variability in aircraft weights and haul lengths, the 60 percent useful load category is considered the default, unless there are specific known operations that would suggest using the 90 percent useful load category. Examples of a need to use the 90 percent useful load include regular air cargo flights, long haul flights (i.e., cross-country), or known fuel-ferrying needs. For this analysis, the default 60 percent useful load category will be used.

Step 4: Select the recommended runway length from the appropriate methodology.

The next step is to examine the 100 percent of the fleet at 60 percent useful load performance chart in Figure 3-2 of the AC (**Figure 3A**). This chart requires the following knowledge:

- The mean maximum daily temperature of the hottest month: August at 96.4°(F).
- The airport elevation: 854 feet above mean sea level (MSL).

By locating the appropriate temperature and airport elevation on the performance chart, the recommended runway length, without any adjustments, is approximately 6,000 feet.

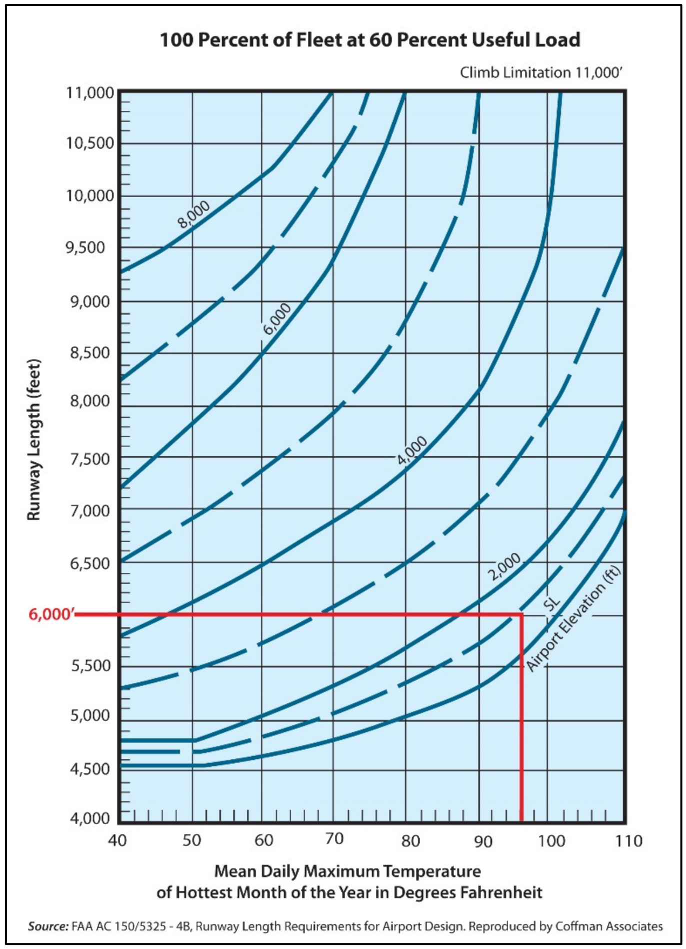

Figure 3A: Business Jet Runway Length Chart

Step 5: Apply any necessary adjustments to the obtained runway length.

The recommended runway length determined in Step #4 is based on zero effective runway gradient and dry runways. Step #5 applies adjustments to the raw runway length for these factors. The adjustments are not cumulative, and the higher of the two adjustments is the recommended runway length. With an 0.2 percent effective runway gradient (9 feet of elevation difference for Runway 15-33), the runway length obtained from Step #4 is increased at the rate of 10 feet for each foot of elevation difference between the high and low points of the runway centerline. At CPT, this equates to an additional 90 feet of required runway length, resulting in a runway length of 6,090 feet. For wet and slippery runway length calculations (applicable to landing operations only), the runway length obtained in Step #4 is increased 15 percent or up to 5,500 feet for the 60% useful load category, or up to 7,000 feet for the 90 percent useful load category. Any final runway length obtained is rounded to the nearest hundred if above 30 feet. **Table 3E** summarizes the data inputs and the final recommended runway length of 6,100 feet for Cleburne Regional Airport.

If there is specific justification to use the 90 percent useful load category, then the recommended runway lengths would be 7,300 for 75 percent of the fleet and 9,700 feet for 100 percent of the fleet. **That justification does not exist today, therefore the recommended runway length, following FAA guidance, is 6,100 feet for Cleburne Regional Airport.**

TABLE 3E | Business Jet Runway Length Requirements

Airport Elevation:	854' feet above mean sea level			
Average High Monthly Temp:	96.4 degrees (August)			
Runway Gradient:	0.2% Runway 15-33 (9' elevation change)			
Fleet Mix Category	**Raw Runway Length from FAA AC**	**Runway Length with Gradient Adjustment**	**Wet Surface Landing Length for Jets (+15%)***	**Final Runway Length**
75% of fleet at 60% useful load	4,894	4,984	5,500	5,500
100% of fleet at 60% useful load	**6,000**	**6,090**	**5,500**	**6,100[1]**
75% of fleet at 90% useful load	7,217	7,307	7,000	7,300[2]
100% of fleet at 90% useful load	9,559	9,649	7,000	9,700[2]

*Max 5,500' for 60% useful load and max 7,000' for 90% useful load in wet conditions
[1] Recommended runway length for CPT
[2] Requires specific documentation of regular operations by 90% useful load aircraft.
Source: FAA AC 150/5325-4B, Runway Length Requirements for Airport Design.

Supplemental Runway Length Analysis for Specific Business Jets Operating at CPT

The official runway length methodology previously presented determined that the airport could have a need for a runway length of 6,100 feet based on existing activity levels by large business jets (those in the 100 percent fleet mix category). In some cases, this generalized methodology may not account for different conditions that may apply to specific aircraft models. The following discussion examines the runway length needs for specific aircraft that can operate at the airport by examining the flight planning manuals of a variety of aircraft.

The flight planning manuals of several business jet and turboprops were analyzed for takeoff and landing length requirements under the local condition of a design temperature of 96.4 degrees F at a field elevation of 854.2 feet MSL. **Exhibit 3B** provides detailed runway takeoff and landing length analyses for the most common business jet and turboprop aircraft in the national fleet. This data was obtained from Ultranav software, which computed operational parameters for specific aircraft based on the flight planning manuals for each aircraft. The resulting runway length figures are shaded green or red, based on their relation to the current length of Runway 15-33 (5,697 feet), with red figures exceeding the current runway length.

Takeoff Length Requirements

The runway takeoff length analysis calculates the length needed for a specific aircraft to safely perform a departure from an airport, given the airport's specific conditions (elevation, max temperature, and runway grade). It includes the maximum takeoff weight (MTOW) allowable and the useful load from 60 percent to 100 percent.

This analysis shows that during the hottest periods of the year, Runway 15-33 can accommodate all but one aircraft at 60 percent useful load (the Gulfstream 100/IAI Astra business jet). At 70 percent useful load, seven aircraft become weight-restricted, and progressively fewer turbine aircraft can operate on the available runway as the useful load increases. The average takeoff length needed for all turbine aircraft analyzed at 100 percent useful load is **5,865 feet**.

Aircraft Name	MTOW	Takeoff Length Requirements (feet) – Useful Load 60%	70%	80%	90%	100%
Pilatus PC-12	9,921	2,134	2,309	2,493	2,685	2,886
King Air C90B	10,100	2,649	2,846	3,054	3,271	3,497
Citation I/SP	11,850	2,910	3,159	3,424	3,704	4,001
Citation V (Model 560)	15,900	2,918	3,169	3,441	3,728	4,034
Citation Mustang	8,645	2,967	3,281	3,627	4,076	4,514
Citation CJ3	13,870	3,007	3,232	3,481	3,731	4,012
Citation Encore Plus	16,830	3,223	3,541	3,886	4,267	4,682
Citation II (550)	13,300	3,238	3,573	3,930	4,308	6,647
Citation (525A) CJ2	12,375	3,307	3,555	3,863	4,135	4,422
Citation Sovereign	30,300	3,425	3,518	3,716	3,975	4,260
King Air 200 GT	12,500	3,489	3,608	3,733	3,864	3,997
Citation 560 XLS	20,200	3,502	3,776	4,071	4,370	4,698
King Air 350	15,000	3,573	3,731	3,896	4,160	4,493
Citation (525) CJ1	10,600	3,622	4,100	4,581	5,060	5,555
Citation Bravo	14,800	3,625	3,902	4,211	4,564	4,955
Premier 1A	12,500	3,746	4,123	4,570	5,083	5,571
Lear 31A	17,000	3,952	4,286	4,652	5,047	6,130
Lear 40XR	21,000	4,057	4,310	4,649	5,009	5,348
Beechjet 400A	16,300	4,107	4,421	4,748	5,098	5,480
Lear 45XR	21,500	4,171	4,477	4,856	5,234	5,655
Lear 40	21,000	4,345	4,747	5,221	5,785	6,460
Hawker 4000	39,500	4,379	4,753	5,151	5,590	6,150
Falcon 900EX	49,200	4,380	4,930	5,600	6,270	6,870
Gulfstream V	90,500	4,456	4,989	5,820	6,679	7,709
Global 5000	92,500	4,462	4,959	5,481	6,027	6,597
Hawker 800/850 XP	28,000	4,529	4,967	5,452	O/L	O/L
Falcon 7X	70,000	4,531	5,038	5,581	6,177	6,860
Falcon 50 EX	41,000	4,563	5,046	5,556	6,095	6,591
Challenger 300	38,850	4,568	5,004	5,452	5,926	6,418
Citation III	21,500	4,592	5,053	5,553	O/L	O/L
Lear 45	21,500	4,594	5,036	5,559	6,112	7,052
Gulfstream 450	74,600	4,617	5,085	5,605	6,160	6,752
Gulfstream IV	74,600	4,712	4,998	5,585	6,141	6,464
Citation X	35,700	4,729	5,148	5,645	6,194	6,773
Gulfstream 550	91,000	4,759	5,436	6,140	6,902	7,691
Citation VII	23,000	4,789	5,136	5,516	5,933	O/L
Falcon 2000	35,800	4,911	5,374	5,832	6,338	7,215
Gulfstream 650	99,600	5,019	5,519	6,096	6,758	7,529
Challenger 604/605	48,200	5,068	5,592	6,184	6,815	7,455
Westwind II	23,500	5,157	5,692	6,246	O/L	O/L
Challenger 601	45,100	5,190	5,780	6,430	7,170	8,000
Lear 60	23,500	5,296	5,846	6,395	6,958	7,670
Lear 35A	19,600	5,354	6,041	6,735	18,720	O/L
Embraer 135	49,604	5,469	6,067	6,340	6,924	7,629
Hawker 1000	31,000	5,500	6,140	6,780	O/L	O/L
Gulfstream 200	35,450	5,594	6,281	7,032	7,838	O/L
Israel IAI/Gulfstream 100	24,650	5,837	6,406	O/L	O/L	O/L
Average Takeoff Length		**4,235**	**4,638**	**5,041**	**5,688**	**5,865**

Aircraft Name	MLW	Landing Length Requirements (feet) – Dry Runway Conditions: Part 25	Dry: 80% Rule	Dry: 60% Rule	Wet Runway Conditions: Part 25	Wet: 80% Rule	Wet: 60% Rule
King Air 200 GT	12,500	1,231	1,539	2,052	N/A	N/A	N/A
King Air C90B	9,600	1,270	1,588	2,117	N/A	N/A	N/A
Pilatus PC-12	9,921	2,351	2,939	3,918	N/A	N/A	N/A
Citation I/SP	11,350	2,436	3,045	4,060	2,801	3,501	4,668
Westwind II	19,000	2,440	3,050	4,067	2,810	3,513	4,683
Citation II (550)	12,700	2,510	3,138	4,183	6,065	7,581	10,108
Citation Mustang	8,000	2,577	3,221	4,295	3,616	4,520	6,027
Challenger 300	33,750	2,649	3,311	4,415	5,077	6,346	8,462
Hawker 800/850 XP	23,350	2,703	3,379	4,505	4,157	5,196	6,928
Global 5000	78,600	2,711	3,389	4,518	3,118	3,898	5,197
Embraer 135	40,785	2,733	3,416	4,555	3,133	3,916	5,222
Gulfstream 550	75,300	2,821	3,526	4,702	5,118	6,398	8,530
Gulfstream V	75,300	2,838	3,548	4,730	3,264	4,080	5,440
Challenger 604/605	38,000	2,841	3,551	4,735	4,420	5,525	7,367
King Air 350	15,000	2,877	3,596	4,795	3,309	4,136	5,515
Lear 40	19,200	2,886	3,608	4,810	3,679	4,599	6,132
Lear 40XR	19,200	2,887	3,609	4,812	3,679	4,599	6,132
Lear 45	19,200	2,887	3,609	4,812	3,679	4,599	6,132
Lear 45XR	19,200	2,887	3,609	4,812	3,679	4,599	6,132
Hawker 1000	25,000	2,927	3,659	4,878	4,003	5,004	6,672
Citation Sovereign	27,100	2,929	3,661	4,882	3,737	4,671	6,228
Citation (525) CJ1	9,800	2,945	3,681	4,908	3,981	4,976	6,635
Israel IAI/Gulfstream 100	20,700	2,968	3,710	4,947	3,413	4,266	5,688
Falcon 7X	62,400	2,974	3,718	4,957	3,421	4,276	5,702
Falcon 50 EX	35,715	2,978	3,723	4,963	3,425	4,281	5,708
Lear 31A	16,000	3,070	3,838	5,117	4,299	5,374	7,165
Citation CJ3	12,750	3,086	3,858	5,143	4,202	5,253	7,003
Citation Encore Plus	15,200	3,106	3,883	5,177	4,729	5,911	7,882
Citation V (Model 560)	15,200	3,132	3,915	5,220	4,643	5,804	7,738
Falcon 2000	33,000	3,179	3,974	5,298	3,656	4,570	6,093
Citation VII	20,000	3,195	3,994	5,325	4,318	5,398	7,197
Citation (525A) CJ2	11,500	3,262	4,078	5,437	4,728	5,910	7,880
Hawker 4000	33,500	3,278	4,098	5,463	3,770	4,713	6,283
Lear 35A	15,300	3,305	4,131	5,508	4,627	5,784	7,712
Gulfstream 450	66,000	3,317	4,146	5,528	5,706	7,133	9,510
Challenger 601	36,000	3,389	4,236	5,648	4,066	5,083	6,777
Premier 1A	11,600	3,440	4,300	5,733	4,426	5,533	7,377
Citation 560 XLS	18,700	3,499	4,374	5,832	5,512	6,890	9,187
Gulfstream 200	30,000	3,601	4,501	6,002	4,141	5,176	6,902
Gulfstream IV	66,000	3,678	4,598	6,130	7,050	8,813	11,750
Citation Bravo	13,500	3,680	4,600	6,133	5,780	7,225	9,633
Lear 60	19,500	3,681	4,601	6,135	4,956	6,195	8,260
Falcon 900EX	44,500	3,733	4,666	6,222	4,293	5,366	7,155
Beechjet 400A	15,700	3,787	4,734	6,312	5,613	7,016	9,355
Citation X	31,800	3,908	4,885	6,513	5,578	6,973	9,297
Gulfstream 650	83,500	3,920	4,900	6,533	5,157	6,446	8,595
Citation III	19,000	4,219	5,274	7,032	6,139	7,674	10,232
Average Landing Length		**3,037**	**3,796**	**5,061**	**4,340**	**5,425**	**7,234**

NOTE: Green figures are less than or equal to the length of the runway; red figures are greater than the runway length. Calculation assumptions: 854 feet MSL field elevation; 96.4° F ambient temperature; 0.15% runway grade.
O/L: Out of Limits, based on aircraft planning manuals. MTOW: Maximum Takeoff Weight MLW: Maximum Landing Weight N/A: Not Applicable. Turboprop aircraft landing lengths are not adjusted for wet runway conditions.
Source: Ultranav software

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Landing Length Requirements

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

As can be seen on the landing length table on **Exhibit 3B**, there are several business jets that may be weight-restricted for landing. With an average landing length of 5,425 feet for aircraft operating under the 80 percent rule during wet runway conditions, the airport can accommodate most aircraft. However, under the 60 percent rule, an average landing length of 7,234 feet is needed. It should be noted that the landing length calculations consider the maximum landing weight. Most aircraft will have burned off fuel during flight and will be lighter.

Small Aircraft Runway Length

Many of the operations at CPT are conducted using smaller GA aircraft weighing less than 12,500 pounds, such as the Cessna 172, Beech Bonanza, or Cessna Conquest. Following guidance from AC 150/5325-4B, *Runway Length Requirements for Airport Design*, to accommodate 100 percent of these small aircraft, a runway length of 4,100 feet is recommended. For small aircraft with 10 or more passenger seats, 4,400 feet of runway length is recommended. **Table 3F** summarizes the runway length needs for small aircraft.

TABLE 3F | Small Airplane Runway Length Requirements

Airport Elevation	854.2 feet mean sea level (MSL)
Average High Monthly Temp.	96.4 degrees F (August)
Fleet Mix Category	**Runway Length (feet)**
100% of small airplanes	4,100
100% of small airplanes (10+ seats)	4,400

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

Runway Length Summary

The analysis for determination of the recommended runway length for Cleburne Regional Airport followed FAA guidance provided in FAA Advisory Circular 150/5325-4B, *Runway Length Requirements for Airport Design.* To accommodate 100 percent of the general aviation business jet fleet at 60 percent useful load, the runway should be 6,100 feet long. The analysis also indicated that a runway length of 7,300 and 9,700 feet could be justified if the 90 percent useful load category were justified. Runway extension planning is restricted to the 60 percent useful load category unless specific documentation can be provided. Therefore, **future planning for CPT will consider a runway length of 6,100 feet**.

Additional analysis was conducted to determine the runway length needs of specific aircraft that may operate at CPT by examining the flight planning manuals for specific aircraft. Under certain operating conditions (hot days, wet runways, and/or maximum weight), several aircraft will be weight restricted when operating on the current runway length of 5,697 feet. If activity by any of these specific aircraft can be documented to exceed the 500 operations threshold, then an extension to fully accommodate those aircraft would be justified.

Justification for any runway extension to meet the needs of business jets would require regular use on the order of 500 annual itinerant operations. This is the minimum threshold required to obtain FAA grant funding assistance. The existing length of Runway 15-33 does not fully provide for all jet activity, especially during hot weather conditions and when jet aircraft are carrying full useful loads. Analysis in the next chapter will examine the potential to extend the runway to 6,100 feet to better serve the needs of larger aircraft during the planning period and beyond.

RUNWAY WIDTH

Runway 15-33 is 100 feet wide, which exceeds FAA's design standards for ARC B-II runways and meets ARC C-II standards. CPT should maintain its current runway width in order to accommodate both the current and future design aircraft.

PAVEMENT STRENGTH

An important feature of airfield pavement is its ability to withstand repeated use by aircraft of significant weight. At CPT, the pavement for Runway 15-33 should be able to accommodate regular usage by the largest business jet aircraft using and planned to use the airport. The current strength rating on Runway 15-33 is 30,000 pounds single wheel loading (SWL). The current strength rating is adequate for many of the business jet fleet, including the smaller Cessna Citation jets, Embraer Phenom 300, and the IAI Westwind business jets. The runway currently does not have a dual wheel loading (DWL) rating.

The future critical design aircraft grouping includes aircraft like the Bombardier Challenger 600/604, which averages 45,000 pounds, and the Gulfstream V/550, weighing approximately 90,000 pounds. Most of these aircraft, like the Challenger and Gulfstream, have dual wheel landing gear configurations. Therefore, to better serve the business jet fleet, and to ensure the longevity of the runway, consideration should be given to improving the surface strength rating to 60,000 pounds (SWL) and 90,000 pounds (DWL) through the planning period.

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 Runway 15-33 is ADG "II" and the TDG "2A." **Table 3G** presents the taxiway design standards related to ADG II.

The table also shows those taxiway design standards related to 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 those taxiways. Different taxiway/taxilane pavements can and should be designed to the most appropriate TDG design standards.

The existing and ultimate critical TDG for CPT is 2A, which is based on the Beechcraft King Air 300, an aircraft which is based at and regularly uses the airport. This means that the taxiways associated with the runway should be at least 35 feet wide. All taxiways on the airfield are at least 35 feet wide, except for the northernmost, unmarked section of Taxiway B, as well as a small section of Taxiway E. The surface of Taxiway A leading onto Runway 15 is 80 feet wide, which exceeds the design standard. Consideration should be given to making all taxiways a uniform width of 35 feet.

TABLE 3G | Taxiway Dimensions and Standards

STANDARDS BASED ON ADG	ADG II
Taxiway Protection	
Taxiway Safety Area (TSA) Width	79
Taxiway Object Free Area (TOFA) Width	124
Taxilane Object Free Area Width	110
Taxiway Separation	
Taxiway Centerline to:	
Fixed or Movable Object	62
Parallel Taxiway/Taxilane	101.5
Taxilane Centerline to:	
Fixed or Movable Object	55
Parallel Taxilane	94.5
Wingtip Clearance	
Taxiway Wingtip Clearance	22.5
Taxilane Wingtip Clearance	15.5
STANDARDS BASED ON TDG	**TDG 2A**
Taxiway Width Standard	35
Taxiway Edge Safety Margin	7.5
Taxiway Shoulder Width	15

ADG: Airplane Design Group
TDG: Taxiway Design Group
Note: All dimensions are in feet.

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

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. There are no conflicts within either the TSA or the TOFA, and they should be maintained as such through the planning period.

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 CPT 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 probably of runway incursions.
   - *Increase Pilot Situational Awareness*: A pilot who knows where they are 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. CPT does not have any identified "hot spots." However, Taxiway G provides direct access to Runway 15-33 from the main terminal apron, which can lead to runway incursions. Additionally, the north end of Taxiway A is a wide throat taxiway entrance to Runway 15. These conditions are shown on **Figure 3B**.

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.

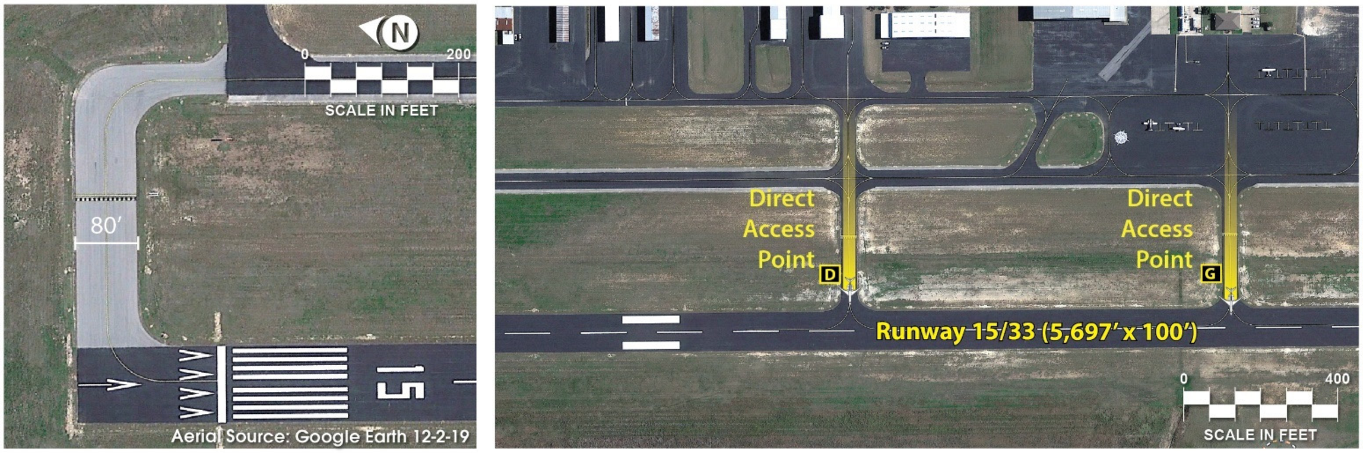

Figure 3B: Non-Standard Taxiway Conditions

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 the T-hangar buildings needs to only meet clearance standards for ADG I aircraft which has a TOFA requirement of 79 feet. Currently, the separation between the buildings is 70 feet, and the centerline markings are less than 39.5 feet for several other taxilanes. In the future, the taxilane centerline for T-hangars should be 39.5 feet from the hangar building. Typically, TxDOT and FAA will want the ALP to reflect the proper TOFA when the buildings are at the end of their useful life and when they are to be replaced.

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), Object Free Area (ROFA), Obstacle Free Zone (OFZ), and Runway Protection Zone (RPZ). **Table 3H** presents the applicable design standards for the RSA, ROFA, and OFZ. RPZs are discussed later.

Dimensional standards for the various safety areas associated with the runway are a function of the type of aircraft (ARC) expected to use the runway, as well as the approved instrument approach visibility minimums. The entire RSA, ROFA, and OFZ should be under the direct control of the airport to ensure these areas remain free of obstacles and can be readily accessed by maintenance and emergency personnel. **Exhibit 3C** depicts the existing and ultimate safety areas at CPT, as well as any current or future non-standard conditions.

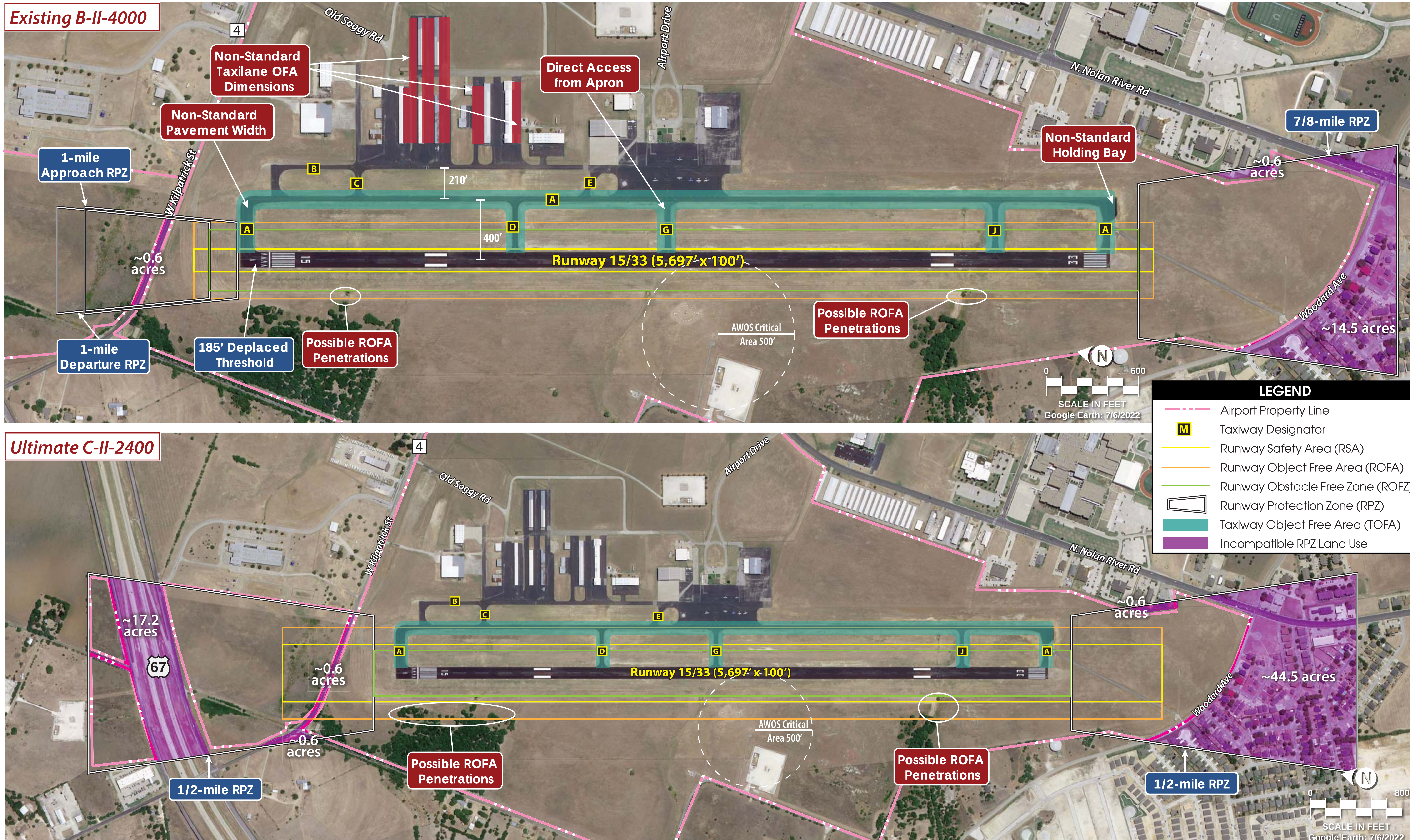

Exhibit 3C
EXISTING AND ULTIMATE SAFETY AREAS

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TABLE 3H | Airfield Design Standards

Runway Design Code (RDC)	B-II-4000 (Existing)	C-II-2400 (Ultimate)	Current Conditions/Notes
RUNWAY DIMENSIONS			
Runway Width	75	100	Exceeds Existing and Meets Ultimate Standard
Runway Shoulder Width	10	10	Meets Existing and Ultimate Standard
RUNWAY SAFETY AREA			
Width	150	500	Trees, Drainage May Conflicts with Ultimate RSA Width
Length Prior to Threshold	300	600	Kilpatrick Rd Conflicts with Ultimate RSA length
Length Beyond End	300	1,000	Kilpatrick Rd Conflicts with Ultimate RSA length
RUNWAY OBJECT FREE AREA			
Width	500	800	Trees, Drainage Conflicts with Existing and Ultimate ROFA Width
Length Beyond Runway End	300	1,000	Kilpatrick Rd Conflicts with Ultimate ROFA Length
RUNWAY OBSTACLE FREE ZONE			
Width	400	400	Meets Existing and Ultimate Standard
Length Beyond Runway End	200	200	Meets Existing and Ultimate Standard
SEPARATION STANDARDS – RUNWAY CENTERLINE TO:			
Holding Position	200	250	Exceeds Existing and Meets Ultimate Standard
Parallel Taxiway	240	400	Exceeds Existing and Meets Ultimate Standard
Note: All dimensions are in feet.			

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

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 RSA 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 the airport and perform airport inspections.

For ARC B-II design, the FAA calls for the RSA to be 150 feet wide and extend 300 feet beyond the runway ends. Analysis in the previous chapter indicated that Runway 15-33 should be planned to accommodate aircraft in ARC C-II in the future. The RSA for C-II is 500 feet wide and extends 1,000 feet beyond each runway end. It should be noted that only 600 feet of RSA is needed prior to the landing threshold on each runway end under ARC C-II standards.

The RSA meets the current design standards. When the airport transitions to C-II, the RSA (and ROFA) design standards become more stringent, getting wider and extending further beyond the runway ends. West Kilpatrick Road would be in the future RSA (and ROFA). Certain trees and drainage features on the west side of the runway may also penetrate the future RSA. Consideration will be given on how to best mitigate these future RSA conflicts in the alternatives analysis.

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.

ARC B-II standards require a 500-foot wide ROFA that extends 300 feet beyond the ends of the runway. It appears there are some trees and a drainage feature within the ROFA in two locations on the west side of the runway. Ultimate C-II standards require an 800-foot wide ROFA that extends 1,000 feet beyond the end of the runway. This introduces West Kilpatrick Road as a non-standard condition, as well as the tree and drainage features on the west side of the runway. The alternatives analysis will explore options to meet the ultimate C-II ROFA standard.

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 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 any runways that serve aircraft over 12,500 pounds, such as Runway 15-33, the OFZ is 400 feet wide, centered on the runway, and extends 200 feet beyond the runway ends. This standard applies to Runway 15-33 at CPT in both the existing and ultimate conditions. Currently there are no OFZ obstructions at the airport. Future planning should maintain the OFZ for the appropriate runway type.

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. Airport ownership and/or control of the RPZ and implementation of compatible land use principles is the optimal method of ensuring the public's safety in these areas. The RPZ dimensions are based upon the established RDC of the runway. **Table 3J** details the applicable RPZ dimensions for the runways at CPT.

TABLE 3J | Runway Protection Zones

	RDC B-II-4000 (Existing)		RDC C-II-2400 (Ultimate)	
	Runway 15	Runway 33	Runway 15	Runway 33
APPROACH RUNWAY PROTECTION ZONES				
Approach Visibility Minimum	1-mile	⅞-mile	½-mile	½-mile
Inner Width (ft.)	500’	1,000’	1,000’	1,000’
Outer Width (ft.)	700’	1,510’	1,750’	1,750’
Length (ft.)	1,000’	1,700’	2,500’	2,500’
DEPARTURE RUNWAY PROTECTION ZONES				
Inner Width (ft.)	500’	500’	500’	500’
Outer Width (ft.)	700’	700’	1,010’	1,010’
Length (ft.)	1,000’	1,000’	1,700’	1,700’
RDC: Runway design code				

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

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 facilities, such as required for airport facilities that are fixed-by-function in regard to the RPZ.
- Above-ground fuel tanks associated with back-up 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 (i.e., 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, with the Alternatives Evaluation conducted 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 or not 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 not allow 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 RPZs or to demonstrate that appropriate actions have been taken. It is ultimately up to the airport sponsor to permit existing and to 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. 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.

As depicted on **Exhibit 3C**, the existing RPZs extend over public roads and residential areas. These are considered incompatible land uses within an RPZ. In the future condition the RPZs become larger based on lower visibility minimums. These larger RPZ sizes expand the scope of impacted incompatible land uses, including U.S. Highway 67 to the north and an increase of 30 acres over residential areas to the south.

Table 3K documents the amount of existing and future incompatible land use within the RPZs. Several roads are within the existing RPZ serving Runway 15. On the south end, the existing RPZ serving Runway 33 extends over approximately 46 homes and streets. If in the future, the existing runway was equipped with visibility minimums of ½-mile, then the level of incompatible land use within the larger RPZ would 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 TxDOT to determine if the additional incompatible land is acceptable.

Improved visibility minimums are a vital benefit to general aviation airports with existing and increasing amounts of business and corporate jet operations. Lower visibility minimums extend the usefulness of the airport to times of poor visibility conditions. This means that any executive flying to Cleburne can be reassured that even in poor visibility conditions they will be able to complete their business in the community.

TABLE 3K | Runway Protection Zone Detail

Runway	RPZ Dimensions (ft.)		RPZ Size (ac.)	Owned in Fee (ac.)/% Owned	Existing Incompatible Land Uses	Acres Incompatible/ % Incompatible
Rwy 15 Current	Inner Width: Outer Width: Length:	500 700 1,000	13.770 ac.	12.3 ac./89.47%	W. Kilpatrick St.	1.45 ac./10.53%
Rwy 33 Current	Inner Width: Outer Width: Length:	1,000 1,510 1,700	48.978 ac.	33.99 ac./69.39%	Woodard Ave./N. Noah River Rd.; Numerous Residential Streets; 46 Homes	14.99 ac./30.61%
Rwy 15 Future	Inner Width: Outer Width: Length:	1,000 1,750 2,500	78.914 ac.	56.52 ac./71.63%	W. Kilpatrick St./County Rd 1217; U.S. Highway 67; Business Parking Lot	22.39 ac./28.37%
Rwy 33 Future	Inner Width: Outer Width: Length:	1,000 1,750 2,500	78.914 ac.	33.98 ac./43.06%	Woodard Ave./N. Noah River Rd.; Numerous Residential Streets; 116 Homes; Apartment Building; 7 Commercial buildings	44.93 ac./56.94%

Source: Coffman Associates analysis

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 B-II-4000 is 240 feet from the runway centerline to the parallel taxiway centerline. For RDC C-II-2400, the separation standard is 400 feet. Taxiway A is located 400 feet from Runway 15-33 (centerline to centerline). Therefore, the airfield currently meets runway/taxiway separation design standards for the ultimate condition.

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.

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. Runway 15-33 is an "other-than-utility" runway since it serves aircraft weighing over 12,500 pounds. The BRL is the CFR Part 77 transitional surface clearance requirements. These requirements stipulate that no object can be located in the primary surface, defined as being 500 feet wide for "other-than-utility" runways with visibility minimums greater than ¾-mile. From the primary surface, the transitional surface extends outward at a slope of one vertical foot to every seven horizontal feet. A change in visibility minimums to ¾-mile and below would result in the primary surface increasing from 500 to 1,000 feet wide.

A common BRL identifies the 35-foot clearance line for the transitional surface. Currently, the 35-foot BRL is 495 feet from the runway centerline. The future 35-foot BRL will be positioned 745 feet from the runway centerline. 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.

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 non-towered airports like CPT, it is common practice for pilots to stop short of the markings before moving onto the active runway. For Runway 15-33, holding position marking lines are situated 250 feet from the runway centerline, which exceeds ARC B-II design standard of 200 feet but meets ultimate C-II design standard of 250 feet. Therefore, the holding position marking should be maintained in their current position for the duration of the planning period.

INSTRUMENT APPROACH CAPABILITY

Instrument approaches are categorized as either precision or non-precision. Precision instrument approach aids provide an exact course alignment and vertical descent path for aircraft on final approach to a runway, while non-precision instrument approach aids provide only course alignment information. In the past, most existing precision instrument approaches in the U.S. have been the ILS; however, with advances in global positioning system (GPS) technology, it can now be used to provide both vertical and lateral navigation for pilots under certain conditions.

CPT currently has straight-in instrument approach capability to each runway end, including the localizer approach (LOC) and area navigation (RNAV) GPS approaches. The RNAV/GPS approach to Runway 33 provides for the lowest visibility minimum with ⅞-mile visibility and a 250-foot decision altitude. Consideration will be given to reducing the approach visibility minimums for one or both runways to ½-mile. This will permit additional operational capacity of the airport during inclement weather or poor visibility conditions.

The visibility minimums at an airport directly impact the economic development objective of the community. The lower the visibility minimums, the more confidence that operators will have that they can arrive and depart, even in poor visibility conditions. For general aviation airports, ½-mile minimums are the lowest achievable, and the impacts of such minimums will be considered in the Alternatives chapter of this master plan.

VISUAL APPROACH AIDS

In most instances, the landing phase of any flight must be 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 15 is served by a four-box precision approach path indicator (PAPI-4) system. There are no visual approach aids provided on Runway 33. PAPI-4s are recommended for runways that are used by jet aircraft; therefore, consideration should be given to installing a PAPI-4 on Runway 33.

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.

Neither end of the runway has an approach lighting system (ALS). These systems provide a visual lighted grid and alignment lead in lights for pilots at nighttime. For visibility minimums lower than ¾-mile, a medium intensity approach lighting system with runway alignment indicator lights (MALSR) is required on the lead-in to the landing end of the runway. A MALSR will be considered for both ends of the runway to support the lowest possible instrument approach visibility minimums.

AIRFIELD LIGHTING, MARKING, AND SIGNAGE

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 CPT, located on a stand-alone pole adjacent to a hangar at the north end of the field, 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 15-33 is equipped with medium-intensity runway lighting (MIRL). If ½-mile visibility minimums are ultimately obtained for the airport, then the runway edge lights should be improved to high-intensity runway lights (HIRL).

Medium-intensity taxiway lighting (MITL) is provided on all taxiways, except for the northernmost section of Taxiway B. This system is vital for safe and efficient ground movements and should be maintained in the future. Consideration should be given to expanding edge lighting to all of Taxiway B, as well as all future taxiways that support the runway at CPT.

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 15-33 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 should a lower approach minimum is established.

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. All signs should be maintained throughout the planning period, and consideration should be given to gradually replacing all lighted signs with LED technology.

Additional consideration may be given to installing distance remaining signage. These lighted signs alert pilots to how much runway length remains in 1,000-foot increments.

WEATHER AND COMMUNICATION INFORMATION

CPT has a lighted wind cone and segmented circle on the west side of the runway near the mid-field. 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 is a supplemental cone near the Runway 15/Taxiway A intersection and one near the Runway 33 end. These should be maintained throughout the planning period.

The airport is equipped with an AWOS, 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 119.525 MHz. Additionally, pilots can call a published telephone number (817-641-4135) and receive the information via an automated voice recording. This system should be maintained throughout the planning period. The AWOS equipment is not currently protected with security fencing. Consideration should be given to adding security fencing around the AWOS.

Furthermore, an AWOS critical area with a radius of 500 feet is depicted on **Exhibit 3C**. Objects and buildings within this area are permissible if they do not obstruct the operation of the AWOS sensors. The airport should monitor any development within the AWOS critical area to ensure the weather equipment remains unobstructed.

AIRFIELD FACILITY REQUIREMENTS SUMMARY

A summary of the airside facilities previously discussed at CPT is presented on **Exhibit 3D**.

	AVAILABLE	SHORT TERM	LONG TERM
RUNWAY 15-33			
	RDC B-II-4000	RDC B-II-4000	RDC C-II-2400
	5,697' x 100'	Maintain	6,100' x 100'
	30,000 lbs. SWL	Maintain	Strengthen to 60,000 lbs SWL/90,000 lbs. DWL
	Standard RSA; Obstructions in ROFA (trees, drainage); Standard ROFZ obstructions	Mitigate ROFA obstructions	Mitigate new RSA/ROFA with meeting RDC C-II-2400 standards
	RPZs partially owned, extends over private property, public roads	Mitigate RPZ incompatibilities	Mitigate new RPZ incompatibilities with upgrading to RDC C-II-2400 standards
TAXIWAYS			
	TDG 2	TDG 2	TDG 2
	35' Taxiway Width	Maintain	Maintain
	400' Runway Separation	Maintain	Maintain
	Taxiway A entrance to Runway 15 is 80' wide	Provide 35' taxiway	Maintain corrected condition
	Taxiways D and G provide direct access points to Runway 15-33	Mitigate direct access points	Maintain corrected condition
	Taxiway B is 30'	Widen to 35' standard	Maintain corrected condition
NAVIGATIONAL AND APPROACH AIDS			
	LOC - Runway 15 (1-mile)	Maintain	Maintain
	RNAV (GPS) - Runways 15 (1⅜-mile), 33 (⅞-mile)	Maintain	Reduce RNAV (GPS) Visibility Minimums to ½-mile
	AWOS	Maintain	Maintain
	Lighted Windcones	Maintain	Maintain
	PAPI-4 - Runway 15	Maintain	Add PAPI-4 to Runway 33
	No REILs or Approach Lighting System	Add REILs Runway 15, 33	Add MALSRs to Runways 15, 33
LIGHTING, MARKING, AND SIGNAGE			
	Rotating Beacon	Maintain	Maintain
	Non-Precision Markings - Runways 15, 33	Maintain	Consider Precision Markings Runways 15, 33
	MIRL - Runway 15-33	Maintain / Consider gradual replacement with LED technology	
	MITL	Maintain / Consider gradual replacement with LED technology	
	Runway Holding Position Markings - 250' from runway centerline	Maintain	Maintain
	Lighted airfield location signage	Consider gradual replacement with LED technology, addition of runway distance remaining signage	

KEY

AWOS: automated weather observation system
DWL: dual-wheel type landing gear type
GPS - Global Positioning System
LOC - Localizer
MALSR: MALS with runway alignment indicator lights
MIRL: medium intensity runway edge lighting
MITL - Medium Intensity Taxiway Lighting
PAPI: precision approach path indicator
REIL: runway end identification lighting
RNAV - Area Navigation (GPS variant)
ROFA: runway object free area
ROFZ: runway obstacle free zone
RPZ: runway protection zone
RSA: runway safety area
SWL: single-wheel landing gear type

Exhibit 3D
AIRSIDE REQUIREMENTS SUMMARY

LANDSIDE FACILITY REQUIREMENTS

Landside facilities are those necessary for the handling of aircraft and passengers while on the ground. These facilities provide the essential interface between the air and ground transportation modes. The capacity of the various components of each element was examined in relation to projected demand in order to identify future landside facility needs. At CPT, this includes components for general aviation needs, such as:

- General Aviation Terminal Facilities
- Vehicle Parking
- Aircraft Hangars
- Aircraft Parking Aprons
- Airport Support Facilities

GENERAL AVIATION TERMINAL FACILITIES

General aviation 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. Currently, the terminal building provides these services, and the FBO provides a pilot lounge and restrooms as well. The terminal building is approximately 2,800 square feet (sf) in size.

The methodology used in estimating general aviation terminal facility needs is based on the number of airport users expected to utilize general aviation facilities during the design hour. Space requirements for terminal facilities are based on providing 120 sf per design hour itinerant passenger. A multiplier of 2.0 is also applied to terminal facility needs to better determine the number of passengers associated with each itinerant aircraft operation. This multiplier indicates an expected increase in business and recreational operations throughout the planning period. These operations often support larger turboprop and jet aircraft, which accommodate an increasing passenger load factor.

Table 3L outlines the space requirements for general aviation terminal services at CPT through the planning period. As shown in the table, the existing terminal building is adequate in size to meet future demand.

TABLE 3L | General Aviation Service Facilities

	Existing	Short Term	Intermediate Term	Long Term
Design Hour Operations	21	23	25	27
Design Hour Itinerant Operations	5	6	7	7
Multiplier	2.0	2.0	2.0	2.0
Total Design Hour Itinerant Passengers	11	12	14	14
GA Terminal Building Services (sf)	2,300	1,200	1,280	1,360
FBO GA Services (sf)	500	300	320	340
Total GA Services (sf)	**2,800**	**1,500**	**1,600**	**1,700**

Note: 20% of GA services are assumed to be provided by FBO's.

Source: Coffman Associates analysis

Vehicle Parking

General aviation vehicular parking demands have also been determined for CPT. 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 general aviation automobile parking space requirements. Using this methodology, parking requirements for general aviation activity call for approximately 87 spaces in the short-term, increasing to approximately 108 spaces in the long-term. The GA based parking space estimate is the recommendation and is not reflective of what is currently available. **Table 3M** presents the vehicle parking needs of the airport through the planning period. Future consideration in the master plan will be given to providing vehicle parking to support additional development potential.

TABLE 3M | General Aviation Vehicle Parking Requirements

	Existing	Short Term	Inter. Term	Long Term
Design Hour Itinerant Passengers	11	12	14	14
VEHICLE PARKING SPACES				
GA Itinerant Spaces (Terminal)	13	23	26	27
GA Based Spaces (Near/In Hangars)	60	64	70	81
Total Parking Spaces	**73**	**87**	**96**	**108**
VEHICLE PARKING AREA (sf)				
GA Itinerant Parking Area	4,095	7,000	8,000	9,000
GA Based Parking Area	18,900	20,000	22,000	26,000
Total Parking Area (sf)	**22,995**	**27,000**	**30,000**	**35,000**

Source: Coffman Associates analysis

AIRCRAFT HANGARS

Utilization of hangar space varies as a function of local climate, security, and owner preferences. The trend in general aviation aircraft, whether single- or multi-engine, is toward more sophisticated aircraft (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 CPT 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, 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. Basically, the 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 with aircraft owners with tighter budgets as they tend to be the least expensive enclosed hangar space to build and lease. There are currently 68 T-hangar units at CPT, totaling 88,900 square feet of aircraft storage capacity.

Box hangars, sometimes referred to as executive hangars, are mid-sized hangar facilities 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. CPT has six box hangars, totaling 15,900 square feet.

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 an FBO and/or SASOs (e.g., an aircraft maintenance business). Conventional hangars generally range in size from 4,000 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 CPT encompass approximately 113,500 sf and could accommodate up to 38 aircraft. The estimate of 38 conventional hangar positions is an ideal situation and does not take into consideration the actual function of the hangar. For example, a large 10,000 square foot 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 3N** provides a summary of the aircraft storage needs through the long-term planning horizon.

The analysis shows that there is a potential need for over 103,000 square feet of new hangar storage capacity through 2041. 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 general aviation 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 that are better suited to accommodate larger turboprop and jet aircraft. T-hangar storage space requirements will also grow over time as new piston-driver aircraft base at CPT.

TABLE 3N | Aircraft Hangar Requirements

	Existing	Short Term	Inter. Term	Long Term
Based Aircraft	119	128	139	162
AIRCRAFT TO BE HANGARED	113	122	132	153
T-Hangar Positions	68	69	72	80
Box Hangar Positions	6	12	13	14
Conventional Hangar Positions	38	41	47	59
Total Positions	**112**	**122**	**132**	**153**
HANGAR AREA REQUIREMENTS				
T-Hangar Area	88,900	96,000	101,000	113,000
Box Hangar Area	15,900	27,000	28,000	31,000
Conventional Hangar Area	113,500	122,000	141,000	178,000
Total Storage Area (sf)	**218,300**	**245,000**	**270,000**	**322,000**

Notes:
Future T-hangars estimated at 1,400 sf per aircraft parking space
Future box hangars estimated at 2,200 sf per aircraft parking space
Future conventional hangar 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 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; yet 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 CPT, the number of itinerant spaces required was determined to be approximately 15 percent of the busy-day itinerant operations for general aviation 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 generally they are 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 3P** and are separated into local and transient needs, as well as the total apron needs.

TABLE 3P | Aircraft Parking Apron Requirements

	Existing	Short Term	Inter. Term	Long Term
Local Apron Area (sy)	11,000	8,200	8,500	9,100
Transient Apron Area (sy)	5,800	7,920	8,640	9,180
Total Apron Area (sy)	**16,800**	**16,120**	**17,140**	**18,280**

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

Currently, the existing GA and terminal aircraft parking apron encompasses approximately 16,800 sy of space at the airport. Available apron space is not sufficient to meet long-term needs of GA activity at CPT; approximately 1,500 sy of additional apron will be needed through 2041.

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 City of Cleburne operates the only FBO at the airport and is the airport's fuel service provider. There are two above ground storage tanks, one for Jet A and one for AvGas/100LL, both with a 12,000-gallon capacity. These tanks are connected by underground piping to the self-serve pumps, located on the ramp. Pilots can also have fuel delivered by fuel trucks. For the purposes of this study, however, only static fuel storage capacity will be considered.

Records of fuel sales were provided by airport management. Based on a five-year historic fuel sales average, the airport pumps 86,665 gallons of Jet A and 72,536 gallons of AvGas. Operational data was drawn from the airport's Automatic Dependent Surveillance-Broadcast (ADS-B) system, which is a method for aircraft to communicate automatically with each other and with stations on the ground. Using the available ADS-B data from 2021, it is estimated that 7 percent of all operations were conducted by turbine aircraft, with the remaining 93 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 2021, the airport pumped approximately 29.55 gallons of Jet A per turbine operation and 1.86 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.

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 3Q**. 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 criteria for both Jet A and AvGas fuel to meet demand through the long-term period.

TABLE 3Q | Fuel Storage Requirements

	Current Capacity	Baseline[1]	Short Term	Inter. Term	Long Term
Jet A					
Daily Usage	**12,000**	237	264	322	444
14-Day Supply		3,324	3,697	4,506	6,211
Annual Usage		86,665	96,387	117,484	161,925
AvGas					
Daily Usage	**12,000**	199	221	233	252
14-Day Supply		2,782	3,094	3,265	3,521
Annual Usage		72,536	80,673	85,114	91,808

[1] Baseline data derived from five-year average annual fuel sales (2017-2021).
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 AWOS equipment. Consideration should be given to adding security fencing to protect the AWOS and upgrading the perimeter security fence to include barbed wire tops to increase the difficulty of accessing the airfield.

LANDSIDE FACILITY REQUIREMENTS SUMMARY

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

SUMMARY

The intent of this chapter has been to outline the facilities required to meet potential aviation demands projected for CPT 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.

Runway 15-33 is designed to meet FAA design standards associated with RDC B-II-4000. This category includes most small- and medium-sized business jets, such as the Cessna Citation II/SP/Latitude, as well as most turboprop aircraft, including the Beechcraft King Air 300. Ultimately, the airport should be planned to meet RDC C-II-2400 design standards to accommodate more frequent operations by larger business jets, such as the Gulfstream G280.

The existing runway has been adequately serving a wide range of aircraft fleet mix, including business jets. 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.

AIRCRAFT STORAGE HANGAR REQUIREMENTS

	Existing	Short Term	Intermediate Term	Long Term
Aircraft to be Hangared	113	122	132	153
T-Hangar Positions (#)	68	69	72	80
Box Hangar Positions (#)	6	12	13	14
Conventional Hangar Positions (#)	38	41	47	59
Total Hangar Positions (#)	**112**	**122**	**132**	**153**
T-Hangar Area (sf)	88,900	96,000	101,000	113,000
Box Hangar Area (sf)	15,900	27,000	28,000	31,000
Conventional Hangar Area (sf)	113,500	122,000	141,000	178,000
Total Hangar Storage Area (sf)	**218,300**	**245,000**	**270,000**	**322,000**

AIRCRAFT PARKING APRON REQUIREMENTS

	Existing	Short Term	Intermediate Term	Long Term
Local Apron Area (sy)	11,000	8,200	8,500	9,100
Transient Apron Area (sy)	5,800	7,920	8,640	9,180
Piston Transient Positions	8	6	7	7
Turbine Transient Positions	0	2	2	2
Total Apron Area (sy)	**16,800**	**16,120**	**17,140**	**18,280**

GENERAL AVIATION TERMINAL FACILITIES AND PARKING

	Existing	Short Term	Intermediate Term	Long Term
Building Space (sf)*	2,800	1,500	1,600	1,700
Itinerant Parking Spaces (Terminal)	13	23	26	27
Based Parking Spaces (Near/In Hangars)	60	64	70	81
Total Parking Spaces	73	87	96	108
Total Parking Area (sf)	**22,995**	**27,000**	**30,000**	**35,000**

SUPPORT FACILITIES

	Capacity	Short Term	Intermediate Term	Long Term
14-Day Fuel Storage, Jet A	12,000	3,697	4,506	6,211
14-Day Fuel Storage, AvGas (100LL)	12,000	3,094	3,265	3,521

*Includes FBO and Terminal spaces Red numbers indicate a deficiency in meeting demand.

Exhibit 3E
LANDSIDE FACILITY REQUIREMENTS

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.