Center Municipal Airport

Airport Layout Plan & Narrative

DRAFT

DRAFT FINAL

AIRPORT LAYOUT PLAN & NARRATIVE

FOR

Center Municipal Airport (F17)
City of Center, TX

PREPARED BY

Coffman Associates
Airport Consultants

June 2025

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Introduction

INTRODUCTION

This Airport Layout Plan (ALP) Update and Narrative for Center Municipal Airport (F17) serves as an update to the previous ALP that was completed in 1999. The primary focus of this study is to provide the airport sponsor (City of Center, Texas), the Texas Department of Transportation – Aviation Division (TxDOT), and the Federal Aviation Administration (FAA) with a strategic plan and vision for short-term and long-term operations, as well as any necessary improvements that may be needed over the next 20 years. The report will include an updated ALP set, which serves as a blueprint of the current and future conditions at the airport. The updates to the ALP will focus on the development direction and facility changes that have taken place since the completion and approval of the previous planning study. The development of a height hazard zoning map for the sponsor's implementation will also be completed with this study.

This study was designed to guide future development and provide updated justification for projects for which the airport may receive funding participation through federal and state airport improvement programs. Coffman Associates, an airport consulting firm that specializes in master planning and environmental studies, is preparing this plan.

This ALP Update and Narrative is being prepared in accordance with FAA requirements, including Advisory Circular (AC) 150/5300-13B, *Airport Design*, AC 150/5070-6B, *Airport Master Plans*, and FAA ARP Standard Operating Procedures (SOPs) 2.00 and 3.00, Appendix A, *ALP Review Checklist*. The following goals and objectives have been determined for the ALP Update and Narrative.

1. Prepare and update the ALP with narrative consistent with the most current FAA Advisory Circulars and Standard Operating Procedures.

2. Incorporate FAA Airports Geographic Information Systems (AGIS) requirements and data collection, as needed, including an 18B obstruction survey.

3. Develop a capital improvement plan (CIP), including a recommended phasing plan and a financial overview that considers local, state, federal, and alternative funding sources.

4. Establish phased, attainable goals for airport improvements and development based on forecasts for aviation demand and critical aircraft.

5. Consider the emergence of unmanned aircraft systems (UAS), advanced air mobility (AAM), and the potential inclusion of facilities (i.e., vertiport siting).

6. Develop a height hazard zoning map that incorporates the airport's Part 77 surfaces.

7. Review any existing runway safety area (RSA) determinations and update them as needed or complete a determination for any runway that does not have one. If an RSA study is needed, that study will be conducted as part of this planning effort.

STUDY PARTICIPATION

The ALP Update and Narrative is of interest to many within the local community and region, including local citizens and businesses, community organizations, city officials, airport users and tenants, and aviation organizations. To assist in the development of the study, the city has identified a group of stakeholders to act in an advisory role as the plan progresses. The planning advisory committee (PAC) is comprised of individuals and organizations with a vested interest in the future development of Center Municipal Airport. Members of the PAC will meet at designated points during the planning process to review draft study materials and provide comments to help ensure a realistic and viable plan is developed. A community outreach program will also be established to allow members of the public to review and comment on the study as it develops.

PROCESS

The ALP Update and Narrative is prepared in a systematic fashion pursuant to the scope of services that was coordinated with the City of Center and TxDOT Aviation. The study includes several elements, which are described below and depicted on **Exhibit i**:

- **Study Initiation** includes development of the scope of services, budget, and schedule.

- **Inventory** involves the collection of facility and operational data and wind data. This step establishes existing airfield facility conditions and capacities and identifies existing environmental conditions at the airport.

- **Forecasts** of aviation demand levels at the airport (based aircraft and operations) are prepared to establish the existing and ultimate critical aircraft, per FAA AC 150/5000-17. The forecasting approach utilizes the FAA's *Terminal Area Forecast* (TAF), as well as regional and local socioeconomic and aviation trends. The forecasts will ultimately be submitted to TxDOT and the FAA for review and approval.

- **Facility Requirements** are determined for the airport for existing, short-term, intermediate-term, and long-term timeframes based on both the critical aircraft and updated forecasts.

- **Alternatives** involves evaluation of various development alternatives to accommodate current and forecasted facility needs for airside and landside facilities.

- **Airport Plans and Land Use Compatibility** will result in the selection of a recommended development concept through coordination with airport staff and the PAC. Airport layout plans will be developed to depict the recommended development concept. The drawings will meet the requirements of FAA SOP 2.00, *Standard Procedure for FAA Review and Approval of Airport Layout Plans (ALPs)* (effective October 1, 2013). The updated ALP set will be included as an appendix to this study. The airport's noise exposure and land use compatibility will also be evaluated. An environmental overview will identify any potential environmental concerns that must be addressed prior to the implementation of the recommended development program.

- **Airport Development Schedules and Cost Estimates** includes the preparation of development schedules for the recommended concept, and potential federal and state aid for specific projects will be identified. A five-year CIP will be prepared to identify capital funds required by the City of Center to accomplish each proposed stage of improvements for the airport.

- **Final Drawings and Reports** will include a technical report (printed and digital formats) and full-size/full-color copies of report exhibits in final report documentation, as well as drawings produced for the study.

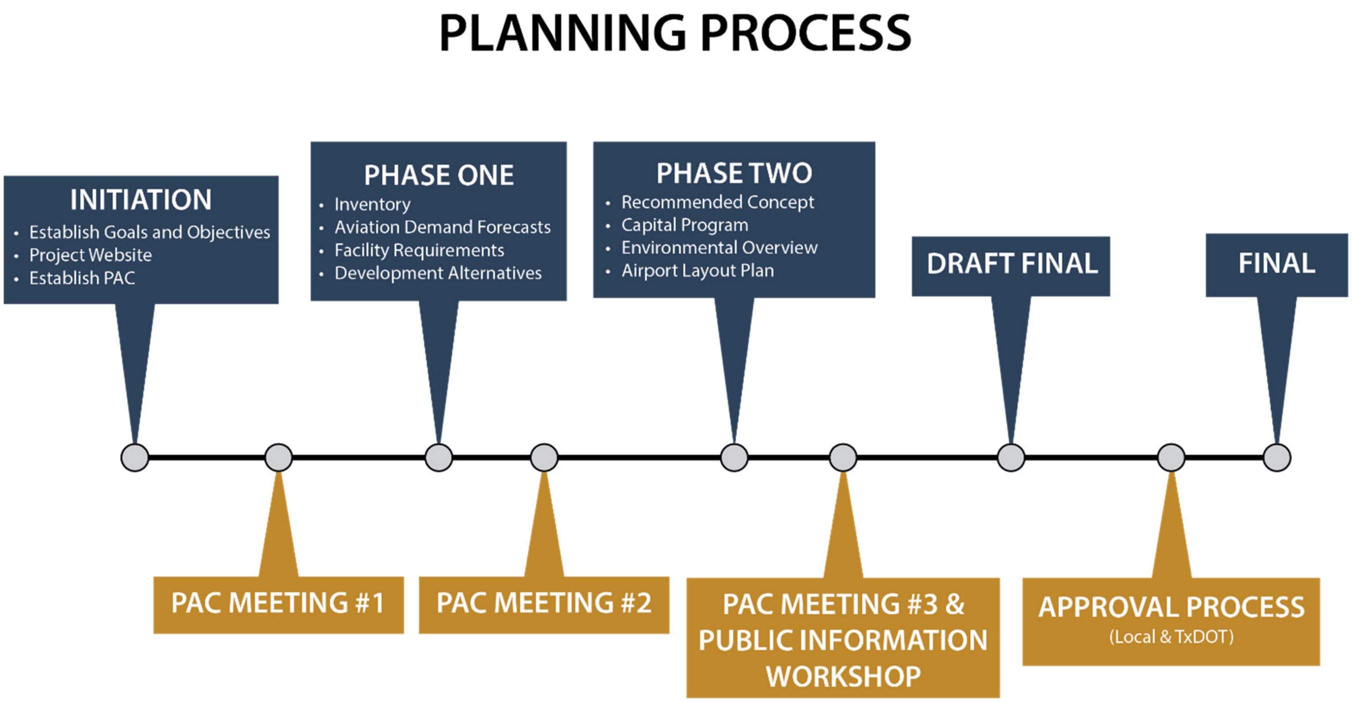


Exhibit i – Planning Process

SWOT ANALYSIS

A SWOT analysis is a strategic business planning technique used to identify **S**trengths, **W**eaknesses, **O**pportunities, and **T**hreats associated with an action or plan. This exercise involves identifying an action, objective, or element, and then identifying the internal and external forces that are positively and negatively impacting it. The internal forces include attributes of the airport and market area that may be considered strengths or weaknesses, while the external forces are those outside the airport's control, such as the aviation industry as a whole or the economy. These manifest as opportunities or threats.

A SWOT analysis was conducted with the PAC in April 2024. A summary of this exercise and discussion is included in **Table i**. It is important to note that some attributes may fall into more than one category.

TABLE i | SWOT ANALYSIS

S STRENGTHS	• 5,500-foot runway is capable of accommodating much of the general aviation fleet, up to and including small to mid-sized business jets • Great airport "team" consisting of the city, the airport board, and airport users • Good city and public support • Airport has the infrastructure necessary to serve a large population • Well-equipped terminal building	• Two courtesy cars are available to transient airport users • Airport experiences frequent turboprop and jet activity • There is good visibility around the airport; obstructions (trees) were recently removed • RNAV GPS approaches to both runway ends • Plenty of apron space with no tiedown fees
W WEAKNESSES	• Fuel truck is not operational • Fuel system needs upgrades • Lack of available hangar space • Obstructions to runway approaches • Lack of full-length parallel taxiway requires pilots to back-taxi • Beacon light is dim	• Lack of taxiway lighting; limited lighting, overall • PAPI is intermittent • Pavement markings are old and need to be remarked • The runway is the low point on the airport, so drainage can be an issue during rain events
O OPPORTUNITIES	• Transient hangar space • Additional hangars for local tenants • Improved marketing of the airport • Taxiway extensions • Relocate fuel station/new fuel tanks • Perimeter fencing	• Aircraft mechanic school • Nearby flight schools at Letourneau and Nacogdoches could result in more traffic at F17 • Alternate forms of fuel (i.e., unleaded Avgas) • Commercial footprint on airport
T THREATS	• Wildlife can access airfield due to lack of fencing • No significant increase in FAA funding pool, combined with increased construction costs	• Airfield pavement needs to be rehabilitated • Drainage issues on airport • Lack of ADS-B tower in area

Chapter One

Inventory

CHAPTER ONE – INVENTORY

AIRPORT BACKGROUND

The City of Center is located in East Texas, less than 20 miles from the Louisiana border. With a population of 5,221,[1] Center serves as the Shelby County seat. The area is known for its diverse industrial base; major economic drivers include manufacturing, timber, and energy. Center Municipal Airport (F17) is situated approximately three miles northeast of the city and encompasses approximately 150 acres at an elevation of 318.6 feet above mean sea level (MSL). **Exhibit 1A** depicts the airport in its regional setting. The airport serves a wide range of general aviation activities, including recreational and corporate flying, with seasonal traffic associated with hunting and agricultural spraying.

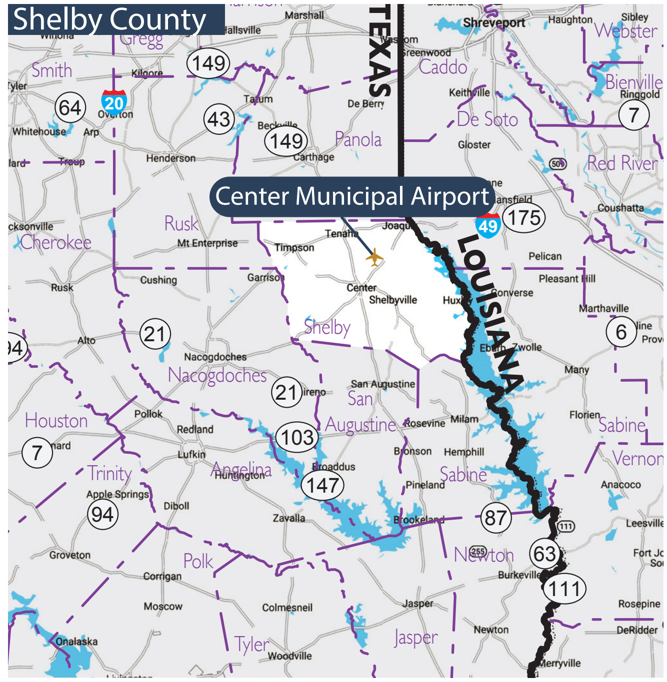
In 2018, the Texas Department of Transportation – Aviation Division (TxDOT) undertook an economic impact study to determine the impact and relationships of airports in Texas within the state's economy. According to the study, Center Municipal Airport generated $680,000 in total economic impact output, supported six jobs, and paid out $207,000 in payroll in 2018.

Airport Terminal Building

CLIMATE

Climate plays an important role in airport planning, and preparing for weather conditions enhances the use of an airport. For example, high temperatures and humidity increase runway length requirements, while cloud cover percentages and frequency of inclement weather determine the need for navigational aids and lighting. Knowledge of these weather conditions during the planning process allows the airport to prepare for any improvements that may be needed on the airfield.

[1] U.S. Census Bureau, 2020 Decennial Census



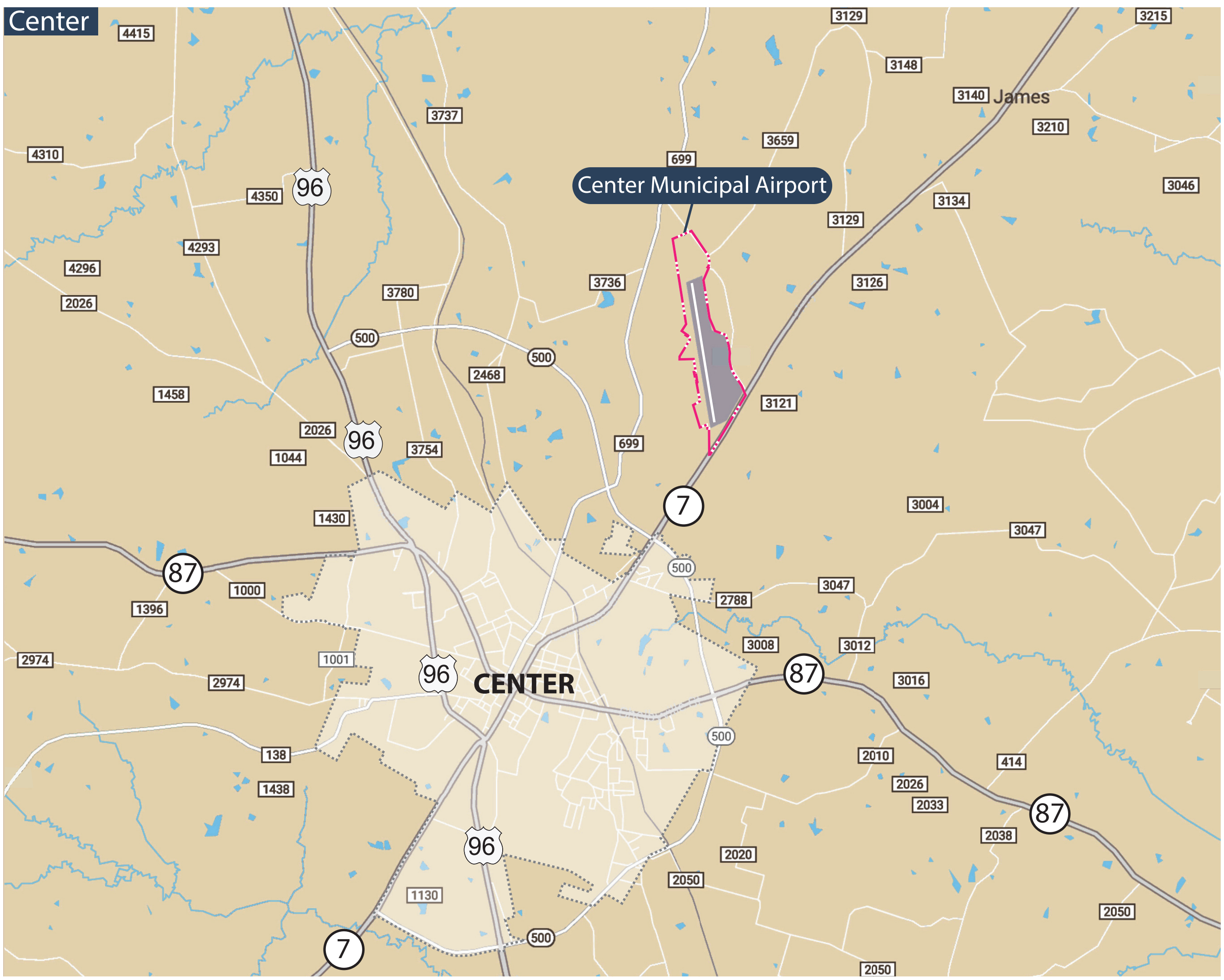


Exhibit 1A
LOCATION

Exhibit 1B summarizes temperature and precipitation data from the National Oceanic and Atmospheric Administration (NOAA), sourced from a local sensor monitored in the city proper. It should be noted that this data is not from the airport's automated weather observing system (AWOS-3), as that data is not being submitted to NOAA's data system and is only used for real-time flying conditions. The data shown represent total weather observations between 1991 and 2020. The hottest month is August, with a mean maximum high temperature of 94.5 degrees Fahrenheit (°F), and January is the coldest month, with a minimum temperature of 35.7 °F. Most precipitation occurs during the month of December, in which an average of 5.62 inches of rain is recorded. Snowfall is rare; an average of 0.5 inches is recorded annually.

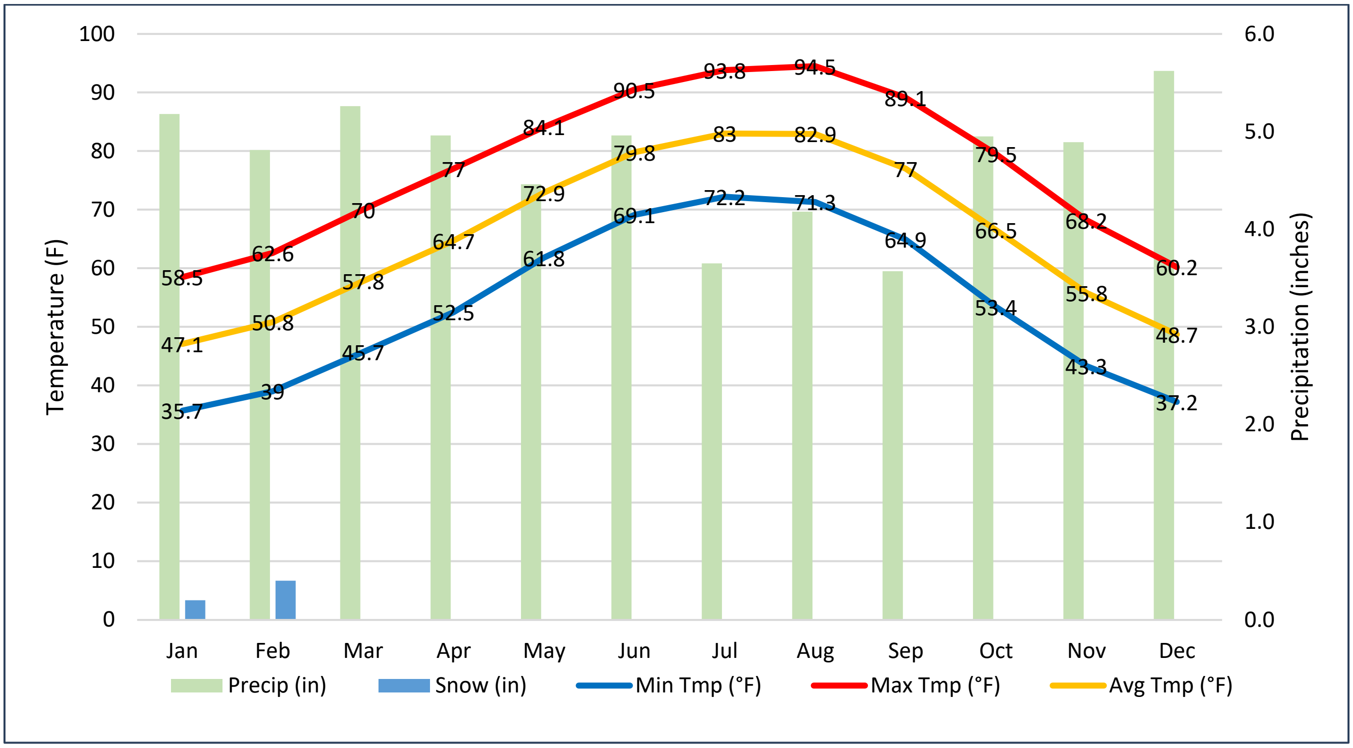
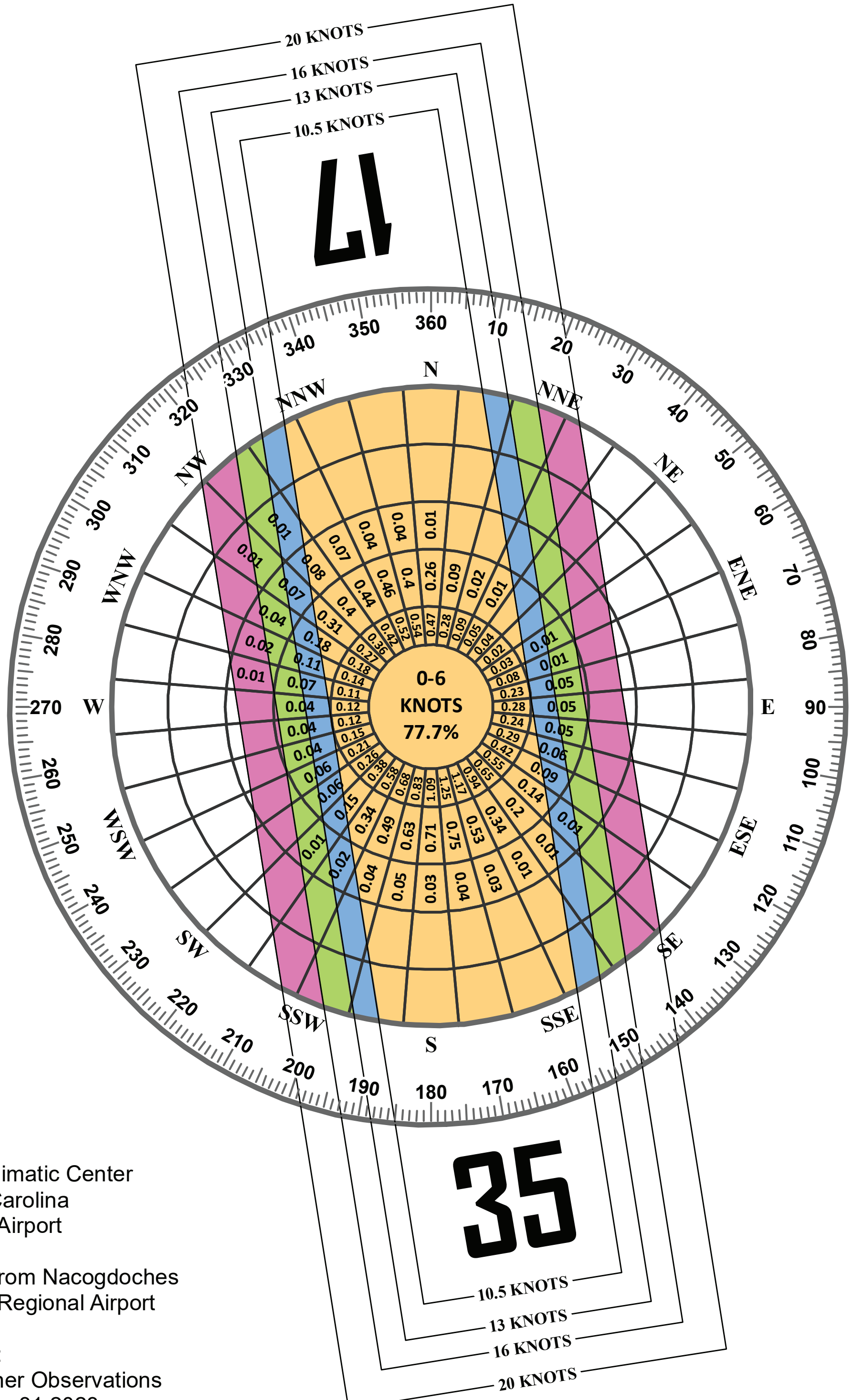


Exhibit 1B – Climate Data

Wind data have also been collected, including wind speeds, direction, and gusts. As with temperature information, data from the on-airport AWOS was not available, so information from A.L. Mangham Regional Airport in nearby Nacogdoches was used. A total of 156,379 observations of wind direction and other data points were made over a 10-year period beginning January 1, 2014, and ending December 31, 2023; these are the most recent data available for this airport. For the operational safety and efficiency of an airport, it is desirable for the runway to be oriented as close as possible to the direction of the prevailing wind. This reduces the impact of wind components perpendicular to the direction of travel of an aircraft that is landing or taking off.

Exhibit 1C presents the associated wind coverage for the runway at Center Municipal Airport. Runway 17-35 provides 98.87 percent coverage at 10.5 knots and greater than 99 percent coverage at 13- through 20-knot conditions in all weather conditions.

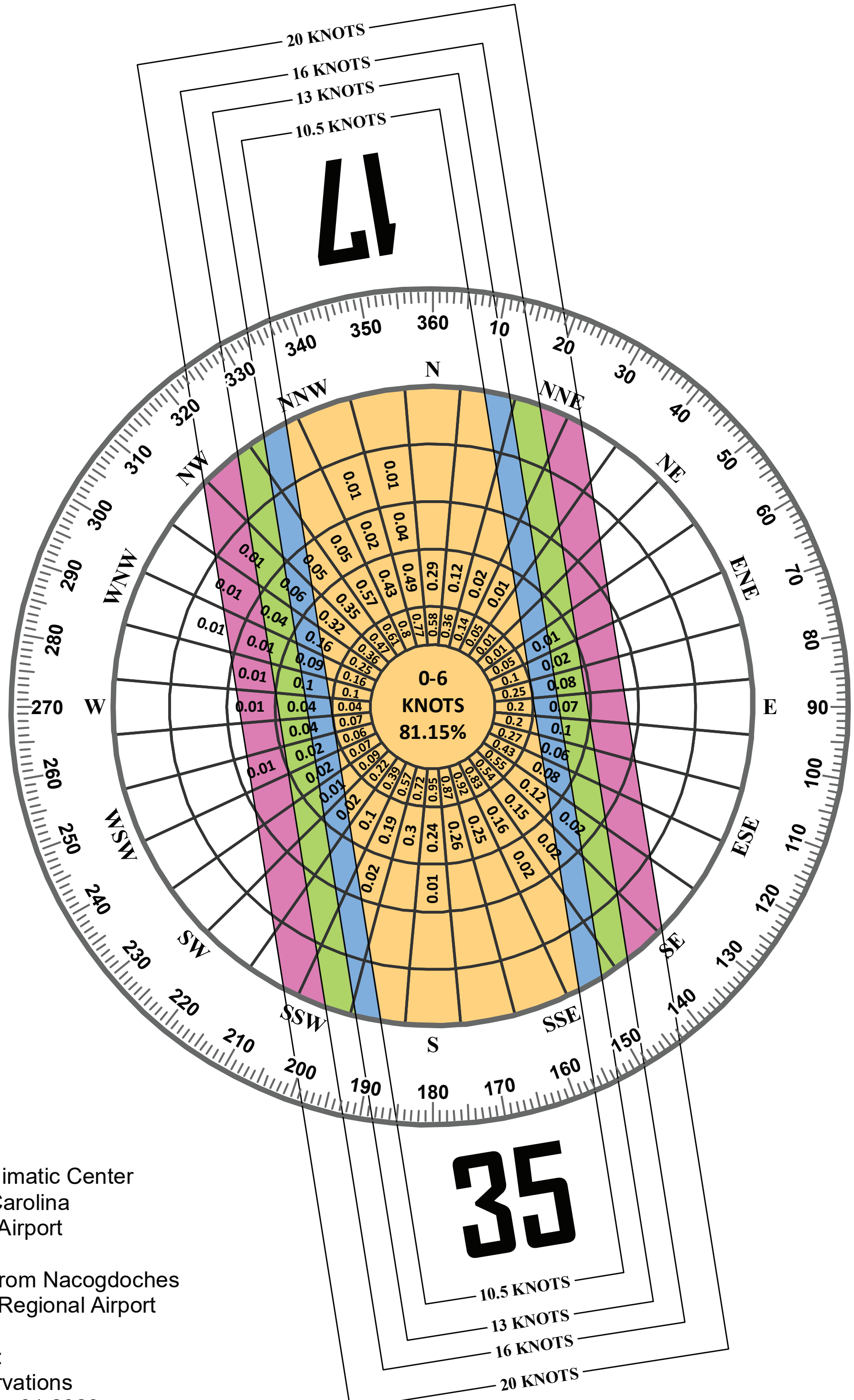
ALL WEATHER WIND COVERAGE				
Runways	10.5 Knots	13 Knots	16 Knots	20 Knots
Runway 17-35	98.87%	99.54%	99.92%	99.99%



SOURCE:
NOAA National Climatic Center
Asheville, North Carolina
Center Municipal Airport
Center, Texas
Wind data taken from Nacogdoches
A L Mangham Jr. Regional Airport

OBSERVATIONS:
156,379 All Weather Observations
Jan. 1, 2014 - Dec, 31 2023

IFR WIND COVERAGE				
Runways	10.5 Knots	13 Knots	16 Knots	20 Knots
Runway 17-35	98.97%	99.51%	99.90%	99.98%



SOURCE:
NOAA National Climatic Center
Asheville, North Carolina
Center Municipal Airport
Center, Texas
Wind data taken from Nacogdoches
A L Mangham Jr. Regional Airport

OBSERVATIONS:
22,775 IFR Observations
Jan. 1, 2014 - Dec, 31 2023

AIRPORT ROLE

An airport's role, both nationally and regionally, also plays a critical role in facility planning. At the national level, the FAA's *National Plan of Integrated Airport Systems* (NPIAS) categorizes airports based on their importance to national air transportation. Airports included within the NPIAS are qualified for federal funding through the Airport Improvement Program (AIP).

Center Municipal Airport is classified as a general aviation (GA) airport in the NPIAS. GA airports are further classified into one of four categories: National, Regional, Local, and Basic. The airport falls into the Local GA category. Local airports comprise 36 percent of all NPIAS airports. They are located near population centers and experience a moderate level of activity, including operations by turboprops and corporate jets. Local airports average approximately 33 based aircraft, which are typically all piston-powered aircraft.

At a more local level, the airport is also included in the 2010 *Texas Airport System Plan* (TASP). The TASP classifies Center Municipal Airport as a Business/Corporate (BC) facility, which is an airport that provides community access by business jets. According to the TASP, "Business/Corporate airports provide access to turboprop and turbojet business aircraft and are located where there is sufficient population or economic activity to support a moderate to high level of business jet activity and/or to provide capacity in metropolitan areas." These airports are generally located more than 30 minutes from commercial service or reliever airports and serve areas with a concentrated population, purchasing power, or mineral production.

AIRPORT ADMINISTRATION

The airport is owned and operated by the City of Center. An airport advisory committee oversees the facility and provides guidance regarding the operation, expansion, planning, and management of the airport. Daily operations are managed by City of Center personnel.

GRANT HISTORY

To assist in ongoing capital improvements, the FAA and TxDOT Aviation provide funding to Center Municipal Airport through the AIP. Texas is a member of the FAA's State Block Grant Program, which gives TxDOT the responsibility (among other things) for administering AIP grants to reliever and general aviation airports, including Center Municipal Airport. The State of Texas also offers the following funding opportunities for which Center Municipal Airport is eligible:

- **Routine Airport Maintenance Program (RAMP)** – TxDOT matches local program grants up to $100,000 for basic improvements, such as parking lots, fencing, and other airside or landside needs.

- **Federal Aviation Grants** – Federal and state grant funding for maintenance and improvement projects is available to airports included in the NPIAS.

Table 1A summarizes airport capital improvement projects and maintenance undertaken since 2001, with funding from federal, state, and local sources.

TABLE 1A | Grant History

Year	Description	Federal Total	State Total	Local Total	Total
2001	Engineering/Design to Rehab Facility	$83,822	–	$9,313	$93,135
2002	Terminal Construction	–	$45,000	$45,000	$90,000
2003	Rehab Runway 17-35, Taxiway A, Taxiway B; Taxiway Striping; Apron Expansion; Drainage/ Erosion Improvements; Signage Installation	$1,483,236	–	$164,804	$1,648,040
2010	Misc. Construction Project (08HGCENTR)	$1,491,822	–	$165,758	$1,657,580
2014	AWOS	$175,500	–	$19,500	$195,000
2015	Reconstruct Apron; Taxiway D Rehab; MIRL/ PAPI/Beacon Replacement; Drainage (Design)	$164,286	–	$18,254	$182,540
2016	Misc. Construction Project (1711CENTR)	$996,030	–	$110,670	$1,106,700
2020	Rehab Runway 17-35 and Taxiway D	$1,016,424	–	$112,936	$1,129,360
2022	RAMP: Sponsor to Perform Airport General Maintenance	–	$10,000	–	$10,000
2023	ALP Update with Narrative	$325,000	–	–	$325,570
2023	Runway Engineering Study (Pavement Study)	$75,000	–	–	$75,000
TOTALS		**$5,811,120**	**$55,000**	**$646,235**	**$6,512,925**

Source: FAA/TxDOT Records

AIRSIDE FACILITIES

Airport facilities are functionally classified into two broad categories: airside and landside. The airside category includes those facilities that are directly associated with aircraft operations. **Table 1B** and **Exhibit 1D** detail the airside facilities at Center Municipal Airport.

TABLE 1B | Airside Facilities

	Runway 17	Runway 35
RUNWAY FEATURES		
Length	5,501'	
Width	75'	
Runway End Elevation MSL	318.5'	290.9'
Gradient	0.50%	
Runway Magnetic Heading	167	347
Pavement Surface Material/Condition*	Asphalt/Good	
Pavement Markings/Condition	Non-Precision/Good	Non-Precision/Good
Traffic Pattern Direction	Left	Left
Pavement Strength	30,000 lbs. S	
VISUAL AND INSTRUMENT APPROACH AIDS		
Visual Slope Indicator	2-Light PAPI on Left	2-Light PAPI on Left
Visual Glide Angle	3.00 Degrees	3.00 Degrees
Approach Lighting	None	None
REILs	No	No
Instrument Approach Procedure	LNAV GPS (1-mile); NDB	LNAV GPS (1-mile)

TAXIWAY FEATURES

Taxiway Designation	Width	Function	Hold Line Separation
A	35' - 75'	Partial Parallel; Threshold Connector (Runway 35)	250'
B	35'	Connector; Exit	250'
C	35'	Connector; Exit; Landside Access	250'
D	40'	Landside Access	N/A

(Continues)

TABLE 1B | Airside Facilities (continued)

WEATHER AND MISCELLANEOUS FACILITIES	
Lighted Wind Cone; Segmented Circle; AWOS-3 (128.775)	
LIGHTING & SIGNAGE	
Runway Lighting	MIRL (PCL via CTAF 122.8); Threshold Lights
Taxiway Lighting	Centerline Reflectors
Identification	Rotating Beacon
Signage	Directional

AWOS = automated weather observing system
GPS = global positioning system
LNAV = lateral navigation
MSL = mean sea level
PAPI = precision approach path indicator
REILs = runway end identifier lights
S = single wheel gear loading

*A pavement evaluation, including soils investigation and materials testing, is being conducted concurrently with this planning study. The results of this analysis will be included when they become available.

Sources: Airnav.com; Google Earth

INSTRUMENT APPROACH PROCEDURES

Instrument approach procedures are a series of predetermined maneuvers established by the FAA using electronic navigational aids that assist pilots in locating and landing at an airport during low visibility and cloud ceiling conditions. Instrument procedures are defined as either precision approach, approach with vertical guidance (APV), or non-precision. Precision instrument approaches provide an exact course alignment and vertical descent path for an aircraft on final approach to a runway with a height above threshold (HATh) lower than 250 feet and visibility lower than ¾-mile. APVs also provide course alignment and vertical descent path guidance but have HATHs of 250 feet or more and visibility minimums of ¾-mile or greater. Non-precision instrument approach aids provide only horizontal guidance.

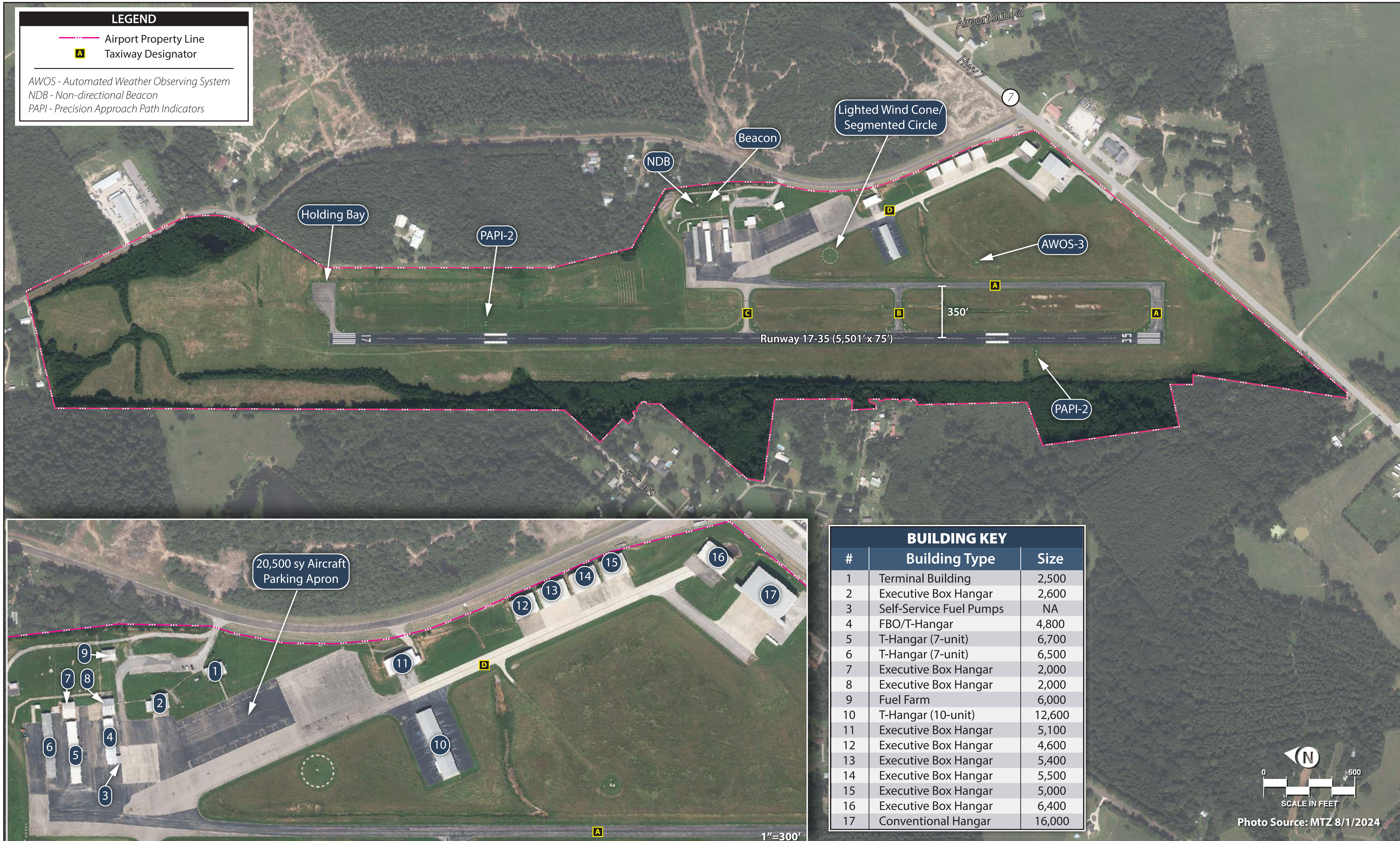
Instrument approach procedure capabilities are defined by visibility and cloud ceiling minimums. Visibility minimums define the horizontal distance a pilot must be able to see to complete an approach. Cloud ceilings define the lowest level a cloud layer (defined in feet above the ground) can be situated for the pilot to complete the approach. If the observed visibility or cloud ceilings are below the minimums prescribed for the approach, the pilot cannot complete the instrument approach and must commence a missed approach procedure.

Center Municipal Airport is currently equipped with three instrument approach procedures, as identified on **Exhibit 1E**.

LANDSIDE FACILITIES

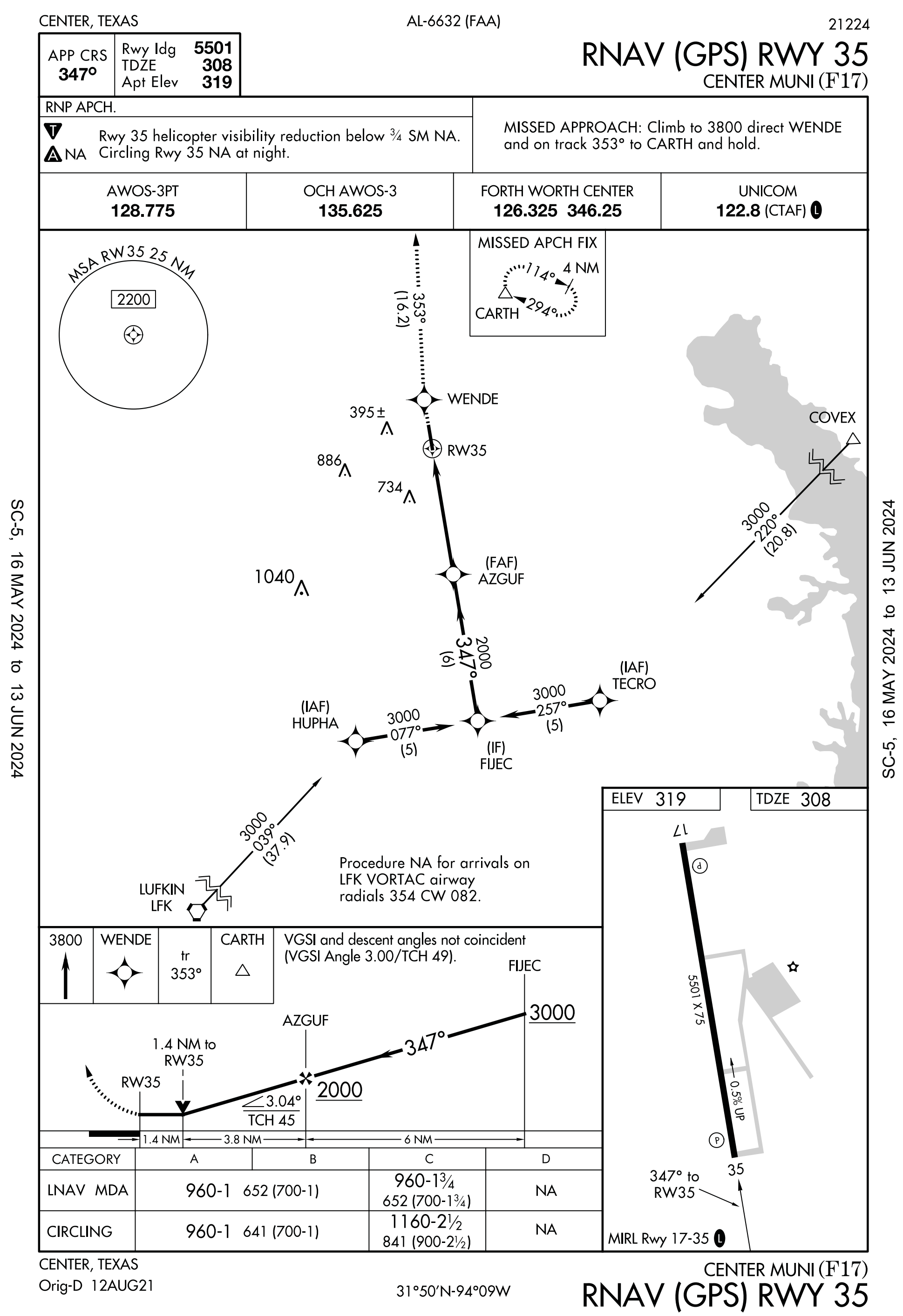
Landside facilities are ground-based facilities that support the aircraft and pilot/passenger handling functions. These facilities typically include the airport terminal building, aircraft storage hangars, aircraft parking aprons, and support facilities (such as fuel storage and roadway access). **Exhibit 1D** details the landside facilities at Center Municipal Airport.

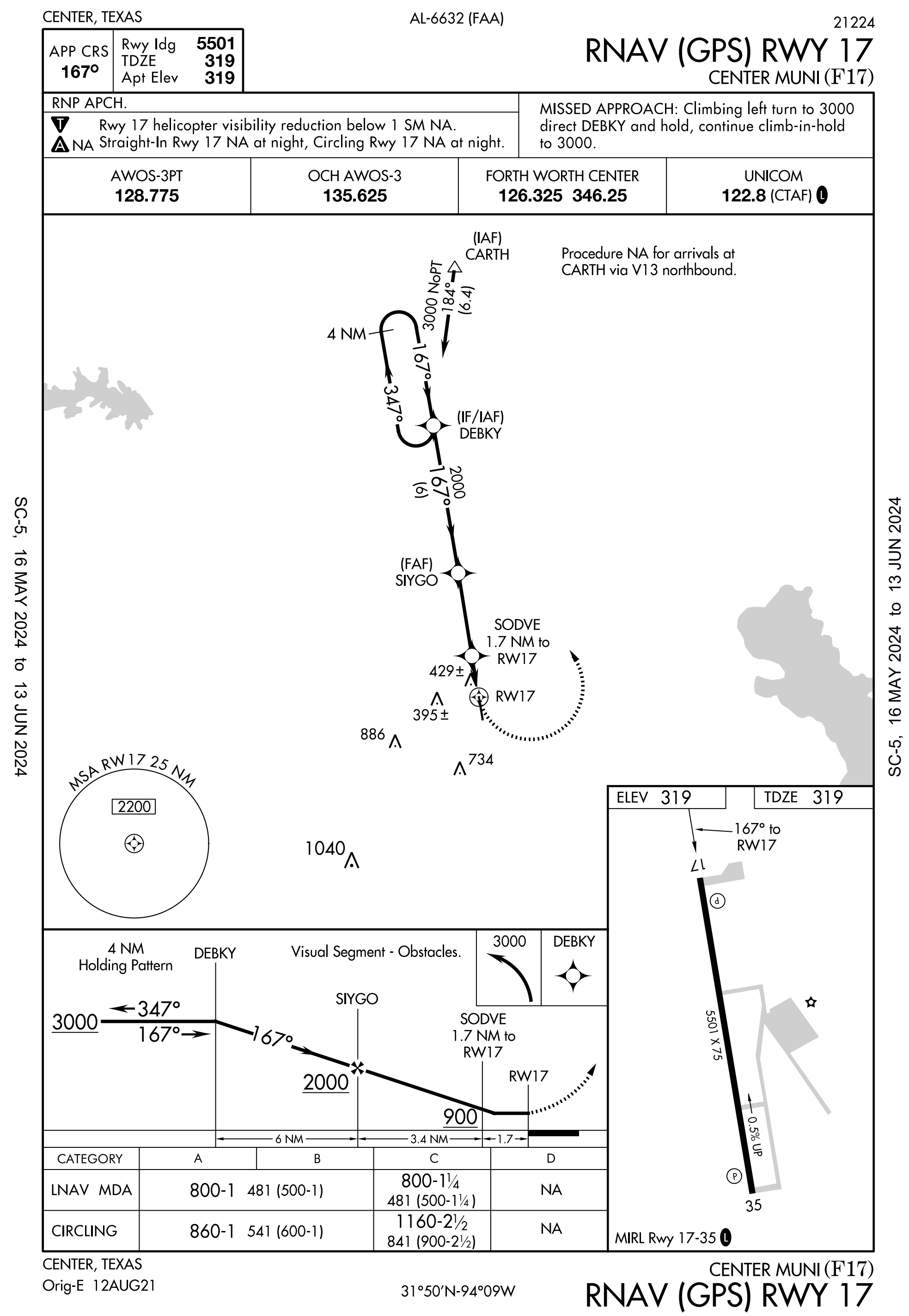
The airport is equipped with a terminal building that is approximately 2,500 square feet (sf) in size and includes a pilots' lounge, a flight planning office, restrooms, and a small kitchen area. A vehicle parking lot is adjacent to the terminal for airport users and visitors; there are four individual parking spaces, as well as a large, unmarked parking area. Two courtesy cars are also available for transient pilot use.

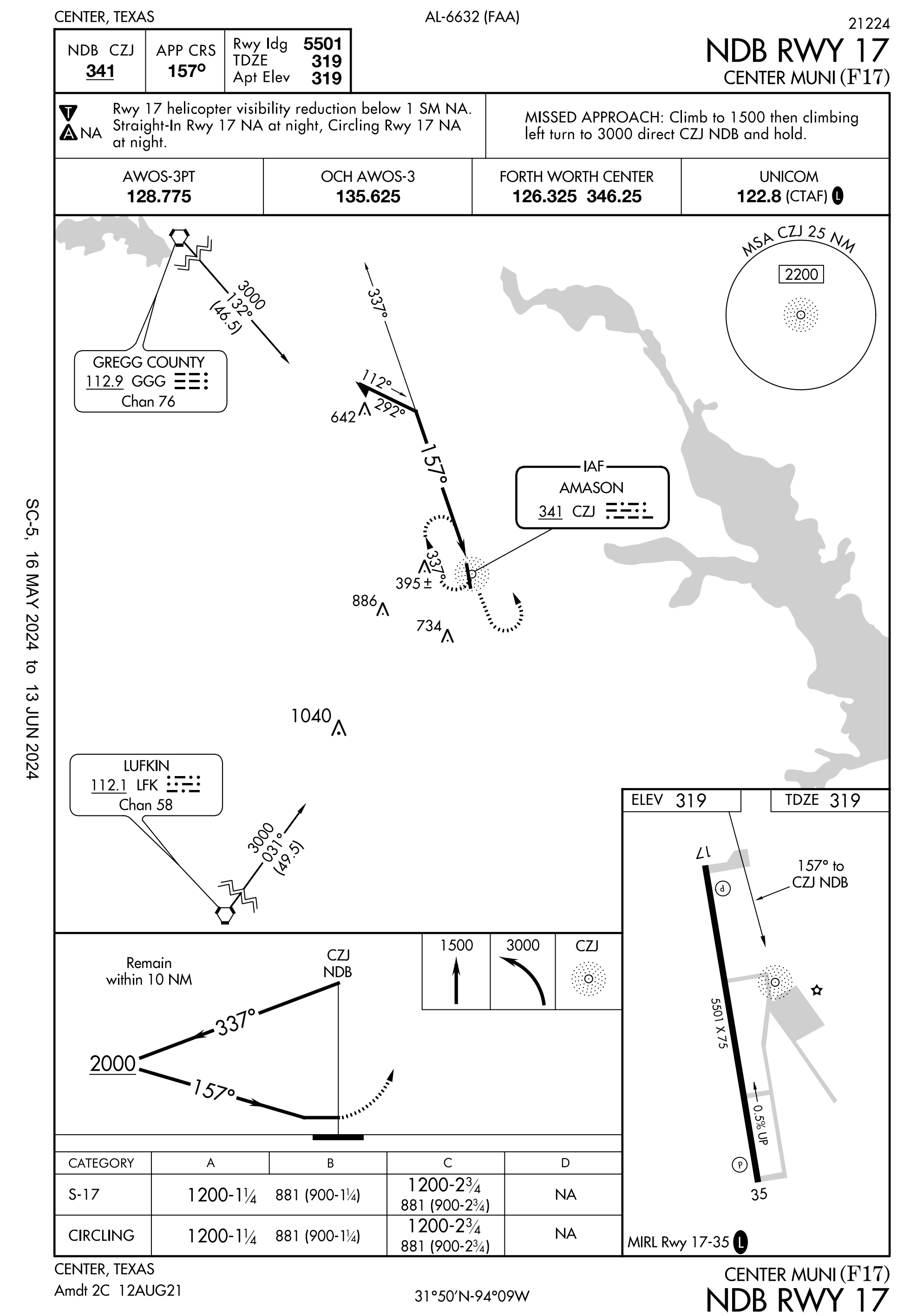


BUILDING KEY

#	Building Type	Size
1	Terminal Building	2,500
2	Executive Box Hangar	2,600
3	Self-Service Fuel Pumps	NA
4	FBO/T-Hangar	4,800
5	T-Hangar (7-unit)	6,700
6	T-Hangar (7-unit)	6,500
7	Executive Box Hangar	2,000
8	Executive Box Hangar	2,000
9	Fuel Farm	6,000
10	T-Hangar (10-unit)	12,600
11	Executive Box Hangar	5,100
12	Executive Box Hangar	4,600
13	Executive Box Hangar	5,400
14	Executive Box Hangar	5,500
15	Executive Box Hangar	5,000
16	Executive Box Hangar	6,400
17	Conventional Hangar	16,000


CENTER, TEXAS
AL-6632 (FAA)
21224
RNAV (GPS) RWY 35
CENTER MUNI (F17)
APP CRS 347°
Rwy ldg 5501
TDZE 308
Apt Elev 319
RNP APCH.
Rwy 35 helicopter visibility reduction below ¾ SM NA.
Circling Rwy 35 NA at night.
MISSED APPROACH: Climb to 3800 direct WENDE and on track 353° to CARTH and hold.
AWOS-3PT 128.775
OCH AWOS-3 135.625
FORTH WORTH CENTER 126.325 346.25
UNICOM 122.8 (CTAF)
MSA RW35 25 NM
2200
MISSED APCH FIX
CARTH
WENDE
RW35
(FAF) AZGUF
(IAF) HUPHA
(IF) FIJEC
(IAF) TECRO
COVEX
LUFKIN LFK
Procedure NA for arrivals on LFK VORTAC airway radials 354 CW 082.
VGSI and descent angles not coincident (VGSI Angle 3.00/TCH 49).
ELEV 319
TDZE 308
MIRL Rwy 17-35
CATEGORY A B C D
LNAV MDA 960-1 652 (700-1) 960-1¾ 652 (700-1¾) NA
CIRCLING 960-1 641 (700-1) 1160-2½ 841 (900-2½) NA
SC-5, 16 MAY 2024 to 13 JUN 2024
Orig-D 12AUG21
31°50'N-94°09'W


CENTER, TEXAS
AL-6632 (FAA)
21224
RNAV (GPS) RWY 17
CENTER MUNI (F17)
APP CRS 167°
Rwy ldg 5501
TDZE 319
Apt Elev 319
RNP APCH.
Rwy 17 helicopter visibility reduction below 1 SM NA.
Straight-In Rwy 17 NA at night, Circling Rwy 17 NA at night.
MISSED APPROACH: Climbing left turn to 3000 direct DEBKY and hold, continue climb-in-hold to 3000.
AWOS-3PT 128.775
OCH AWOS-3 135.625
FORTH WORTH CENTER 126.325 346.25
UNICOM 122.8 (CTAF)
(IAF) CARTH
Procedure NA for arrivals at CARTH via V13 northbound.
(IF/IAF) DEBKY
(FAF) SIYGO
SODVE 1.7 NM to RW17
RW17
MSA RW17 25 NM
2200
Visual Segment - Obstacles.
ELEV 319
TDZE 319
MIRL Rwy 17-35
CATEGORY A B C D
LNAV MDA 800-1 481 (500-1) 800-1¼ 481 (500-1¼) NA
CIRCLING 860-1 541 (600-1) 1160-2½ 841 (900-2½) NA
SC-5, 16 MAY 2024 to 13 JUN 2024
Orig-E 12AUG21
31°50'N-94°09'W


CENTER, TEXAS
AL-6632 (FAA)
21224
NDB RWY 17
CENTER MUNI (F17)
NDB CZJ 341
APP CRS 157°
Rwy ldg 5501
TDZE 319
Apt Elev 319
Rwy 17 helicopter visibility reduction below 1 SM NA.
Straight-In Rwy 17 NA at night, Circling Rwy 17 NA at night.
MISSED APPROACH: Climb to 1500 then climbing left turn to 3000 direct CZJ NDB and hold.
AWOS-3PT 128.775
OCH AWOS-3 135.625
FORTH WORTH CENTER 126.325 346.25
UNICOM 122.8 (CTAF)
MSA CZJ 25 NM
2200
GREGG COUNTY 112.9 GGG Chan 76
IAF AMASON 341 CZJ
LUFKIN 112.1 LFK Chan 58
Remain within 10 NM
ELEV 319
TDZE 319
MIRL Rwy 17-35
CATEGORY A B C D
S-17 1200-1¼ 881 (900-1¼) 1200-2¾ 881 (900-2¾) NA
CIRCLING 1200-1¼ 881 (900-1¼) 1200-2¾ 881 (900-2¾) NA
SC-5, 16 MAY 2024 to 13 JUN 2024
Amdt 2C 12AUG21
31°50'N-94°09'W

There are 34 individual hangar units available at Center Municipal Airport, totaling approximately 85,200 sf of aircraft storage space divided between T-hangar, executive box (less than 10,000 sf), and conventional (greater than 10,000 sf) hangar types. At the time of this writing (May 2024), all hangars are occupied. While there is no official waiting list to lease hangar space at the airport, several individuals have expressed interest. A 20,500-square-yard (sy) aircraft parking apron is located immediately adjacent to the terminal building and includes 16 marked tiedowns for fixed-wing aircraft.

The City of Center provides fixed base operator (FBO) services, including 100LL and Jet A aircraft fuel. Each fuel type is stored in a 6,000-gallon tank; the tanks are more than 30 years old. Self-service pumps are available, as identified on **Exhibit 1D**. Fuel flowage records were provided by the airport sponsor and are summarized on **Exhibit 1F**. Over the last three years, the City of Center has sold an average of 16,832 gallons of 100LL fuel and 14,205 gallons of Jet A fuel annually.

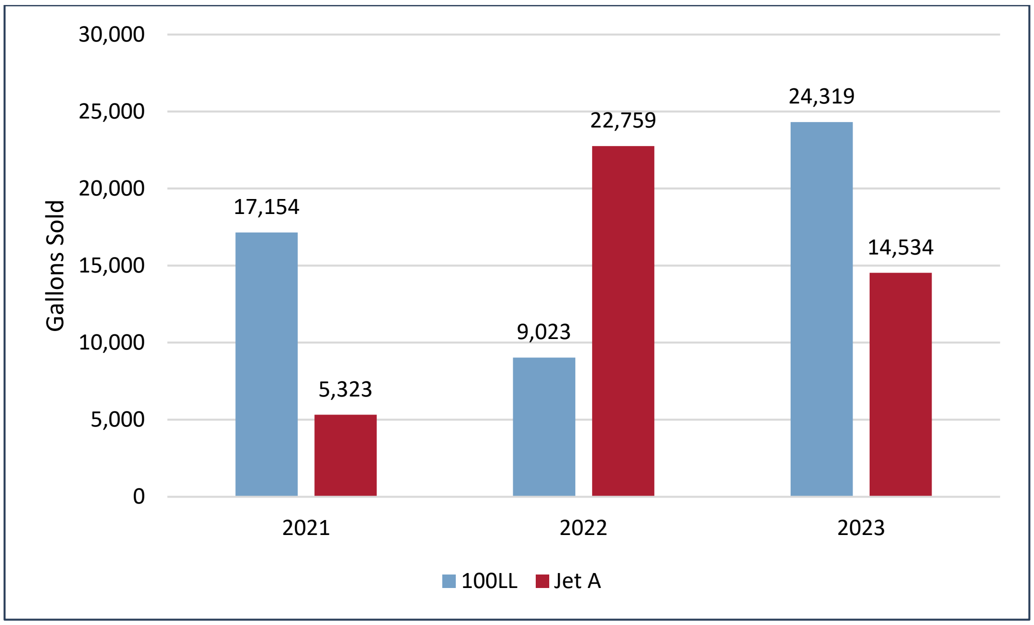
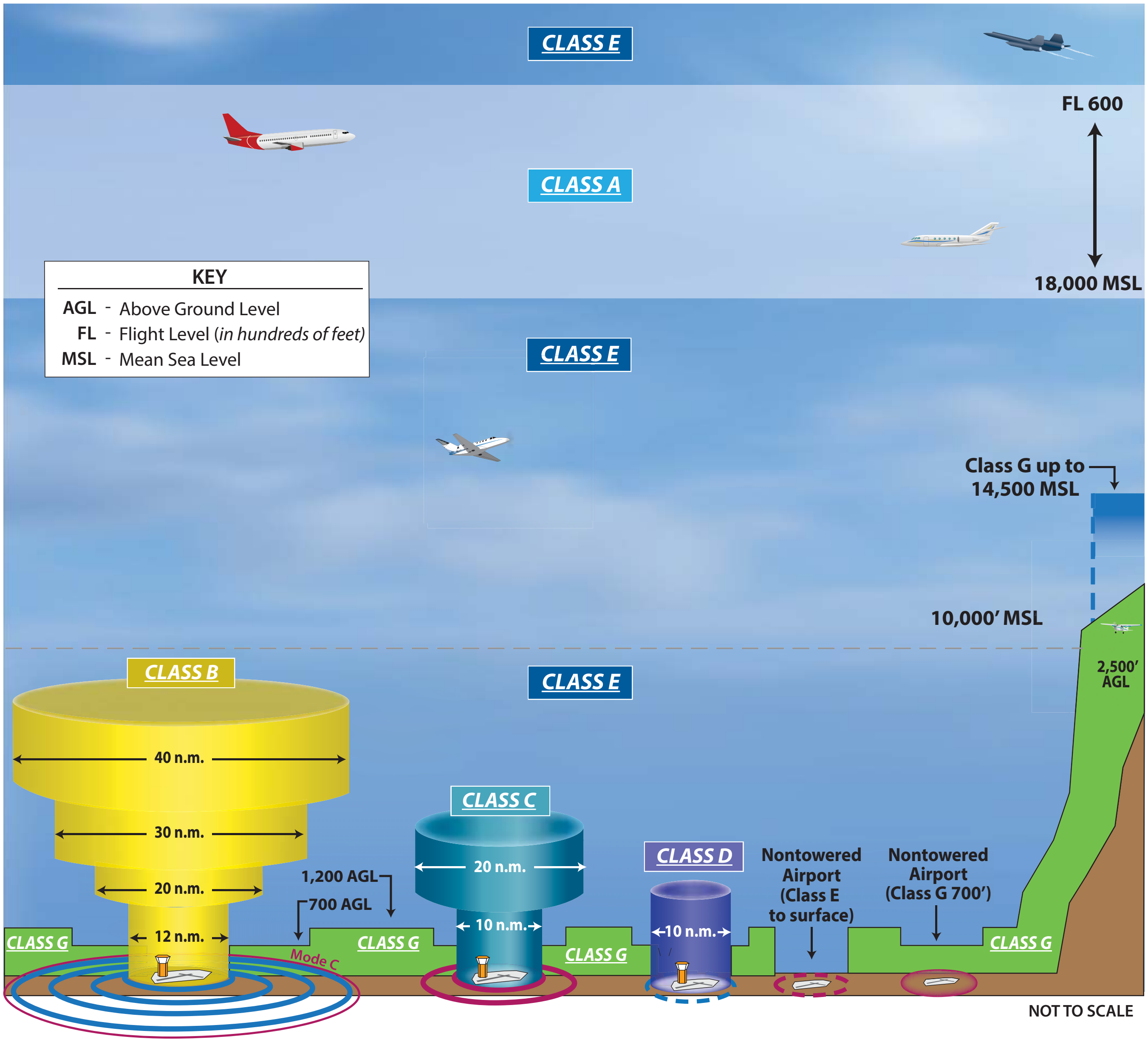


Exhibit 1F – Fuel Flowage

The airport is partially enclosed by fencing, which is predominantly located on the south and east sides of the property in the vicinity of the landside facilities. Near the terminal building, chain-link fencing protects the airport from inadvertent access. A pedestrian gate allows access to the terminal building, while a motorized security gate provides access to authorized personnel north of the terminal. The remainder of the fencing is woven wire. A second motorized gate is located near the Runway 35 threshold to provide tenant access.

AIRSPACE CHARACTERISTICS

The airspace within the National Airspace System (NAS) is divided into six different categories, or classes. The airspace classifications that make up the NAS are presented on **Exhibit 1G**. These categories of airspace are comprised of Classes A, B, C, D, E, and G airspace. Each class of airspace has its own criteria that must be met in terms of required aircraft equipment, operating flight rules (visual or instrument flight rules), and procedures. Classes A, B, C, D, and E are considered controlled airspace, which requires



DEFINITION OF AIRSPACE CLASSIFICATIONS

CLASS A Think A - Altitude. Airspace above 18,000 feet MSL up to and including FL 600. Instrument Flight Rule (IFR) flights only, ADS-B 1090 ES transponder required, ATC clearance required.

CLASS B Think B - Busy. Multi-layered airspace from the surface up to 10,000 feet MSL surrounding the nation's busiest airports. ADS-B 1090 ES transponder required, ATC clearance required.

CLASS C Think C - Mode C. Mode C transponder required. ATC communication required. Generally airspace from the surface to 4,000 feet AGL surrounding towered airports with service by radar approach control.

CLASS D Think D - Dialogue. Pilot must establish dialogue with tower. Generally airspace from the surface to minimum 2,500 feet AGL surrounding towered airports.

CLASS E Think E - Everywhere. Controlled airspace that is not designated as any other Class of airspace.

CLASS G Think G - Ground. Uncontrolled airspace. From surface to a 1,200 AGL (in mountainous areas 2,500 AGL) Exceptions: near airports it lowers to 700' AGL; some airports have Class E to the surface. Visual Flight Rules (VFR) minimums apply.

Source: www.faa.gov/regulations_policies/handbooks_manuals/aviation/phak/media/15_phak_ch15.pdf pilot communication with the controlling agency prior to airspace entry and throughout operation within the designated airspace. Pilot communication procedures, required pilot ratings, and required minimum aircraft equipment vary depending on the class of airspace, as well as the type of flight rules in use.

As shown on **Exhibit 1H**, Center Municipal Airport is in Class E airspace, with the surface beginning at 700 feet above ground level (AGL). The airspace below 700 feet AGL surrounding the airport is Class G airspace. The exhibit also depicts other airspace features within the vicinity of the airport, including Victor airways and military operations areas (MOAs). Victor airways are corridors of airspace extending between VOR facilities that are eight miles wide and extend from 1,200 feet up to, but not including, 18,000 feet. MOAs illustrate airspace in which a high level of military activity is conducted and are intended to separate civil and military aircraft. Civilian air travel is not restricted in MOAs, but pilots are advised to exercise extreme caution when flying within an MOA when military activity is being conducted. MOAs in the vicinity of the airport include the Hackett MOA and the Warrior 1 High and Low MOA.

AIRPORT TRAFFIC CONTROL

There is no airport traffic control tower at Center Municipal Airport; therefore, no formal terminal air traffic control services are available for aircraft landing at or departing from the airport. Aircraft operating in the airport vicinity are not required to file any type of flight plan or contact any air traffic control facility unless they are entering airspace in which contact is mandatory (e.g., Shreveport Class C airspace). The common traffic advisory frequency (CTAF) is used by pilots to obtain airport information and to advise other aircraft of their positions in the traffic pattern and their intentions.

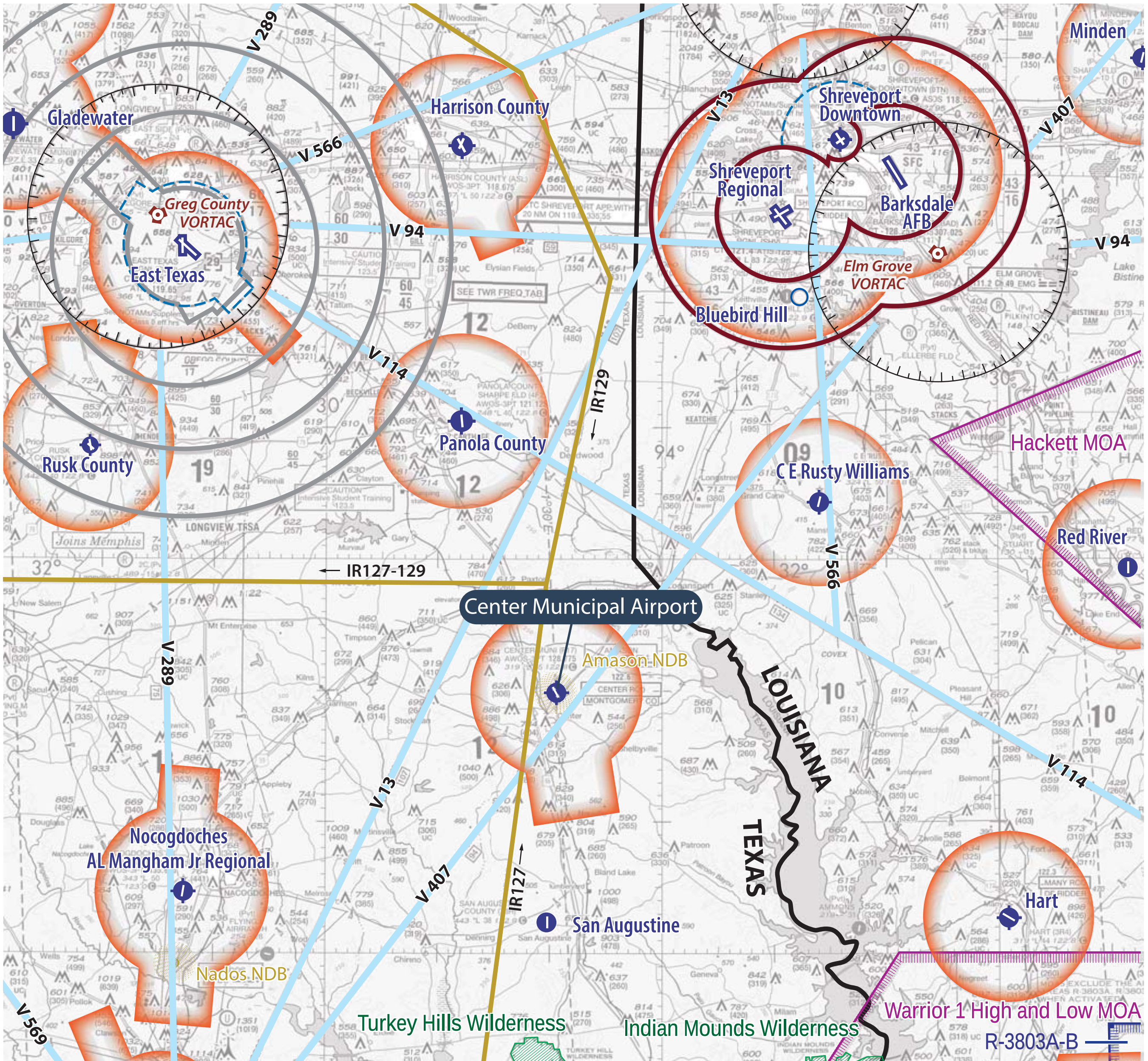
Center Municipal Airport is located within the jurisdiction of the Fort Worth Air Route Traffic Control Center (ARTCC). The Montgomery County flight service station (FSS) provides additional weather data and other pertinent information to pilots in the vicinity of the airport.

REGIONAL AIRPORTS

A review of other public-use airports within 30 nautical miles (nm) of Center Municipal Airport was conducted to identify and distinguish the types of air service provided in the region. It is important to consider the capabilities and limitations of these airports when planning for future changes or improvements at Center Municipal Airport. Public-use airports within 30 nm of the airport are detailed on **Exhibit 1J**, along with information pertaining to each airport that was obtained from FAA records.

COMMUNITY PROFILE

For an airport planning study, a profile of the local community including its socioeconomic characteristics is collected and examined to derive an understanding of the dynamics of growth within the study area. Socioeconomic information related to the local area is an important consideration in the master planning process. The community profile for the City of Center (on **Exhibit 1K**) is derived from several sources, including the U.S. Census Bureau and the Texas Water Development Board.



LEGEND

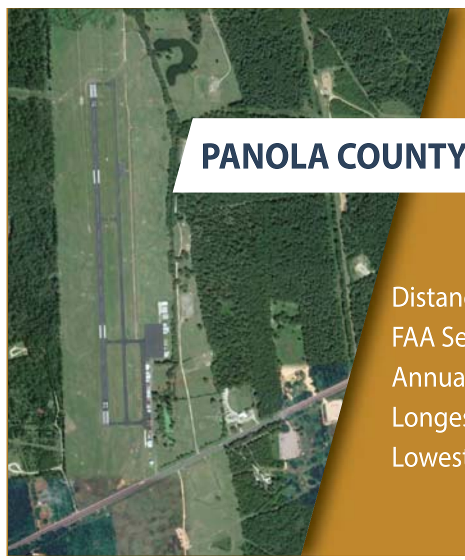
	Airport with other than hard-surfaced runway		Terminal Radar Service Area
	Airport with hard-surfaced runways 1,500' to 8,069' in length		Class C Airspace
	Airports with hard-surfaced runways greater than 8,069' or some multiple runways less than 8,069'		Class D Airspace
	Compass Rose		Class E (sfc) Airspace with floor 700 ft. above surface that laterally abuts 1200 ft. or higher Class E airspace
	VORTAC		Victor Airways
	Prohibited, Warning, or Restricted Areas		Wildlife Refuge
	Military Operations Area (MOA)		Millitary Training Routes
	Non-directional Radio Beacon (NDB)		

Source:
Houston and Memphis Sectional Charts, US Department of Commerce, National Oceanic and Atmospheric Administration, January 25, 2024

78R

SAN AUGUSTINE COUNTY AIRPORT

Distance from F17............. 18 nm S
FAA Service Level .... NA
Based Aircraft .... NA
Annual Operations................ 100
Longest Runway .... 3,800'
Lowest Visiblity Minimums . . Visual Only



4F2

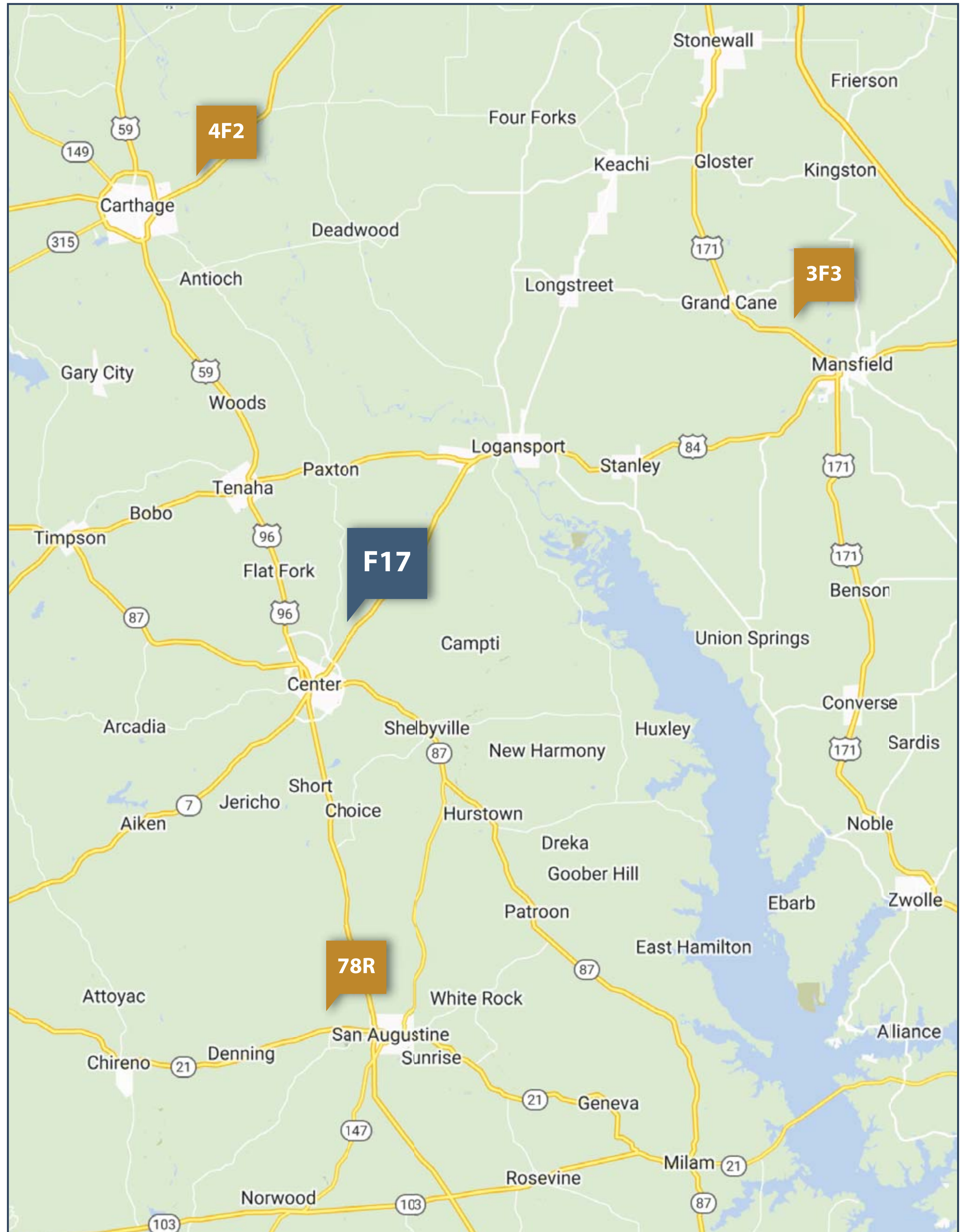
PANOLA COUNTY AIRPORT-SHARPE FIELD

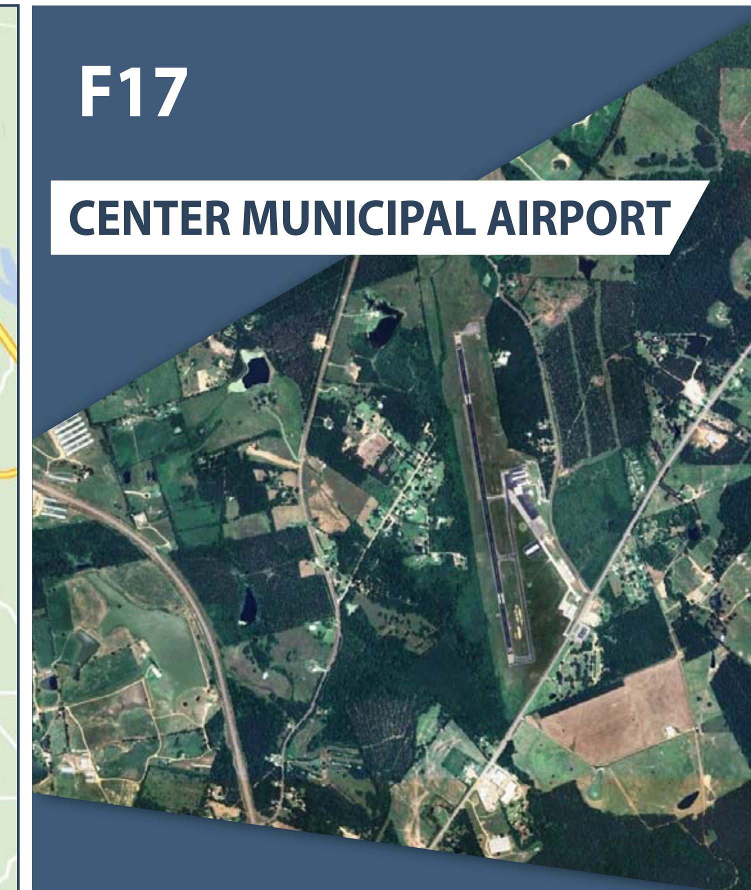
Distance from F17.......... 22 nm NNW
FAA Service Level .... Unclassified GA
Annual Operations.............. 1,404
Longest Runway .... 4,000'
Lowest Visiblity Minimums 1-mile

3F3

C E 'RUSTY' WILLIAMS AIRPORT

Distance from F17............ 25 nm NE
FAA Service Level .... Local GA
Based Aircraft 23
Annual Operations............. 12,045
Longest Runway .... 5,005'
Lowest Visiblity Minimums 1-mile





F17

CENTER MUNICIPAL AIRPORT

FAA Service Level:
Local GA

Based Aircraft:
40

Annual Operations:
12,330

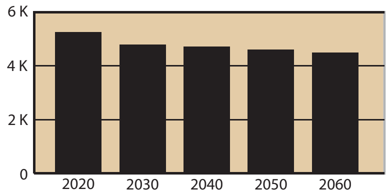
Logest Runway:
5,501'

Lowest Visibility Minimums:
1-mile

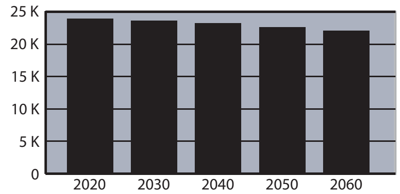
Sources: FAA Form 5010, Airport Master Record; airnav.com; FAA's Validated Based Aircraft Database

POPULATION PROJECTIONS

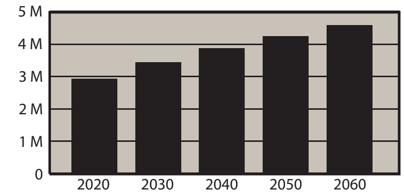
Center
-0.39% CAGR*



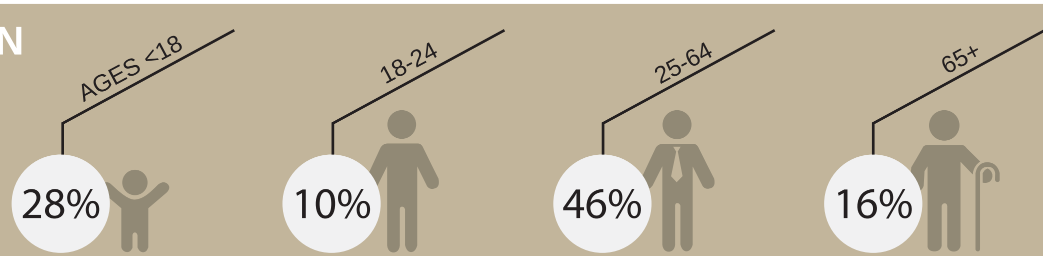
Shelby County
-0.20% CAGR*



Texas
1.13% CAGR*



POPULATION BY AGE



EMPLOYMENT BY SECTOR

TOTAL WORKFORCE
2,417

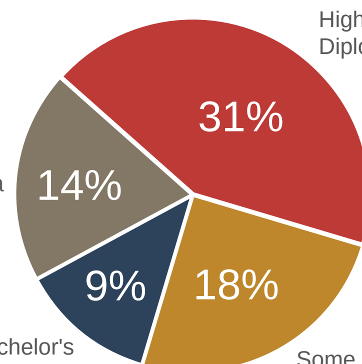
- **22%** Art, entertainment, recreation, accomodation & food services
- **21%** Educational services, health care & social assistance
- **20%** Retail trade
- **12%** Manufacturing
- **9%** Construction
- **6%** Professional, scientific, management administrative & waste management
- **5%** Agriculture, forestry & mining
- **1%** Other services
- **1%** Finance, insurance, real estate & renting/leasing
- **1%** Information
- **1%** Transportation, warehousing & utilities

HOUSEHOLDS

Median Household Income

Total Households

EDUCATION



CAGR* - Compound Annual Growth Rate

Sources: U.S. Census Bureau (2020 Decennial Census & 2022 American Community Survey); Texas Water Development Board

ENVIRONMENTAL INVENTORY

This environmental inventory identifies potential environmental sensitivities, based on the 14 environmental impact categories outlined in FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures*, which should be considered when planning future improvement projects at the airport.

- Air Quality
- Biological Resources (including fish, wildlife, and plants)
- Climate
- Coastal Resources
- *Department of Transportation Act*, Section 4(f)
- Farmlands
- Hazardous Materials, Solid Waste, and Pollution Prevention
- Historical, Architectural, Archaeological, and Cultural Resources
- Land Use
- Natural Resources and Energy Supply
- Noise and Noise-Compatible Land Use
- Socioeconomics, Environmental Justice, and Children's Environmental Health and Safety Risks
- Visual Effects (including light emissions)
- Water Resources (including wetlands, floodplains, surface waters, groundwater, and wild and scenic rivers)

Table 1C provides a summary of the existing environmental conditions at the airport and within its environs for these categories.

TABLE 1C | Summary of Existing Environmental Conditions

CATEGORY	EXISTING ENVIRONMENTAL CONDITIONS
Air Quality	Shelby County is currently in attainment for all federal criteria pollutants; therefore, general conformity review per the *Clean Air Act* would not be required.
Biological Resources (including fish, wildlife, and plants)	Federally Protected Species According to the U.S. Fish and Wildlife Service (USFWS) Information for Planning and Consultation (IPaC) report, there is potential for seven endangered, proposed endangered, and candidate species within the vicinity of the airport: tricolored bat (*Perimyotis subflavus*), piping plover (*Charadrius melodus)*, red-cockaded woodpecker (*Picoides borealis*), rufa red knot (*Calidris canutus rufa)*, alligator snapping turtle (*Macrochelys temminckii*), Texas heelsplitter (*Potamilus amphichaenus*), and monarch butterfly (*Danaus plexippus).* Designated Critical Habitat There are no designated critical habitats within airport boundaries. Non-Listed Species Non-listed species of concern include those protected by the *Migratory Bird Treaty Act* (MBTA) and the *Bald and Golden Eagle Protection Act.* The following species are birds of concern within airport boundaries: bald eagle (*Haliaeetus leucocephalus*), brown-headed nuthatch (*Sitta pusilla*), chimney swift (*Chaetura pelagica*), Kentucky warbler (*Geothlypis formosa*), prairie warbler (*Setophaga discolor),* prothonotary warbler (*Protonotaria citrea*), red-headed woodpecker (*Melanerpes erythrocephalus*), southeastern American kestrel (*Falco sparverius paulus*), and wood thrush (*Hylocichla mustelina*). *(Continues)*

TABLE 1C | Summary of Existing Environmental Conditions (continued)

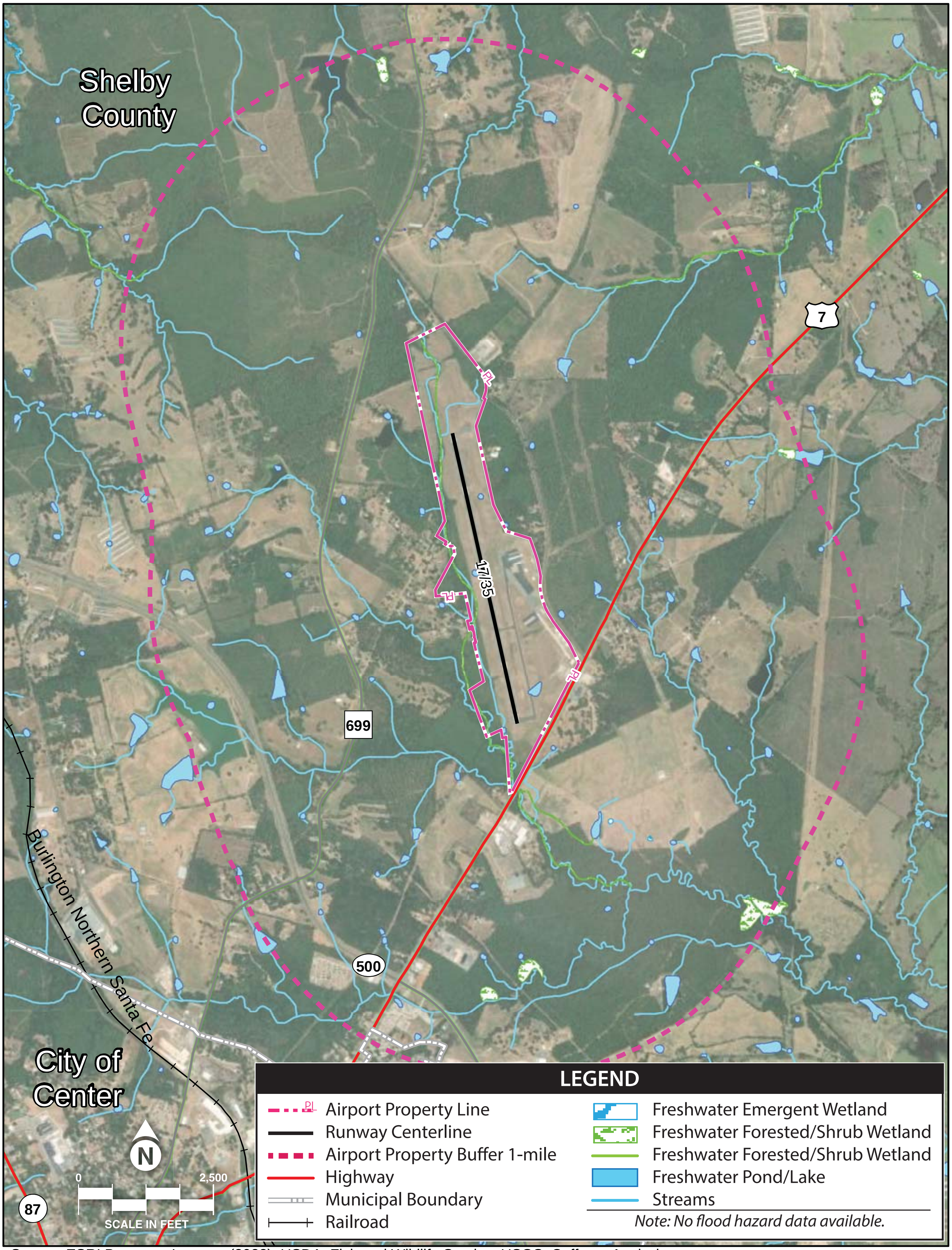
CATEGORY	EXISTING ENVIRONMENTAL CONDITIONS
Biological Resources (continued)	State Protected Species Based on a record search conducted on the Texas Parks & Wildlife Department's *Annotated County Lists of Rare Species*, the following species have been listed as threatened or endangered within Shelby County: Bachman's sparrow (*Peucaea aestivalis*), interior least turn (*Sternula antillarum athalassos*), piping plover (*Charadrius melodus*), swallow-tailed kite (*Elanoides forficatus*), white-faced ibis (*Plegadis chihi*), wood stork (*Myceteria americana*), paddlefish (*Polyodon spathula*), black bear (*Ursus americanus*), Rafinesque's big-eared bat (*Corynorhinus rafinesquii*), Louisiana pigtoe (*Pleurobema riddellii*), sandbank pocketbook (*Lampsilis satura*), southern hickorynut (*Obovaria arkansasensis*), Texas heelsplitter (*Potamilus amphicaenus*), Texas pigtoe (*Fusconaia askewi*), alligator snapping turtle (*Marcrochelys temminckii*), and Texas horned lizard (*Phrynosoma cornutum*).
Climate	The State of Texas does not currently have a statewide climate action plan. The following activities may generate greenhouse gas emissions on the airport: • Vehicular traffic for airport vehicles and ground support equipment • Aircraft traffic • Burning fossil fuels for electricity and heat for landside facilities
Coastal Resources	The airport is not located within a coastal zone. The airport is over 100 miles inland from the coastline. The closest National Marine Sanctuary is Flower Garden Bank National Marine Sanctuary, located 252 miles away.
***Department of Transportation Act,* Section 4(f)** (now codified in Title 49 United States Code [U.S.C.] § 303)	There are no known Section 4(f) resources within one mile of the airport. The nearest historic feature listed on the National Register of Historic Places (NRHP) is the Shelby County Courthouse, which is over two miles away from the airport. The nearest waterfowl and wildlife refuge, wilderness area, and national recreation area are: • Wildlife/Waterfowl Refuge: Red River National Wildlife Refuge (49 miles from the airport) • Wilderness Area: Turkey Hill Wilderness (30 miles from the airport) • National Recreation Area: Chickasaw National Recreation Area (241 miles from the airport)
Farmlands	According to the Natural Resources Conservation Service (NRCS) Web Soil Survey (WSS), the airport is comprised of soils that have been identified as all areas are prime farmland, farmland of statewide importance, prime farmland if drained, and not prime farmland. The airport is not located within a designated urban area.
Hazardous Materials, Solid Waste, and Pollution Prevention	There are no identified brownfields or Superfund sites located within a one-mile buffer of the airport. The closest recycling center is R & J Recycling Center & Disposal, located more than one mile southwest of the airport. The closest landfill is the City of San Augustine Transfer Station Facility, located 21 miles south of the airport. The airport offers both full service and self-service options for fueling purposes and has 100LL and Jet A fuel on airport property; the fuel farm is required to maintain spill response procedures (i.e., a spill prevention, control, and countermeasure plan) to minimize non-stormwater discharges contaminating waterways under federal regulations.
Historical, Architectural, Archaeological, and Cultural Resources	There are no NRHP-listed resources within one mile of the airport. From the information available at the time this report was prepared, no systematic airport-wide cultural surveys have been conducted. Much of the airport has been developed or disturbed by construction practices; however, there is still a chance intact cultural resources may be present either on the ground surface or subsurface. The airport was initially opened in February 1949; however, based on historic aerials, there do not appear to be any historic-age structures (i.e., 50 years or older) on airport property. The nearest tribal lands to Center Municipal Airport are the Osage Reservation, located more than 300 miles north of the airport.

(Continues)

TABLE 1C | Summary of Existing Environmental Conditions (continued)

CATEGORY	EXISTING ENVIRONMENTAL CONDITIONS
Land Use	According to the city's 2014 comprehensive plan, the airport is designated as a public/semi-public area on the Future Land Use Map. Public/semi-public land uses are defined as areas where community facilities, fire and public facilities, schools, churches, and miscellaneous land may be used by the city for storage and utilities.
Natural Resources and Energy Supply	Activities at the airport – such as aircraft operations and maintenance of airside and landside facilities – use consumable natural resources, like fossil fuels.
Noise and Noise-Compatible Land Use	Noise-sensitive land uses may include residential areas, schools, religious facilities, and health care units with overnight occupation. Within a one-mile radius, there are single-family homes adjacent to airport property.
Socioeconomics	The closest residential areas are adjacent to the eastern side of the airport, across from 1656 Road and the western boundary of the airport along Spur 6999, Sycamore, and 3734 Roads. According to the five-year 2017-2021 American Community Survey (ACS) estimates, the population within one mile of the airport is 236 persons, of which 36 percent of the population is considered low-income and 35 percent are people of color.
Environmental Justice	Both low-income and minority populations have been identified in the vicinity of the airport. The nearest residential area areas are adjacent to the eastern and western sides of the airport.
Children's Health and Safety Risks	According to the 2017-2021 ACS estimates, 25 percent of the population within one mile of the airport is between the ages of one and 18. There are no schools located within one mile of the airport, nor are there any parks or other recreational facilities. The airport is an access-controlled facility and children are not allowed on the airport without adult supervision.
Visual Effects – Light Emissions	Airfield lighting at the airport includes a rotating beacon, medium intensity runway lighting (MIRL) at Runway 17-35, and a two-light precision approach path indicator (PAPI) system at Runway 17 and Runway 35. The airfield lights utilize pilot-controlled lighting (PCL); thus, the airfield lights are only illuminated when activated by pilots using the airport. Surrounding the airport are land uses (such as single-family residential neighborhoods) that are sensitive to light pollution. The closest residential neighborhoods are adjacent to the western boundary of the airport along the Spur 699, Sycamore, and 3734 Roads and the eastern boundary of the airport, located off 1656 Road; however, these residential areas are shielded from airfield lighting due to the mature vegetation (i.e., trees and underbrush) encompassing these single-family homes.
Visual Effects – Visual Resources/ Visual Character	Visually, the area surrounding the airport is characterized not only by trees and dense vegetation areas to the west and northeast, but also by residential areas to the west and east. Views of the airport on the west side of the property are not readily accessible from surrounding roadways due to the mature vegetation being densely grouped; however, views of the airport along Texas State Highway 7 near the eastern and southeastern edges of the airport property are readily accessible due to a lack of mature trees and vegetation acting as a visual buffer for those traveling on Texas State Highway 7. In addition, long-range views are not readily available due to the relatively flat topography of the airport environs. There are no national scenic byways in Texas; however, the State of Texas has a State Scenic Byways Program that lists 30 potential state scenic byways. None of these byways are located near the airport; the closest designated Scenic Texas Byway is a segment of Texas State Highway 147, south of the airport.
Water Resources – Wetlands	The USFWS manages the National Wetlands Inventory on behalf of all federal agencies. The National Wetlands Inventory identifies surface waters and wetlands in the nation. Within airport boundaries, there are freshwater emergent wetlands and freshwater ponds scattered throughout the airport. (See **Exhibit 1L**.)
Water Resources – Floodplains	A review of the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) panel denotes that there are no digital data available at the time of this study for F17; thus, it is unknown if there are 100-year or 500-year floodplains on or near the airport property.
Water Resources – Surface Waters	Center Municipal Airport is located in the Prairie Creek-Tenaha Creek watershed. There are two waterbodies located within this watershed: Prairie Creek and Tenaha Creek, located south of the airport. Both waterbodies are reported to be in good condition (good waters are classified as waterbodies that support their designated uses under the *Clean Water Act*).

(Continues)



Source: ESRI Basemap Imagery (2022), USDA, Fish and Wildlife Service, USGS, Coffman Analysis

TABLE 1C | Summary of Existing Environmental Conditions (continued)

CATEGORY	EXISTING ENVIRONMENTAL CONDITIONS
Water Resources – Groundwater	The airport property is not located near a sole source aquifer. The nearest sole source aquifer is the Chicot Aquifer System Sole Source Aquifer, located more than 54 miles southeast of the airport. The Texas Water Development Board (TWDB) monitors groundwater and water quality levels for the state's aquifers. The TWDB recognizes nine major aquifers (aquifers that produce large quantities of water over large quantities of land) and 22 minor aquifers (aquifers that produce small quantities of water over large areas of land, or large quantities of water over small areas of land). The TWDB consists of 16 groundwater management areas, which were created to efficiently manage the state's groundwater supply. Shelby County is located in Groundwater Management Area 11 and is supported by the Carrizo-Wilcox Aquifer. This aquifer is classified as a major outcrop aquifer. Outcrop aquifers correspond to the principal recharge zones for aquifers and groundwater in these areas is normally under unconfined water-table conditions.
Water Resources – Wild and Scenic Rivers	The closest designated National Wild and Scenic River identified is the Saline Bayou River, located 74 miles from the airport in Louisiana. The nearest National River Inventory feature is Sabine River, located 16 miles to the southeast of the airport.

Sources:

- *U.S. EPA Green Book, Texas Nonattainment/Maintenance Status for Each County by Year for All Criteria Pollutants (https://www3.epa.gov/airquality/greenbook/anayo_tx.html), data current as of April 30, 2024*
- *USFWS IPaC (https://ipac.ecosphere.fws.gov/location/index)*
- *U.S. State Climate Action Plans (https://www.c2es.org/document/climate-action-plans/), accessed May 2024*
- *National Register of Historic Places (https://www.nps.gov/maps/full.html?mapId=7ad17cc9-b808-4ff8-a2f9-a99909164466), accessed May 2024; Google Earth Pro Aerial Imagery, accessed May 2024*
- *USDA NRCS, Web Soil Survey (https://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx), accessed May 2024*
- *Historic Aerials Viewer (https://historicaerials.com/viewer), accessed May 2024; U.S. EPA EJScreen (https://www.epa.gov/ejscreen), accessed May 2024*
- *U.S. EPA EJScreen (https://ejscreen.epa.gov/mapper/), accessed May 2024*
- *U.S. Department of Transportation, National Scenic Byways & All-American Roads (https://fhwaapps.fhwa.dot.gov/bywaysp/States/Show/TX), accessed May 2024; Scenic Texas, State Scenic Byway Program (https://www.scenictexas.org/state-scenic-byway-program), accessed May 2024*
- *National Wetlands Inventory (https://fwsprimary.wim.usgs.gov/wetlands/apps/wetlands-mapper/), accessed May 2024*
- *FEMA Flood Map Service Center (https://msc.fema.gov/portal/search?AddressQuery=center%20municipal%20airport)*
- *U.S. EPA, How's My Waterway (https://mywaterway.epa.gov/), accessed May 2024*
- *U.S. EPA, Sole Source Aquifer (https://epa.maps.arcgis.com/apps/webappviewer/index.html?id=9ebb047ba3ec41ada1877155fe31356b), accessed May 2024; Texas Water Development Board, Groundwater Management Area 11 (https://www.twdb.texas.gov/groundwater/management_areas/gma11.asp), accessed May 2024*
- *National Wild and Scenic River System in the U.S. (https://www.rivers.gov/texas); Nationwide River Inventory (https://www.nps.gov/maps/full.html?mapId=8adbe798-0d7e-40fb-bd48-225513d64977)*

Chapter Two

Aviation Demand Forecasts

CHAPTER TWO – AVIATION DEMAND FORECASTS

An important factor when planning the future needs of an airport involves a definition of aviation demand that may reasonably be expected to occur over the next 20 years. Aviation demand forecasting for Center Municipal Airport (F17) will evaluate projections for based aircraft and aircraft operations.

Aviation activity can be affected by many influences on the local, regional, and national levels, making it virtually impossible to predict year-to-year fluctuations of activity over 20 years with any certainty; therefore, it is important to remember that forecasts are meant to serve as guidelines, and planning must remain flexible enough to respond to a range of unforeseen developments.

The following forecast analysis for the airport was produced following these basic guidelines. Existing forecasts are examined and compared against current and historical activity. The historical aviation activity is then examined with other factors and trends that can affect demand, with the intention of providing an updated set of aviation demand projections for the airport that will permit airport management to make planning adjustments, as necessary, to maintain a viable, efficient, and cost-effective facility.

The forecasts for this planning study will utilize a base year of 2024 with a long-range forecast out to 2044.

NATIONAL AVIATION TRENDS

Each year, the FAA updates and publishes a national aviation forecast. Included in this publication are forecasts for large air carriers, regional/commuter air carriers, general aviation, and FAA workload measures. The forecasts are prepared to meet the budget and planning needs of the FAA and provide information that can be used by state and local authorities, the aviation industry, and the public. The current edition when this chapter was prepared was *FAA Aerospace Forecast – Fiscal Years* (FY) *2024-2044*. The FAA primarily uses the economic performance of the United States as an indicator of future aviation industry growth. Similar economic analyses are applied to the outlook for aviation growth in international markets. The following discussion is a brief synopsis of highlights from the FAA's national general aviation forecasts.

NATIONAL GENERAL AVIATION TRENDS

The long-term outlook for general aviation is promising, as growth at the high end of the segment offsets continuing retirements at the traditional low end. The active general aviation fleet is forecast to remain relatively stable between 2024 and 2044, increasing by just 0.4 percent. While steady growth in both gross domestic product (GDP) and corporate profits results in continued growth of the turbine and rotorcraft fleets, the largest segment of the fleet – fixed-wing piston aircraft – continues to shrink over the forecast period.

The FAA forecasts the fleet mix and hours flown for single-engine piston (SEP) aircraft; multi-engine piston (MEP) aircraft; turboprops; business jets; piston and turbine helicopters; and light sport, experimental, and other aircraft (e.g., gliders and balloons). The FAA forecasts active aircraft, not total aircraft. An active aircraft is one that is flown at least one hour during the year. From 2010 through 2013, the FAA undertook an effort to have all aircraft owners re-register their aircraft. This effort resulted in a 10.5 percent decrease in the number of active general aviation aircraft, mostly in the piston category. **Table 2A** shows the primary general aviation demand indicators, as forecast by the FAA.

TABLE 2A | FAA General Aviation Forecast

Demand Indicator	2024	2044	CAGR
General Aviation Fleet			
Total Fixed-Wing Piston	136,485	130,790	-0.2%
Total Fixed-Wing Turbine	27,905	41,580	2.0%
Total Helicopters	10,090	14,025	1.7%
Total Other (experimental, light sport, etc.)	35,625	42,580	0.9%
Total GA Fleet	**210,105**	**228,975**	**0.4%**
General Aviation Operations			
Local	15,900,404	17,570,920	0.5%
Itinerant	15,125,333	16,568,634	0.5%
Total General Aviation Operations	**31,025,737**	**34,139,554**	**0.5%**

CAGR = compound annual growth rate (2024-2044)

Source: FAA Aerospace Forecast – FY 2024-2044

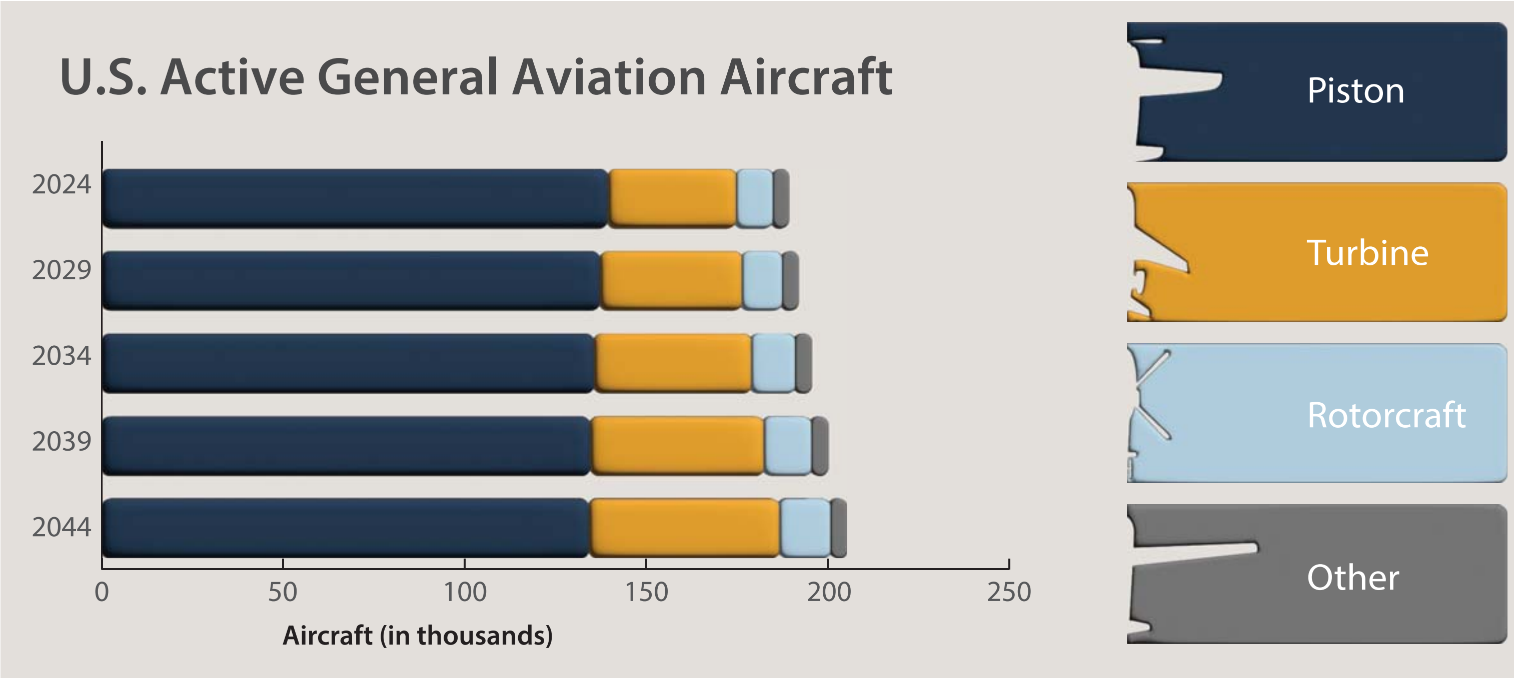
FAA forecasts of total operations – based on activity at control towers across the United States – are categorized as air carrier, air taxi/commuter, general aviation, and military. While the fleet size remains relatively level, the number of general aviation operations at towered airports is projected to increase from 31.0 million in 2024 to 34.1 million in 2044, with an average increase of 0.5 percent per year as growth in turbine, rotorcraft, and experimental hours offsets a decline in fixed-wing piston hours. This includes annual growth rates of 0.5 percent for both local and itinerant general aviation operations. The FAA's forecasts for general aviation are depicted graphically on **Exhibit 2A**.

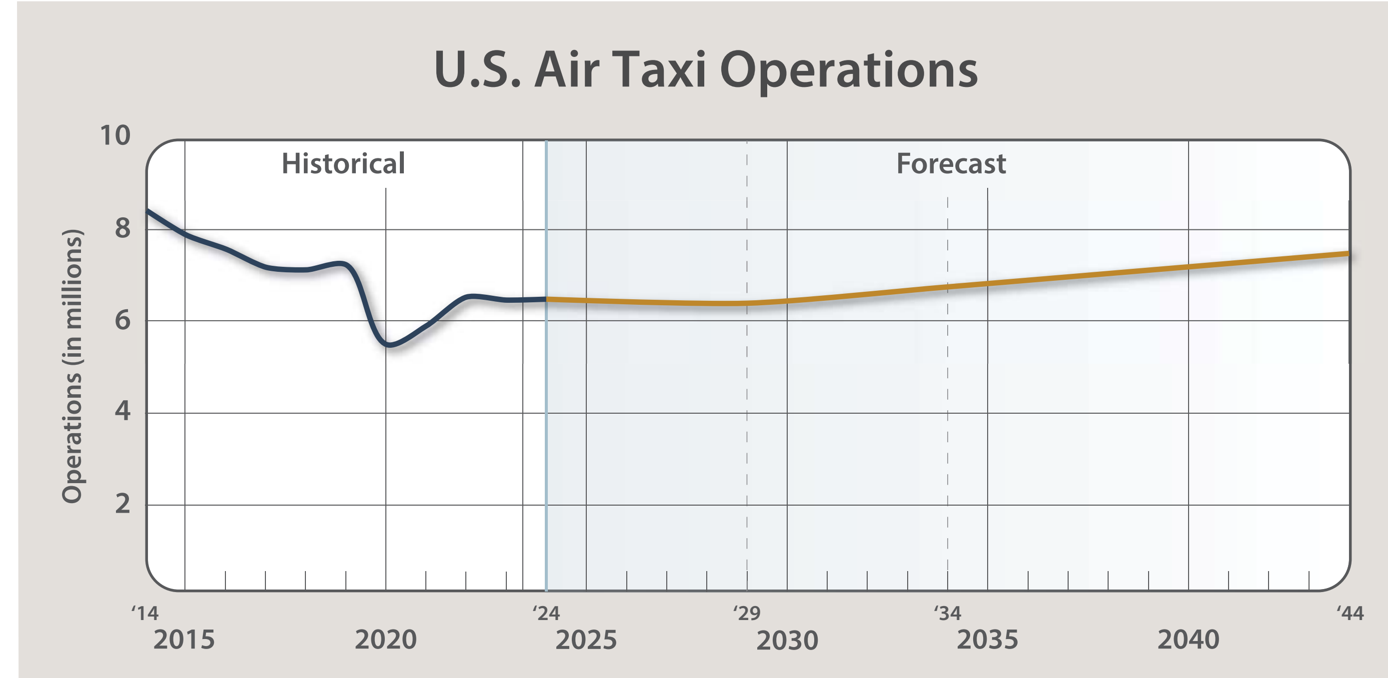
AIRPORT SERVICE AREA

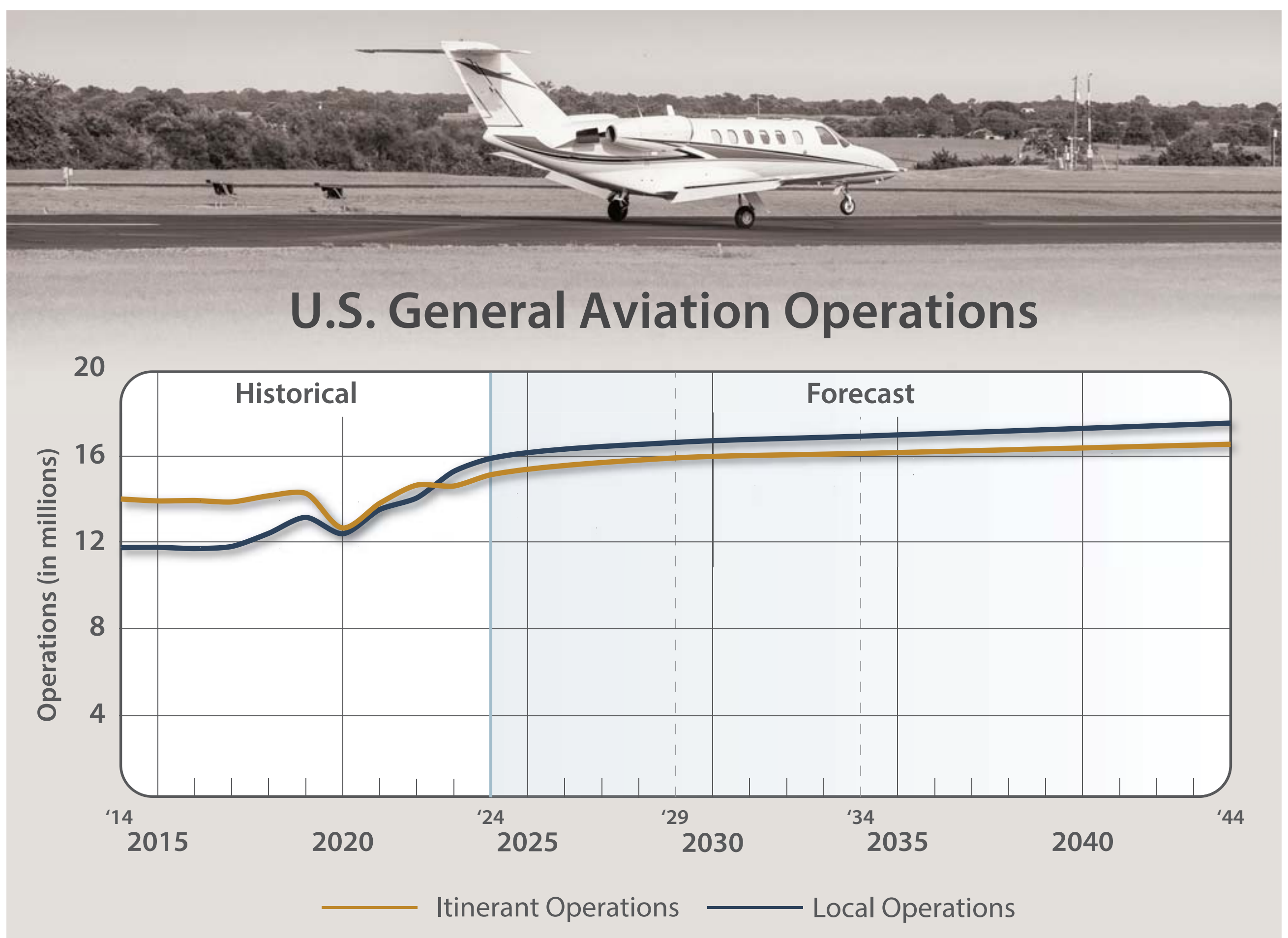
The initial step in determining the aviation demand for an airport is to define its generalized service area for various segments of aviation. The service area is primarily defined by evaluating the locations of competing airports and their capabilities, services, and relative attraction and convenience. In determining the aviation demand for an airport, it is necessary to identify the role of the airport, as well as the specific areas of aviation demand the airport is intended to serve. Center Municipal Airport is classified as a general aviation local airport within the NPIAS, meaning that its main purpose is to serve general aviation activity within its local and regional area.

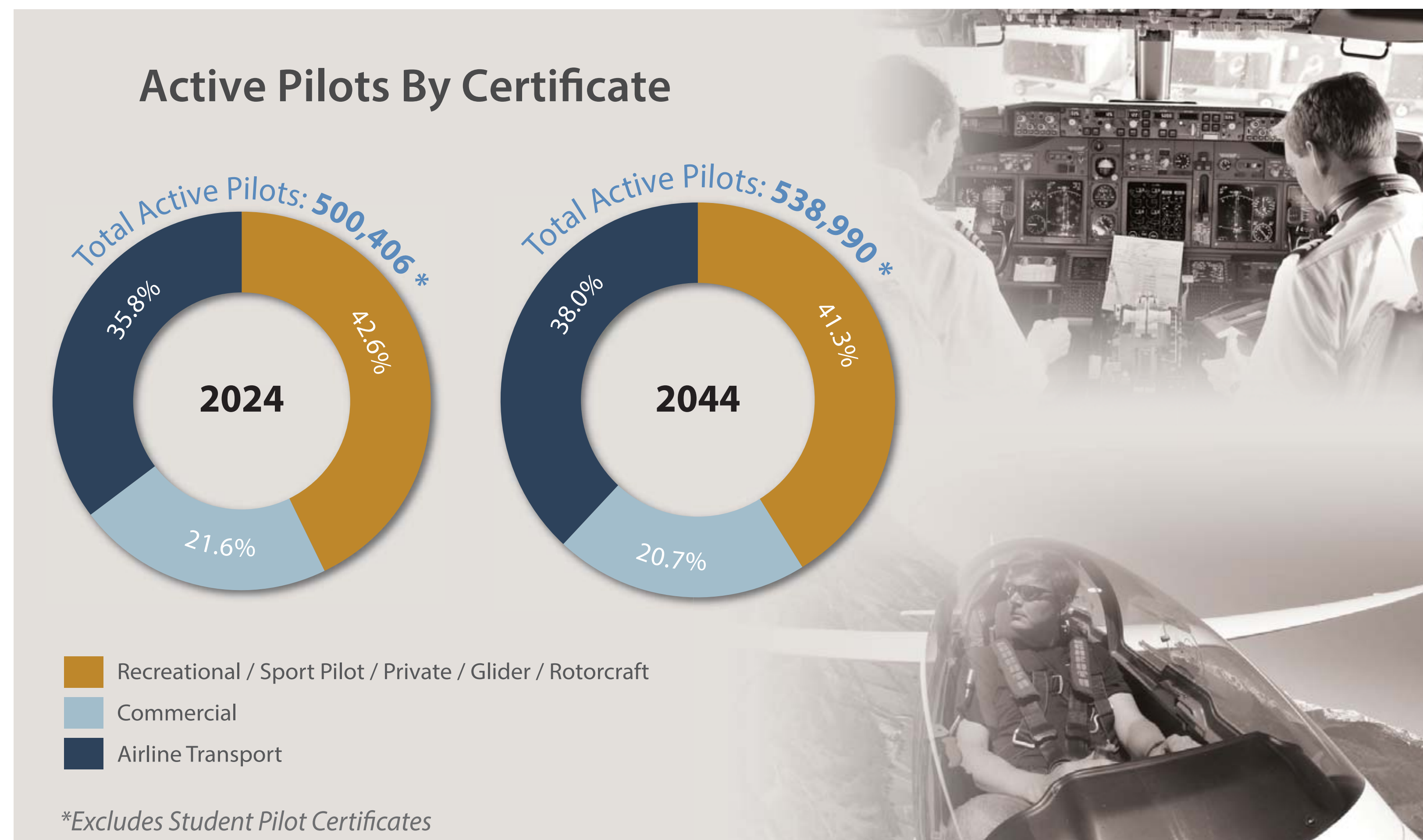
The service area for an airport is a geographic region from which an airport can be expected to attract the largest share of its activity. The definition of the service area can then be used to identify other factors, such as socioeconomic and demographic trends, which influence aviation demand at an airport. Aviation demand will also be impacted by the proximity and strength of aviation services offered at competing airports, as well as the local and regional surface transportation network.

As in any business enterprise, the more attractive the facility is in terms of services and capabilities, the more competitive it will be in the market. If an airport's attractiveness increases in relation to nearby airports, so will the size of its service area. If facilities and services are adequate and/or competitive, some level of aviation activity might be attracted to the airport from more distant locales.









Source: FAA Aerospace Forecasts FY2024-2044

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As a rule, a general aviation airport's service area typically extends for approximately 30 nm. There are three public-use airports within the 30-mile range of Center Municipal Airport, as shown previously on **Exhibit 1J**. Two of these – C.E. Rusty Williams Airport in Mansfield, LA and Panola County Airport-Sharpe Field in Carthage, TX – are classified within the NPIAS as local general aviation and unclassified general aviation airports, respectively. These airports are identified on **Exhibit 2B**.

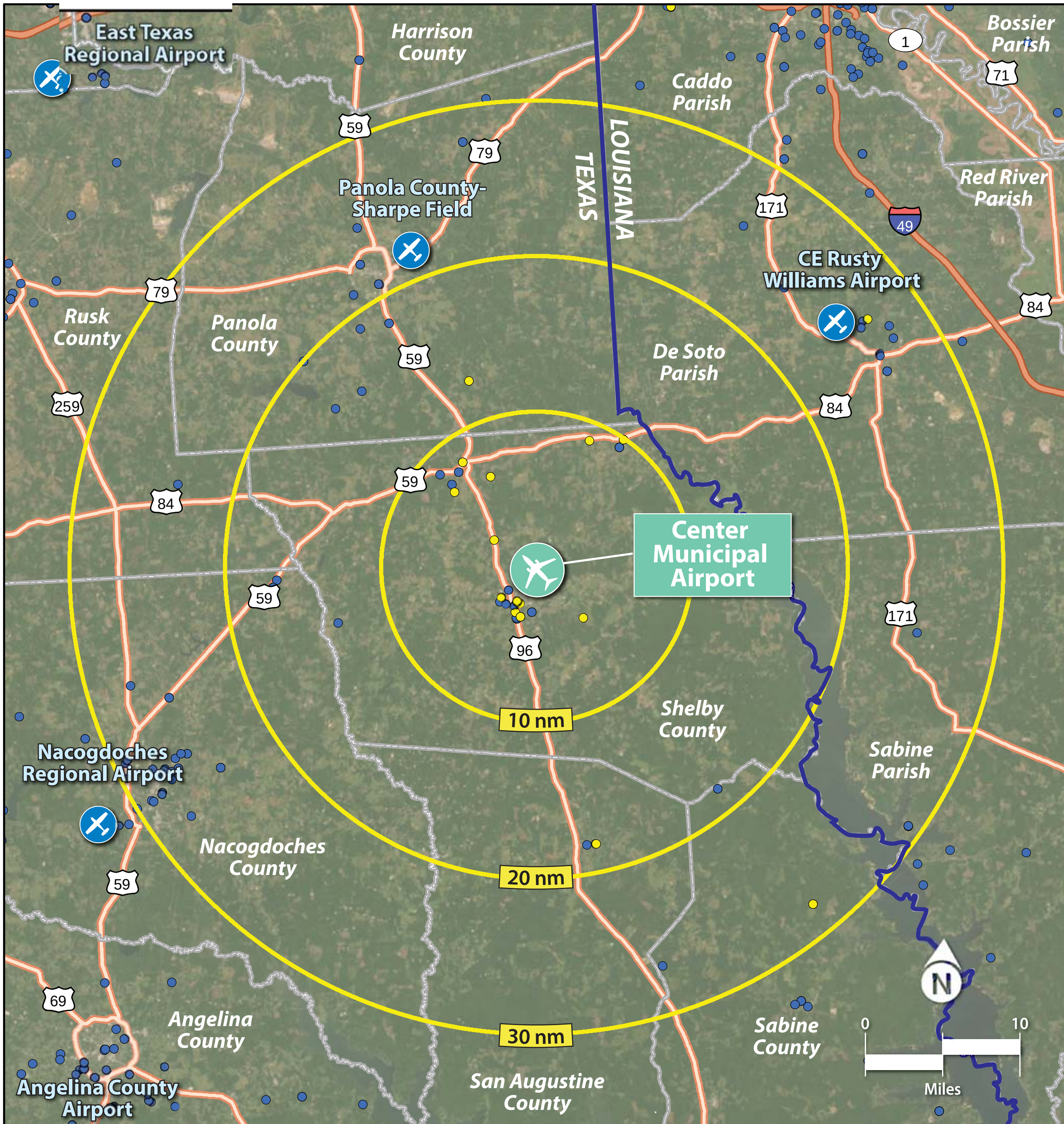
When evaluating the GA service area, two primary demand segments must be considered: based aircraft and itinerant operations. An airport's ability to attract based aircraft is an important factor when defining the service area. Proximity is a consideration for most aircraft owners; aircraft owners typically choose to base at airports that are close to their homes or businesses.

The second demand segment to consider is itinerant operations, which are performed by aircraft that arrive from or depart to another airport outside the service area. In most cases, pilots will use airports nearer their intended destinations; however, this is dependent on the airport's ability to accommodate aircraft operators in terms of the facility and services available. As a result, airports with better facilities and services are more likely to attract a larger portion of the region's itinerant operations. In terms of regional competition, C.E. Rusty Williams Airport is F17's largest competitor. It has similar airfield offerings to Center Municipal Airport, including a 5,005-foot runway and instrument approach capability, as well as 100LL and Jet A fuel, a terminal building, and courtesy cars.

Center Municipal Airport's centralized location within the county makes it an attractive option for all types of general aviation traffic within Shelby County. Additionally, F17 has the longest runway when compared to other airports within the 30 nm radius, as well as other appealing services and amenities, including instrument approach procedures to both runway ends and a well-appointed terminal. For these reasons, and for the purposes of this study, the primary service area of Center Municipal Airport will typify the FAA's general rule of 30 nm but will extend to include the entirety of Shelby County.

SERVICE AREA SOCIOECONOMICS

The socioeconomic characteristics of an airport's surrounding area can provide valuable information from which to derive an understanding of the dynamics of growth near an airport. This information is crucial in determining aviation demand level requirements, as most aviation demand is directly related to the socioeconomic conditions of the surrounding region. Statistical analysis of population, employment, income, and gross regional product (GRP) trends outlines the economic strength of a region and can help determine the ability of the area to sustain a strong economy in the future. Socioeconomic data utilized in the development of new based aircraft and operations forecasts for Center Municipal Airport include historical and projected population, employment, per capita personal income, and GRP data from Woods & Poole Economics, Inc. 10 years of historical data, projections through 2044 for the service area (Shelby County), and a comparison to the State of Texas are summarized in **Table 2B**.



FAA Registered & F17 Based Aircraft

Distance from F17	FAA Registered Aircraft	F17 Based Aircraft
0-10 nm	26	19
10-20 nm	22	3
20-30 nm	79	3
Total	**127**	**25***

*12 Based aircraft registered to addresses beyond 30nm from F17

Source: ESRI Basemap Imagery (2022),
FAA Registered Aircraft Database, BasedAircraft.com

TABLE 2B | Socioeconomic Information

YEAR	POPULATION		EMPLOYMENT		PER CAPITA PERSONAL INCOME*		GROSS REGIONAL PRODUCT (MILLIONS)	
	Shelby County	Texas	Shelby County	Texas	Shelby County	Texas	Shelby County	Texas
Historical								
2014	25,209	26,911,775	12,625	16,000,516	$39,491	$46,035	$1,412,639	$1,534,984,464
2015	24,872	27,404,448	12,691	16,414,589	$42,144	$46,022	$1,251,918	$1,525,949,772
2016	24,990	27,837,096	12,538	16,683,312	$36,549	$44,719	$1,045,543	$1,516,125,977
2017	24,526	28,201,237	12,555	17,104,522	$38,855	$46,406	$1,096,136	$1,577,719,198
2018	24,510	28,521,942	12,888	17,607,239	$40,532	$47,993	$1,151,241	$1,670,464,212
2019	24,408	28,871,352	12,973	17,902,907	$39,406	$49,167	$1,085,023	$1,690,809,641
2020	23,927	29,232,474	13,131	17,706,672	$42,382	$50,000	$969,213	$1,610,448,843
2021	23,962	29,558,864	13,400	18,276,118	$47,212	$51,723	$1,373,878	$1,774,563,924
2022	24,008	30,029,572	13,511	18,962,896	$42,654	$51,486	$1,380,821	$1,862,013,432
2023	24,026	30,401,871	13,564	19,307,741	$41,787	$52,524	$1,390,743	$1,909,538,772
2024	24,043	30,777,462	13,620	19,652,613	$40,935	$53,542	$1,400,920	$1,957,275,658
Forecast								
2029	24,132	32,687,412	14,319	21,545,437	$45,252	$58,560	$1,535,687	$2,239,301,704
2034	24,221	34,639,130	15,002	23,485,358	$49,882	$63,885	$1,677,571	$2,548,726,753
2039	24,311	36,609,582	15,700	25,517,243	$54,867	$69,633	$1,829,317	$2,892,320,670
2044	24,400	38,634,526	16,435	27,647,354	$60,184	$75,753	$1,991,989	$3,274,094,977
CAGRs								
2014-2024	-0.47%	1.35%	0.76%	2.08%	0.36%	1.52%	-0.08%	2.46%
2024-2044	0.15%	2.30%	1.90%	3.47%	3.93%	3.53%	3.58%	5.28%

**Per capita personal income is in 2012 dollars.*
CAGR = compound annual growth rate

Source: Woods & Poole Economics Inc., 2023

FORECASTING APPROACH

The development of aviation forecasts proceeds through both analytical and judgmental processes. A series of mathematical relationships is tested to establish statistical logic and rationale for projected growth; however, the judgment of the forecast analyst – based on professional experience, knowledge of the aviation industry, and assessment of the local situation – is important in the final determination of the preferred forecast. The most reliable approach to estimating aviation demand is through the utilization of more than one analytical technique. Methodologies frequently considered include trend line/time-series projections, correlation/regression analysis, and market share analysis. The forecast analyst may elect to not use certain techniques, depending on the reasonableness of the forecasts produced using other techniques.

Trend line/time-series projections are probably the simplest and most familiar of the forecasting techniques. A basic trend line projection is produced by fitting growth curves to historical data and then extending them out into the future. A basic assumption of this technique is that outside factors will continue to affect aviation demand in much the same manner as in the past. As broad as this assumption may be, the trend line projection serves as a reliable benchmark for comparing other projections.

Correlation analysis provides a direct relationship measure between two separate sets of historical data. If there is a reasonable correlation between the data sets, further evaluation using regression analysis may be employed.

Regression analysis measures statistical relationships between dependent and independent variables, yielding a correlation coefficient. The correlation coefficient (Pearson's r) measures association between the changes in the dependent variable and the independent variable(s). If the r^2 value (coefficient determination) is greater than 0.95, it indicates good predictive reliability. A value less than 0.95 may be used, but with the understanding that the predictive reliability is lower.

Market share analysis involves a historical review of the airport activity as a percentage, or share, of a larger regional, state, or national aviation market. A historical market share trend is determined, providing an expected market share for the future. These shares are then multiplied by the forecasts of the larger geographical area to produce a market share projection. This method has the same limitations as trend line projections but can provide a useful check on the validity of other forecasting techniques.

Forecasts will age and become less reliable the farther they are from the base year, particularly due to changing local and national conditions; nevertheless, the FAA requires that a 20-year forecast be developed for long-range airport planning. Facility and financial planning usually require at least a 10-year view because it often takes more than five years to complete a major facility development program; however, it is important to use forecasts that do not overestimate revenue-gathering capabilities or understate demand for facilities needed to meet public (user) needs.

A wide range of factors is known to influence the aviation industry and can have significant impacts on the extent and nature of aviation activity in both the local and national markets. Historically, the nature and trend of the national economy has had a direct impact on the level of aviation activity; nevertheless, trends emerge over time and provide the basis for airport planning.

Future facility requirements – such as general aviation hangars and terminals, ramp areas, and runways – are derived from projections of various aviation demand indicators. Using a broad spectrum of local, regional, and national socioeconomic and aviation information and analyzing the most current aviation trends, forecasts are presented for the following aviation demand indicators:

- Based Aircraft
- Operations

The following forecast analyses examine these aviation demand categories expected at Center Municipal Airport over the next 20 years. Each segment will be examined individually and collectively to provide an understanding of the overall aviation activity at the airport through 2044.

EXISTING FORECASTS

Consideration is given to any forecasts of aviation demand for the airport that have been completed recently. For Center Municipal Airport, recently prepared forecasts reviewed are those in the FAA *Terminal Area Forecast* (TAF).

FAA TERMINAL AREA FORECAST (TAF JANUARY 2024)

On an annual basis, the FAA publishes the TAF for each airport included in the NPIAS. The TAF is a generalized forecast of airport activity that is used by the FAA primarily for internal planning purposes. It is available to airports and consultants to use as a baseline projection and is an important point of comparison when developing local forecasts. The current TAF was published in January 2024.

Table 2C presents the 2024 TAF for Center Municipal Airport. It is important to note that the TAF based aircraft count is lower than the current FAA-validated count from the based aircraft registry. The TAF reflects 32 based aircraft, while the registry reflects 35 FAA-validated based aircraft.

TABLE 2C | 2024 FAA Terminal Area Forecast

	2024	2029	2034	2039	2044	CAGR 2024-2044
ANNUAL OPERATIONS						
Itinerant						
Air Carrier	0	0	0	0	0	N/A
Air Taxi	0	0	0	0	0	N/A
General Aviation	4,920	4,920	4,920	4,920	4,920	N/A
Military	30	30	30	30	30	N/A
Total Itinerant Operations	**4,950**	**4,950**	**4,950**	**4,950**	**4,950**	**N/A**
Local						
General Aviation	7,380	7,380	7,380	7,380	7,380	N/A
Military	0	0	0	0	0	N/A
Total Local Operations	**7,380**	**7,380**	**7,380**	**7,380**	**7,380**	**N/A**
Total Annual Operations	**12,330**	**12,330**	**12,330**	**12,330**	**12,330**	**N/A**
BASED AIRCRAFT						
Based Aircraft	32	32	32	32	32	N/A
Total Based Aircraft	**32**	**32**	**32**	**32**	**32**	**N/A**

N/A = not applicable

Source: FAA Terminal Area Forecast (TAF), January 2024

The TAF for Center Municipal Airport shows both based aircraft and total operations remaining constant throughout the forecast years, which is not uncommon for smaller general aviation airports, such as F17.

BASED AIRCRAFT FORECAST

REGISTERED AIRCRAFT

Aircraft ownership trends for the service area (Shelby County) typically dictate based aircraft trends for an airport. As such, a forecast of registered aircraft for the service area is developed for use as an input to the subsequent based aircraft forecast.

Table 2D presents the history of registered aircraft in the service area from 2014 through 2024. These figures are derived from the FAA aircraft registration database, which categorizes registered aircraft by county, based on the zip code of each registered aircraft. Although this information generally provides a correlation to based aircraft, it is not uncommon for some aircraft to be registered in one county but based at an airport outside the county, or vice versa.

TABLE 2D | Registered Aircraft Fleet Mix in Shelby County, Texas

Year	SEP	MEP	TP	Jet	H	Other*	UAV	Total
2014	26	3	1	3	7	1	0	41
2015	24	2	1	4	6	1	0	38
2016	23	1	1	3	8	1	0	37
2017	24	0	1	3	7	1	0	36
2018	24	0	1	3	6	1	0	35
2019	22	2	1	3	6	1	0	35
2020	19	2	1	3	5	1	0	31
2021	17	3	0	2	4	1	0	27
2022	15	3	1	2	4	1	0	26
2023	17	3	1	2	4	1	0	28
2024	17	2	1	2	4	1	1	28

SEP = single-engine piston
MEP = multi-engine piston
TP = turboprop
H = helicopter
UAV = unmanned aerial vehicle
E = electric aircraft
N/A = not applicable
*Other includes gliders, ultralights, and experimental aircraft

Sources: FAA Aircraft Registry Database; FAA Census of U.S. Civil Aircraft

The registered aircraft in the service area show a generally declining trend over the last decade, with the historical high of 41 registered aircraft recorded in 2014. Since then, registered aircraft in Shelby County have trended downward, before increasing again in 2023. UAVs (drones) were not included as a separate category until 2015, with one registered UAV added in 2024. The most recent count for 2024 shows 28 reported aircraft registrations in the county.

Although there are no recently prepared forecasts for Shelby County regarding registered aircraft, projections have been prepared for this study using market share and ratio projection methods. Several regression forecasts were also considered, including single- and multi-variable regressions examining the correlation of registered aircraft with the service area population, employment, income, and gross regional product, as well as with U.S. active general aviation aircraft. None of the regressions produced a strong correlation (r^2 value over 0.9); therefore, the regression forecasts were not considered further.

Table 2E presents several projections of registered aircraft for the service area, with a goal of presenting a planning envelope that shows a range of projections based on historical trends. The first set of forecasts is based on market share, which considers the relationship between registered aircraft located in Shelby County and active aircraft within the United States. The next set of projections is based on a ratio of the number of aircraft per 1,000 county residents.

TABLE 2E | Registered Aircraft Projections for Shelby County					
Year	**Service Area Registrations[1]**	**U.S. Active Aircraft[2]**	**Market Share of U.S. Aircraft**	**Service Area Population[3]**	**Aircraft per 1,000 Residents**
2014	41	204,408	0.0201%	25,209	1.63
2015	38	210,031	0.0181%	24,872	1.53
2016	37	211,794	0.0175%	24,990	1.48
2017	36	211,757	0.0170%	24,526	1.47
2018	35	211,749	0.0165%	24,510	1.43
2019	35	210,981	0.0166%	24,408	1.43
2020	31	204,140	0.0152%	23,927	1.30
2021	27	209,194	0.0129%	23,962	1.13
2022	26	209,540	0.0124%	24,008	1.08
2023	28	209,730	0.0134%	24,026	1.17
2024	28	210,105	0.0133%	24,043	1.16
Constant Market Share of U.S. Active Aircraft – Low Range (CAGR 0.43%)					
2029	28	213,370	0.0133%	24,132	1.18
2034	29	217,685	0.0133%	24,221	1.20
2044	31	228,975	0.0133%	24,400	1.25
Increasing Market Share of U.S. Active Aircraft – High Range (CAGR 2.51%)					
2029	32	213,370	0.0150%	24,132	1.33
2034	36	217,685	0.0167%	24,221	1.50
2044	46	228,975	0.0201%	24,400	1.88
Increasing Market Share of U.S. Active Aircraft – Mid Range (CAGR 1.26%)					
2029	30	213,370	0.0139%	24,132	1.23
2034	32	217,685	0.0145%	24,221	1.31
2044	36	228,975	0.0157%	24,400	1.48
Constant Ratio Projection per 1,000 County Residents – Low Range (CAGR 0.07%)					
2029	28	213,370	0.0132%	24,132	1.16
2034	28	217,685	0.0130%	24,221	1.16
2044	28	228,975	0.0124%	24,400	1.16
Increasing Ratio Projection per 1,000 County Residents – High Range (CAGR 1.76%)					
2029	31	213,370	0.0147%	24,132	1.30
2034	35	217,685	0.0160%	24,221	1.44
2044	40	228,975	0.0173%	24,400	1.63
Increasing Ratio Projection per 1,000 County Residents – Mid Range (CAGR 0.80%)					
2029	29	213,370	0.0137%	24,132	1.21
2034	30	217,685	0.0140%	24,221	1.26
2044	33	228,975	0.0143%	24,400	1.35

Sources:
[1] FAA Aircraft Registration Database
[2] FAA Aerospace Forecast – Fiscal Years 2024-2044
[3] Woods & Poole, 2023

Market Share Projections

- *Constant Market Share* – This forecast maintains the 2024 market share of county residents (0.0133 percent) throughout the planning period. The result is very slow growth in registrations in the short and intermediate terms, with just three additional aircraft registrations by the long term. This results in 31 registered aircraft projected for 2044 and a compound annual growth rate (CAGR) of 0.43 percent.

- *Increasing Market Share* – Two increasing market share forecasts were also considered. The first evaluated a scenario in which the county's record high market share (0.0201 percent) was achieved by the long term. This produced a CAGR of 2.51 percent, or 46 registered aircraft in the county by 2044. A mid-range scenario was also considered, based on the county's 10-year average market share. This resulted in 36 registered aircraft in Shelby County by the end of the planning period at a CAGR of 1.26 percent.

Ratio Projections

- *Constant Ratio* – In 2024, there were 1.16 registered aircraft per 1,000 county residents. Carrying this ratio forward through the plan years results in no growth in the number of registrations in the county over the next 20 years, with 28 registered aircraft projected for each of the forecast years.
- *Increasing Ratio* – Mid- and high-range increases were also projected. The high-range projection, which is based on a return to the historical high ratio of 1.63, results in 40 aircraft by 2044, for a CAGR of 1.76 percent. The mid-range projection is based on the county's 10-year average ratio of registered aircraft per 1,000 residents and results in 33 registered aircraft by 2044, which equates to a CAGR of 0.80 percent.

Selected Forecast

Each of the registered aircraft forecasts offers a projection of what aircraft registrations in the service area could look like over the next 20 years, with the constant ratio projection providing the low-end forecast and the high-range increasing market share forecast comprising the top end of the planning envelope. While county registrations generally declined over the last 10 years, they have stabilized in more recent years. The service area population is also expected to grow, albeit at a slow rate, and the FAA estimates healthy growth in the number of aircraft in the national fleet; therefore, it is not unreasonable to expect some level of growth in aircraft registrations in Shelby County over the next 20 years. Within the range of forecasts described above, the mid-range market share projection is considered the most reasonable registered aircraft forecast. At a CAGR of 1.26 percent, this forecast yields moderate growth in aircraft registrations in Shelby County, with 36 registered aircraft projected for the service area by 2044.

The registered aircraft projection is one data point to be used in the development of a based aircraft forecast. The following section will present several potential based aircraft forecasts, as well as the selected based aircraft forecast, to be utilized in this study.

BASED AIRCRAFT FORECAST

Determining the number of based aircraft at an airport can be a challenging task. Aircraft storage can be somewhat transient in nature, meaning aircraft owners can and do move their aircraft. Some aircraft owners may store their aircraft at an airport for only part of the year. For many years, the FAA did not require airports to report their based aircraft counts, nor did they validate based aircraft at airports; however, this has changed in recent years, and now the FAA mandates that airports report their based aircraft levels. These counts are recorded in the National Based Aircraft Inventory program and are maintained and validated by the FAA to ensure accuracy.

According to the FAA's database, Center Municipal Airport has 35 based aircraft, a count that was most recently validated in August 2019. This differs slightly from records provided by the airport that indicate 37 aircraft are based at F17. These records detail 28 single- and multi-engine piston aircraft, along with four jets, four helicopters, and one aircraft categorized as "other." For planning purposes, a base year total of 37 based aircraft will be used.

Like the registered aircraft forecasts, several projections have been made for based aircraft at Center Municipal Airport, including market share and ratio projections, as well as a forecast that considers the growth rate detailed in the FAA's TAF for the State of the Texas. The market share is based on the airport's percentage of based aircraft as compared to registered aircraft in the service area, while the ratio projection is based on the number of based aircraft per 1,000 county residents. The results of these analyses are detailed in **Table 2F**.

TABLE 2F | Based Aircraft Forecasts – Center Municipal Airport

Year	F17 Based Aircraft	Service Area Registrations	Market Share	Service Area Population	Aircraft Per 1,000 Residents
2024	37	28	132.1%	24,043	1.54
Constant Market Share – Low Range (CAGR 1.26%)					
2029	39	30	132.1%	24,132	1.63
2034	42	32	132.1%	24,221	1.72
2044	48	36	132.1%	24,400	1.95
Increasing Market Share – Mid Range (CAGR 1.56%)					
2029	40	30	134.1%	24,132	1.65
2034	43	32	136.1%	24,221	1.78
2044	50	36	140.0%	24,400	2.07
Increasing Market Share – High Range (CAGR 1.91%)					
2029	41	30	136.6%	24,132	1.68
2034	45	32	141.1%	24,221	1.84
2044	54	36	150.0%	24,400	2.21
Constant Ratio per 1,000 Residents (CAGR 0.07%)					
2029	37	30	125.0%	24,132	1.54
2034	37	32	117.9%	24,221	1.54
2044	38	36	104.3%	24,400	1.54
Increasing Ratio per 1,000 Residents – Mid Range (CAGR 0.72%)					
2029	38	30	129.3%	24,132	1.59
2034	40	32	126.0%	24,221	1.64
2044	43	36	118.6%	24,400	1.75
Increasing Ratio per 1,000 Residents – High Range (CAGR 2.53%)					
2029	43	30	144.5%	24,132	1.78
2034	49	32	154.7%	24,221	2.02
2044	61	36	169.5%	24,400	2.50
FAA TAF (CAGR -0.72%)					
2029	32	30	107.7%	24,132	1.33
2034	32	32	101.2%	24,221	1.32
2044	32	36	88.9%	24,400	1.31
FAA TAF Statewide Growth Rate (CAGR 1.07%)					
2029	39	30	131.4%	24,132	1.62
2034	41	32	130.2%	24,221	1.70
2044	46	36	127.3%	24,400	1.88

Sources: basedaircraft.com; 2024 FAA TAF; Woods & Poole, CEDDS, 2023

Market Share Projections

- *Constant Market Share* – In 2024, the airport had 37 based aircraft, which equates to 132.1 percent of the market share of registered aircraft in Shelby County. Carrying this percentage throughout the plan years results in a steady increase in based aircraft, reflecting a 1.26 percent CAGR and yielding 48 based aircraft by 2044.
- *Increasing Market Share* – Two increasing market share forecasts were also evaluated. The mid-range scenario considered a 140.0 percent market share by 2044 and resulted in an increase in based aircraft to 50 aircraft, or a 1.56 percent CAGR, by the end of the planning period. The high-range market share forecast evaluated a stronger growth scenario that considered Center Municipal Airport holding 150.0 percent of the market share by the end of the planning period. This resulted in 54 based aircraft by 2044, for a CAGR of 1.91 percent.

Ratio Projections

- *Constant Ratio* – In 2024, the ratio of based aircraft per 1,000 county residents stood at 1.54. Maintaining this ratio at a constant through 2044 resulted in virtually no growth in based aircraft, with just one additional based aircraft by the end of the planning period.
- *Increasing Ratio* – Mid- and high-range growth scenarios were also evaluated. The mid-range scenario is based on a ratio of 1.75 based aircraft per 1,000 residents by 2044. Applying this figure to the end of the planning period results in 43 based aircraft at the airport by 2044 at a CAGR of 0.72 percent. The high-range scenario considers more aggressive growth, with 2.50 based aircraft per 1,000 residents by the end of the planning period. Applying this ratio produces 61 based aircraft by 2044.

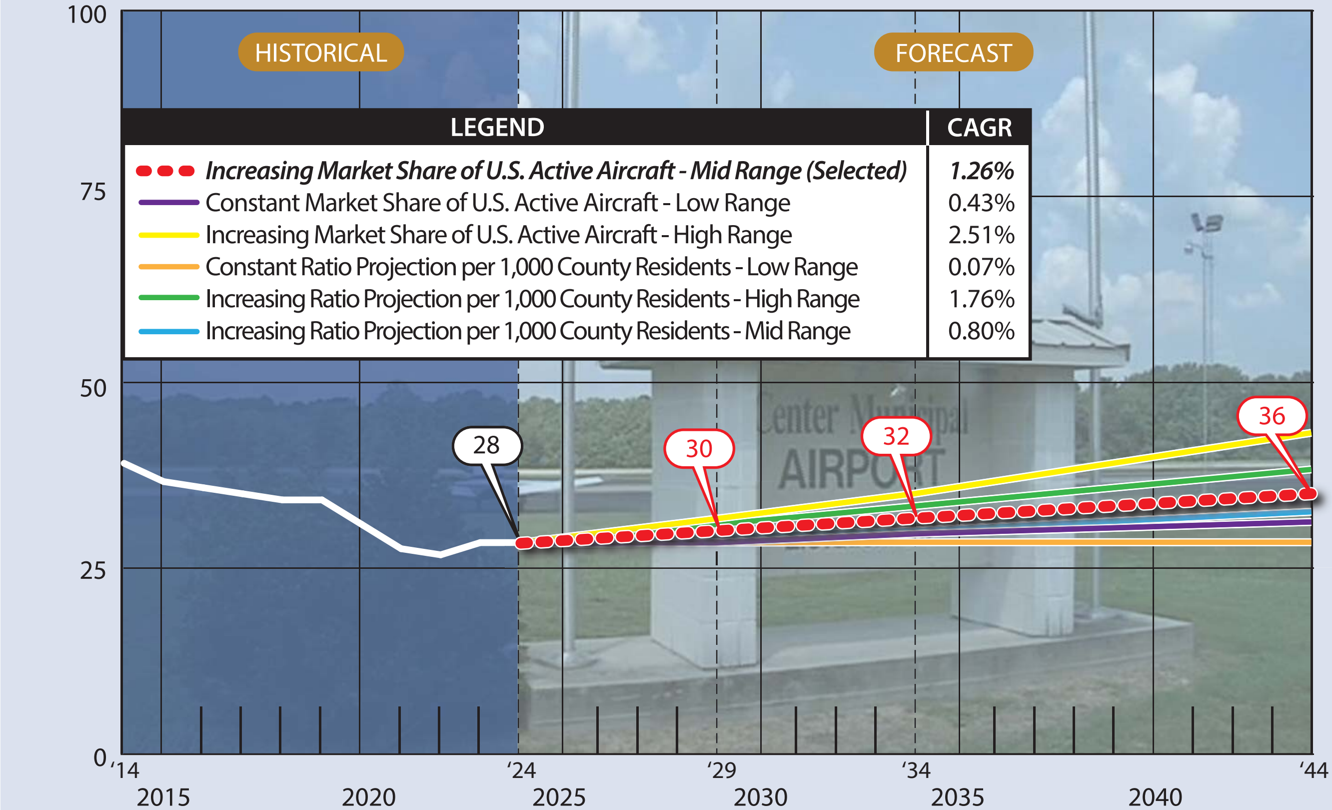
As a point of comparison, the FAA TAF was also considered. The TAF for Center Municipal Airport shows no growth in based aircraft, with the count flatlined at 32 throughout the planning period. This results in a negative CAGR when considering the actual validated count of 37 based aircraft in 2024. On a broader scale, the TAF for the State of Texas was also examined and the statewide growth rate for based aircraft of 1.07 percent was applied. This projection resulted in 46 based aircraft at Center Municipal Airport by the end of the planning period.

Selected Forecast

The forecasts produce a planning envelope ranging from 32 (FAA TAF for F17) to 61 based aircraft on the airport by 2044. There is clear demand for aircraft storage space at the airport, as evidenced by the airport's 132.1 percent market share; based aircraft at F17 currently exceed total county aircraft registrations. In addition, all hangars are currently occupied, and while there is no official waiting list, several individuals have contacted the airport to inquire about available aircraft storage space. Combined with favorable trends in aircraft ownership both locally and nationally, it is reasonable to assume a slightly stronger growth rate for based aircraft at Center Municipal Airport. As such, the constant market share forecast has been selected as the preferred projection. With a CAGR of 1.26 percent, this forecast exceeds the FAA's projected statewide growth rate and results in a forecasted increase of 11 based aircraft by the end of the planning period, for a total of 48 aircraft based at F17 by 2044.

Exhibit 2C graphically depicts the registered and based aircraft forecasts.

Registered Aircraft Forecasts



Based Aircraft Forecasts

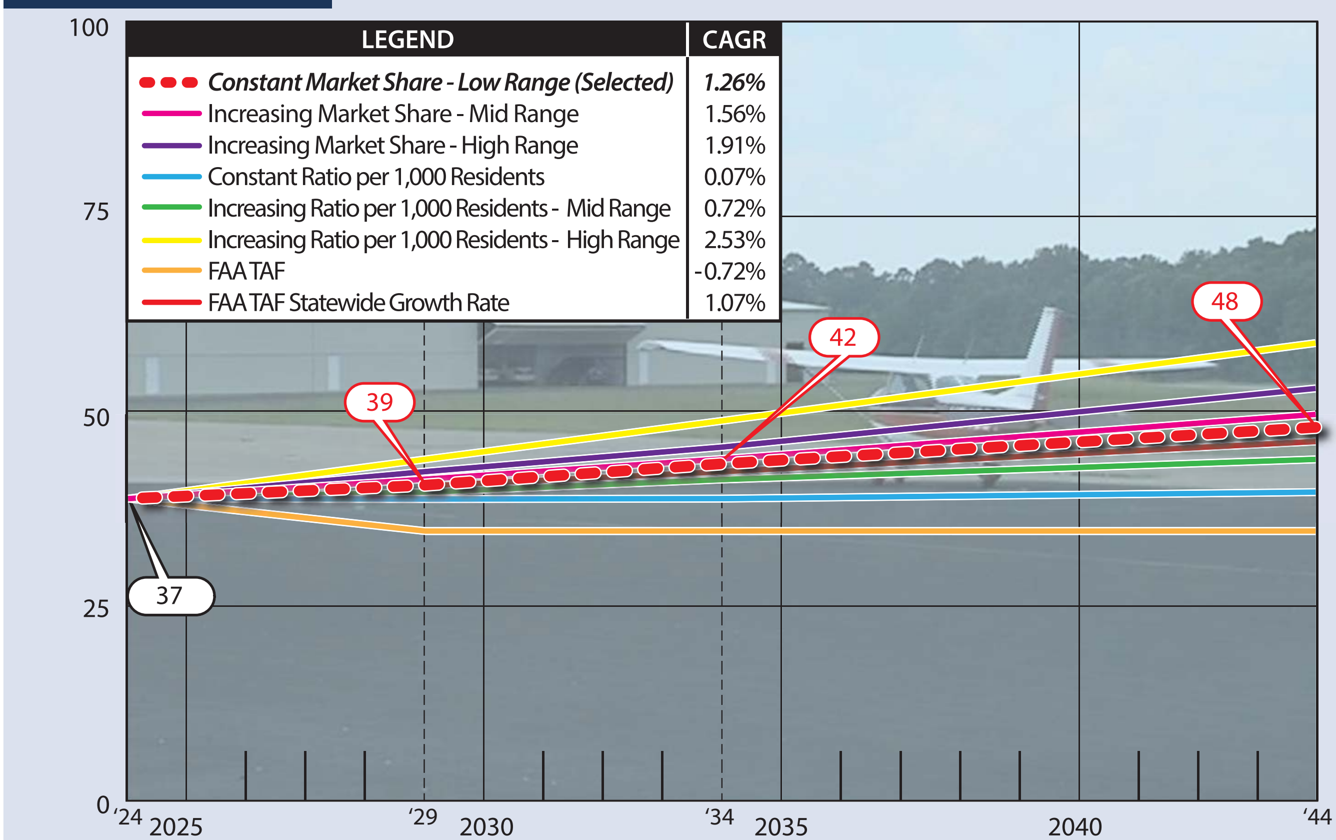


Exhibit 2C
REGISTERED AND BASED AIRCRAFT FORECASTS

OPERATIONS FORECAST

Operations at Center Municipal Airport are classified as either general aviation, air taxi, or military. General aviation operations include a wide range of activities, from recreational use and flight training to business and corporate uses. Air taxi operations are those conducted by aircraft operating under Title 14 Code of Federal Regulations (CFR) Part 135, otherwise known as for-hire or on-demand activity. Military operations include operations conducted by various branches of the U.S. military.

Aircraft operations are further classified as local and itinerant. A local operation is a takeoff or landing performed by an aircraft that operates within sight of an airport, or which executes simulated approaches or touch-and-go operations at an airport. Generally, local operations are characterized by training activity. Itinerant operations are those performed by aircraft with specific origins or destinations away from an airport. Typically, itinerant operations increase with business and commercial use because business aircraft are primarily used to transport passengers from one location to another.

Because Center Municipal Airport is not equipped with an airport traffic control tower (ATCT), precise operational (takeoff and landing) counts are not available. Sources for estimated operational activity at the airport include FAA Form 5010, *Airport Master Record*, and the FAA TAF. Additional calculations to estimate annual operations were also conducted for comparison purposes. The first, Equation 15 in the FAA's *Model for Estimating General Aviation Operations at Non-Towered Airports Using Towered and Non-Towered Airport Data*, factors in regional population and based aircraft data to develop a baseline operational count. A second calculation multiplies validated based aircraft by an estimated number of operations per based aircraft (OPBA), as outlined in Airport Cooperative Research Program (ACRP) Report 129, *Evaluating Methods for Counting Aircraft Operations at Non-Towered Airports*. In FAA Order 5090.5, the FAA recommends using a multiplier of 350 OPBA for local GA airports.

The following estimates of annual operations were derived from the various sources described above:

- FAA Form 5010 – 12,330 annual operations
- 2024 FAA TAF – 12,330 annual operations
- FAA Equation 15 – 13,007 annual operations
- OPBA with 350 multiplier – 12,950 annual operations

Center Municipal Airport also subscribes to 1200.aero, an operations tracking service; however, at the time of this writing (June 2024), only three months of data was available. This is not sufficient to establish a true baseline of annual operations; therefore, for planning purposes, the FAA TAF and Form 5010 estimates of 12,330 total annual operations will be carried forward for use as the base year count of operations at Center Municipal Airport. Of this total, 7,380 are considered local operations, 4,920 are itinerant operations, and 30 are military operations.

General Aviation Operations Forecast

Market Share Projections

Table 2G presents three market share forecasts for local and itinerant GA operations, based on the airport's current market share of total U.S. itinerant GA operations. In 2024, the airport held a 0.033 percent market share of national itinerant operations and 0.046 percent of the market share for local operations. The first forecast carries this figure forward as a constant through the planning period, resulting in 5,390 itinerant operations and 8,160 local operations by 2044, for CAGRs of 0.46 percent and 0.50 percent, respectively.

TABLE 2G | Operations Forecasts – Market Share

Year	F17 GA Itinerant Operations	U.S. GA Itinerant Operations	Market Share	F17 GA Local Operations	U.S. GA Local Operations	Market Share
2024	4,920	15,125,333	0.033%	7,380	15,900,404	0.046%
Constant Market Share - Low Range						
2029	5,180	15,923,540	0.033%	7,730	16,655,425	0.046%
2034	5,250	16,133,058	0.033%	7,870	16,950,476	0.046%
2044	5,390	16,568,634	0.033%	8,160	17,570,920	0.046%
CAGR	**0.46%**	–	–	**0.50%**	–	–
Increasing Market Share - Mid Range						
2029	5,400	15,923,540	0.034%	8,050	16,655,425	0.048%
2034	5,690	16,133,058	0.035%	8,510	16,950,476	0.050%
2044	6,300	16,568,634	0.038%	9,490	17,570,920	0.054%
CAGR	**1.24%**	–	–	**1.27%**	–	–
Increasing Market Share - High Range						
2029	5,680	15,923,540	0.036%	8,500	16,655,425	0.051%
2034	6,250	16,133,058	0.039%	9,440	16,950,476	0.056%
2044	7,460	16,568,634	0.045%	11,420	17,570,920	0.065%
CAGR	**2.10%**	–	–	**2.21%**	–	–

As growth in both itinerant and local operations is expected to occur nationally, two increasing market share forecasts were also developed. The first considers a slower growth scenario, with an increase to 6,300 itinerant operations and 9,490 local operations by 2044. This produced CAGRs of 1.24 percent and 1.27 percent, respectively. A faster growth scenario evaluated market shares at 0.050 percent for itinerant operations and 0.065 percent for local operations. This resulted in 7,460 itinerant operations by 2044 at a CAGR of 2.10 percent, and 11,420 local operations at a CAGR of 2.21 percent.

Other Projections

The Texas TAF growth rate for each operational category was also considered. The statewide TAF growth rate for itinerant operations is estimated at 0.57 percent, which results in 5,510 itinerant operations at Center Municipal Airport by 2044 when applied to the base year count. The Texas TAF growth rate for local operations is estimated at 0.59 percent, which results in 8,300 local operations by 2044 when applied to the base year count. The TAF projections for itinerant and local GA operations were also considered, primarily for comparison purposes. The TAF estimates both itinerant and local operations at Center Municipal Airport to remain flatlined at 4,920 (itinerant) and 7,380 (local) operations over the course of the planning period.

Table 2H and **Exhibit 2D** summarize each forecast. In terms of itinerant operations, the forecasts present a planning envelope ranging from 4,920 (FAA TAF) to 7,460 itinerant operations (high-range market share forecast). Local operations forecasts range from 7,380 (FAA TAF) to 11,420 (high-range market share forecast) local operations. With growth in itinerant and local operations anticipated both nationally and regionally, it is reasonable to assume a moderate increase in this type of traffic over the next 20 years. As such, the mid-range increasing market share forecast is the selected projection for each operational category. For itinerant operations, this is reflective of a 1.24 percent CAGR, or 6,300 operations by the end of the planning period. For local operations, the result is 9,490 operations at a CAGR of 1.27 percent. Overall, this represents a moderate growth scenario for local and itinerant general aviation activity at Center Municipal Airport.

TABLE 2H | F17 Operations Forecast Summary

Projections	2029	3034	2044	CAGR
Itinerant GA				
Constant Market – Low Range	5,180	5,250	5,390	0.46%
Increasing Market – Mid Range – SELECTED FORECAST	**5,400**	**5,590**	**6,300**	**1.24%**
Increasing Market – High Range	5,680	6,250	7,460	2.10%
Texas TAF Growth Rate	5,060	5,210	5,510	0.57%
F17 FAA TAF	4,920	4,920	4,920	0.00%
Local GA				
Constant Market – Low Range	7,730	7,870	8,160	0.50%
Increasing Market – Mid Range – SELECTED FORECAST	**8,050**	**8,510**	**9,490**	**1.27%**
Increasing Market – High Range	8,920	10,290	13,180	2.94%
Texas TAF Growth Rate	7,600	7,830	8,300	0.59%
F17 FAA TAF	7,380	7,380	7,380	0.00%

Air Taxi Operations Forecast

The air taxi category, which is a subset of the itinerant operations category, is comprised of operations that are conducted by aircraft operating under 14 CFR Part 135. Part 135 operations are for-hire or on-demand and include charter and commuter flights, air ambulance operations, and fractional ownership aircraft operations.

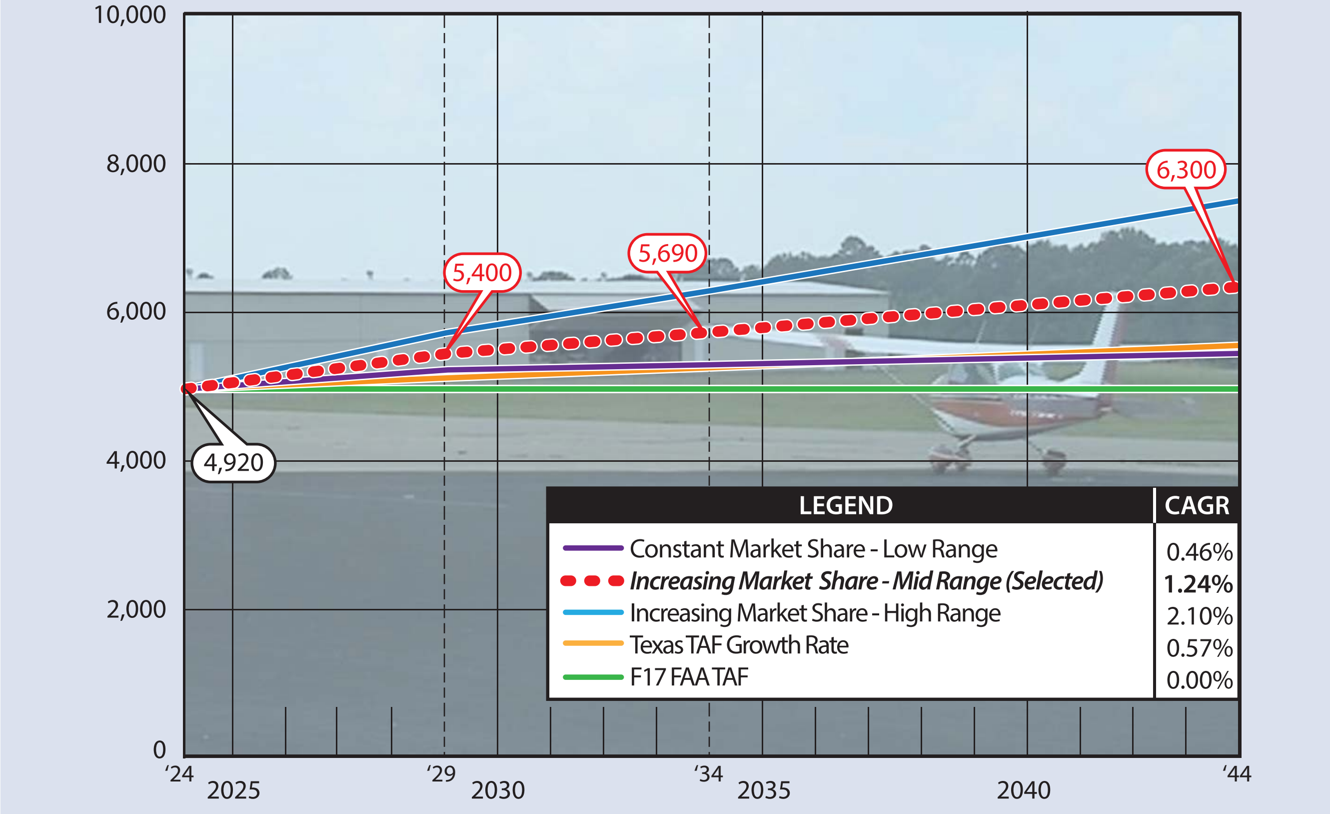
TABLE 2J | Historical and Projected Air Taxi Operations

Year	Air Taxi Operations
2014	2
2015	2
2016	36
2017	44
2018	32
2019	24
2020	22
2021	10
2022	18
2023	50
2024	40
Air Taxi Operations Forecast	
2029	100
2034	100
2044	100

Source: AirportIQ

The FAA TAF and Form 5010 do not report any air taxi activity at Center Municipal Airport; however, AirportIQ, a company that records Part 135 operations, was consulted to determine a more accurate air taxi count. These operational totals are detailed in **Table 2J**. Over the last several years, air taxi operations at F17 have remained fairly consistent. As of June 2024, 10 air taxi landings have been reported by AirportIQ for 2024, and this number has been extrapolated to establish a base year count of air taxi activity at the airport. For planning purposes, a flat count of 100 air taxi operations will be considered for each of the plan years, due to the generally low number of this type of operation.

Itinerant GA



Local GA

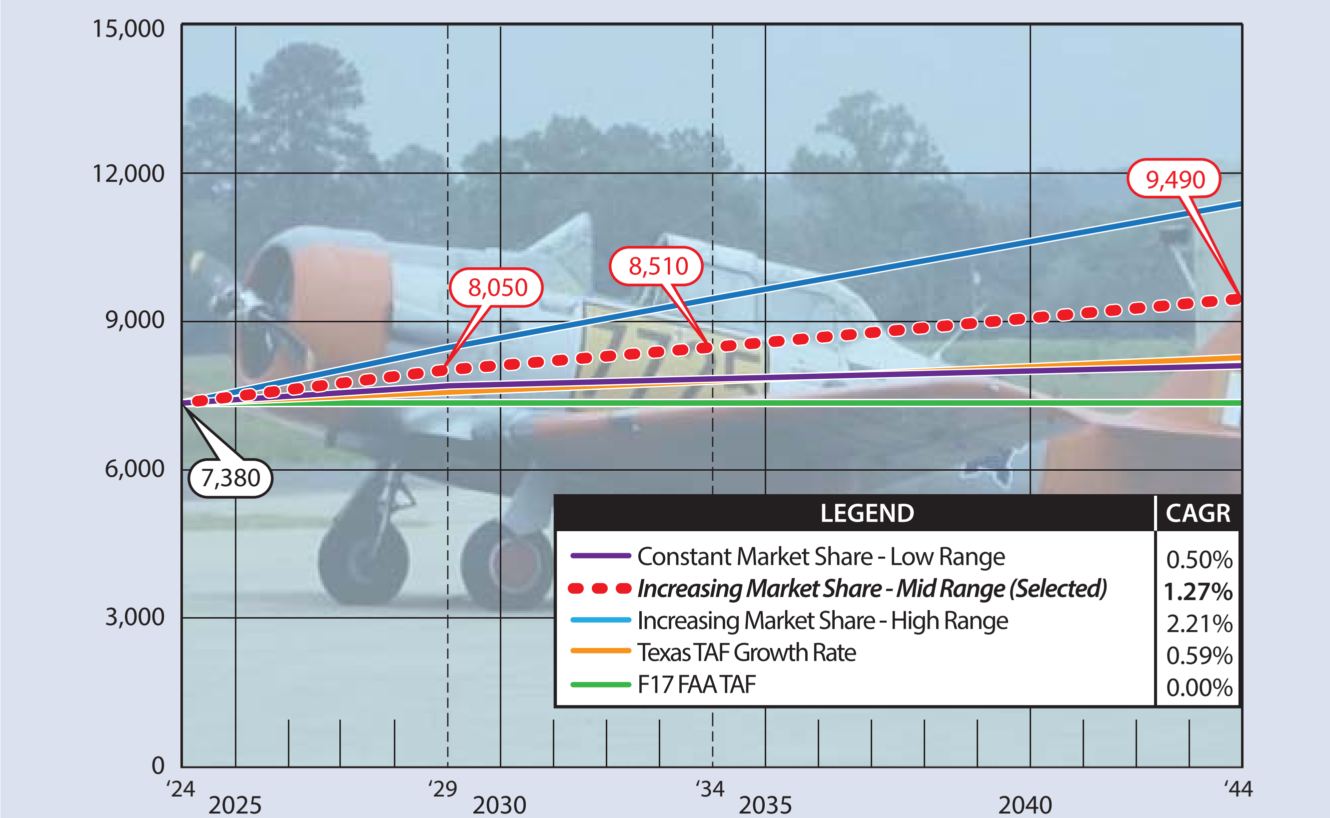


Exhibit 2D
OPERATIONS FORECASTS

Military Operations Forecast

Military aircraft can and do utilize civilian airports across the country, including Center Municipal Airport. It is inherently difficult to project future military operations due to their national security nature and the fact that missions can change without notice; thus, it is typical for the FAA to use a flat-line number for military operations. At F17, the FAA TAF accounts for 30 military operations. This planning study will carry this count forward throughout the forecast years.

Exhibit 2E presents a summary of the aviation forecasts prepared in this chapter.

FORECAST COMPARISON TO THE FAA TAF

Historically, forecasts have been submitted to the FAA for evaluation and comparison to the TAF. The FAA prefers that forecasts differ by less than 10 percent in the five-year period and less than 15 percent in the 10-year period. Where the forecasts differ, supporting documentation is necessary to justify the difference.

Table 2K presents a summary of the selected forecasts and a comparison to the FAA TAF. The direct comparison between the forecasts developed in this planning study and the TAF is presented at the bottom of the table. The ALP forecast is within the TAF tolerance for operations for both the five- and ten-year periods. In terms of based aircraft, the actual count at F17 exceeds the count reported in the TAF, creating a discrepancy in the base year. This discrepancy, combined with the TAF count being flatlined for the next 20 years, contributes to a larger difference in the near- and mid-term comparison.

TABLE 2K | Comparison of ALP Forecasts to the FAA TAF

	BASE YEAR	2029	2034	2044
Total Operations				
ALP Forecast	12,370	13,600	14,300	15,900
TAF	12,330	12,330	12,330	12,330
% Difference	**0.32%**	**9.80%**	**14.80%**	**25.29%**
Based Aircraft				
ALP Forecast	37	39	42	48
TAF	32	32	32	32
% Difference	**14.49%**	**19.72%**	**27.03%**	**40.00%**

CRITICAL AIRCRAFT

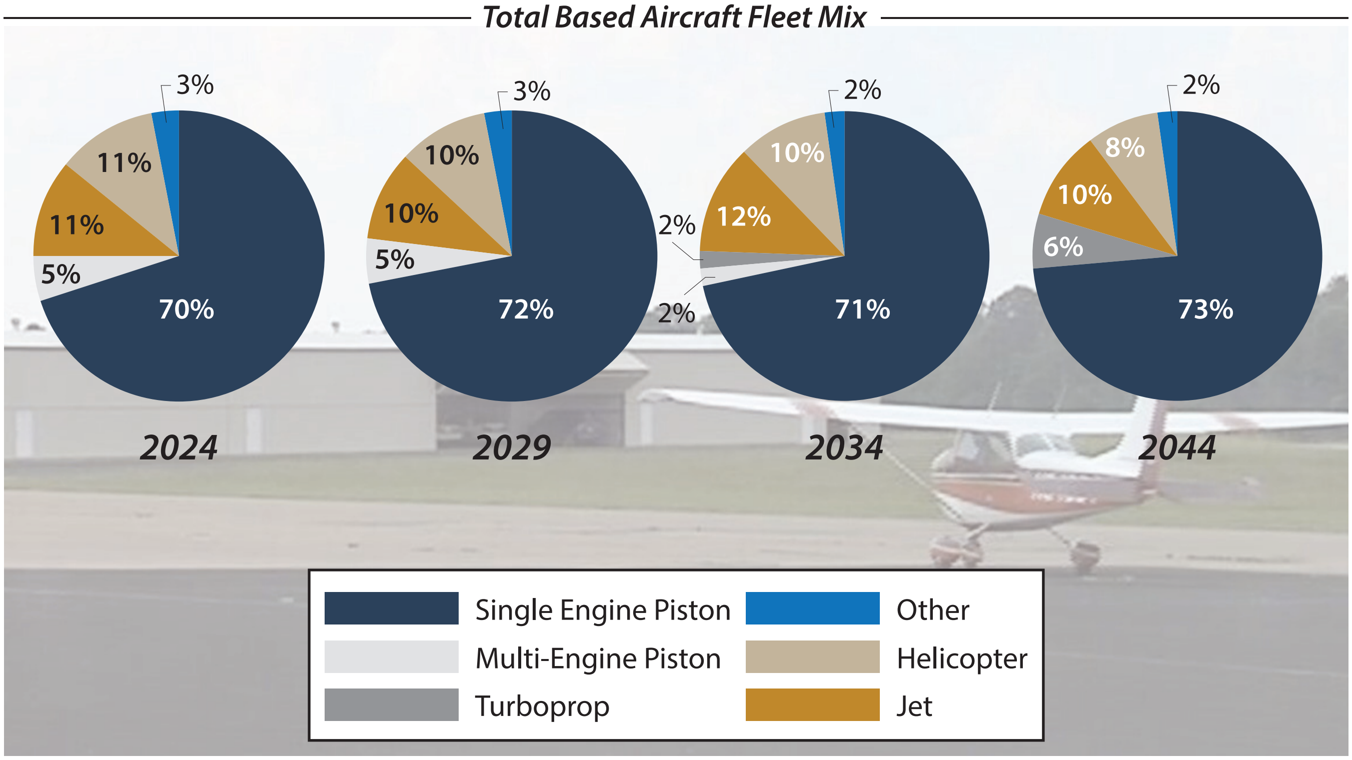
The critical aircraft is defined as an aircraft that conducts at least 500 itinerant operations at an airport, or the most regularly scheduled aircraft in commercial service. When planning for future airport facilities, it is important to consider the demands of aircraft that currently operate at the airport or are anticipated to operate at the airport in the future. Caution must be exercised to ensure that short-term development does not preclude the long-term needs of the airport; thus, a balance must be struck between the facility needs of aircraft currently operating at an airport and those projected to operate at the airport in the future.

	BASE YEAR	2029	2034	2044
ANNUAL OPERATIONS				
Itinerant				
Air Carrier	0	0	0	0
Other Air Taxi	40	100	100	100
General Aviation	4,920	5,400	5,690	6,300
Military	30	30	30	30
Total Itinerant	***4,960***	***5,500***	***5,790***	***6,400***
Local				
General Aviation	7,380	8,050	8,510	9,490
Total Local Operations	***7,380***	***8,050***	***8,510***	***9,490***
Total Annual Operations	***12,370***	***13,600***	***14,300***	***15,900***

Note: Total annual operations have been rounded

	BASE YEAR	2029	2034	2044
BASED AIRCRAFT				
Single Engine	26	28	30	35
Multi-Engine	2	2	1	0
Turboprop	0	0	1	3
Jet	4	4	5	5
Helicopter	4	4	4	4
Other	1	1	1	1
Total Based Aircraft	***37***	***39***	***42***	***48***

Total Based Aircraft Fleet Mix



AIRCRAFT CLASSIFICATION

The selection of appropriate FAA design standards for the development and location of airport facilities is based primarily on the characteristics of the aircraft that are currently using, or are expected to use, an airport. The critical aircraft is used to define the design parameters for an airport. The design aircraft may be a single aircraft type or, more commonly, a composite aircraft that represents a collection of aircraft with similar characteristics. The critical aircraft is defined by three parameters: aircraft approach category (AAC), airplane design group (ADG), and taxiway design group (TDG). FAA AC 150/5300-13B, *Airport Design*, describes the following airplane classification systems, the parameters of which are presented on **Exhibit 2F**.

Aircraft Approach Category (AAC) | The AAC is a grouping of aircraft based on a reference landing speed (V_{REF}), if specified, or if V_{REF} is not specified, 1.3 times stall speed (V_{SO}) at the maximum certificated landing weight. V_{REF}, V_{SO}, and the maximum certificated landing weight are those values as established for the aircraft by the certification authority of the country of registry. In addition, the operational specifications under Part 121, Part 129, or Part 135 for a specific operator and aircraft type may specify a minimum approach speed that is the AAC, rather than V_{REF}.

The AAC generally refers to the approach speed of an aircraft in landing configuration. The higher the approach speed, the more restrictive the applicable design standards. The AAC is depicted by a letter (A through E) and relates to aircraft approach speed (operational characteristic). The AAC generally applies to runways and runway-related facilities, such as runway width, runway safety area (RSA), runway object free area (ROFA), runway protection zone (RPZ), and separation standards.

Aircraft in AAC A and B are further distinguished between those that weigh more than 12,500 pounds and those that weigh less than 12,500 pounds. Aircraft under 12,500 pounds are classified as “small” or (s). The applicable design standards for the airport are different, based on the “small” classification.

Airplane Design Group (ADG) | The ADG is depicted by a Roman numeral (I through VI) and is a classification of aircraft that relates to aircraft wingspan or tail height (physical characteristic). When the aircraft wingspan and tail height fall in different groups, the higher group is used. The ADG influences design standards for taxiway safety area (TSA), taxiway object free area (TOFA), apron wingtip clearance, and various separation distances.

Taxiway Design Group (TDG) | The TDG is a classification of airplanes based on outer-to-outer main gear width (MGW) and cockpit to main gear (CMG) distance. The TDG relates to the undercarriage dimensions of the critical aircraft. The TDG is classified by an alphanumeric system: 1A, 1B, 2A, 2B, 3, 4, 5, 6, and 7. The taxiway design elements determined by the application of the TDG include the taxiway width, taxiway edge safety margin, taxiway shoulder width, taxiway fillet dimensions, and, in some cases, the separation distance between parallel taxiways/taxilanes. Other taxiway elements, such as the TSA, TOFA, taxiway/taxilane separation to parallel taxiway/taxilanes or fixed or movable objects, and taxiway/taxilane wingtip clearances, are determined solely based on the wingspan (ADG) of the design aircraft utilizing those surfaces. It is appropriate for taxiways to be planned and built to different TDG standards based on expected use.

Exhibit 2F presents the aircraft classifications of the most common aircraft in operation today.

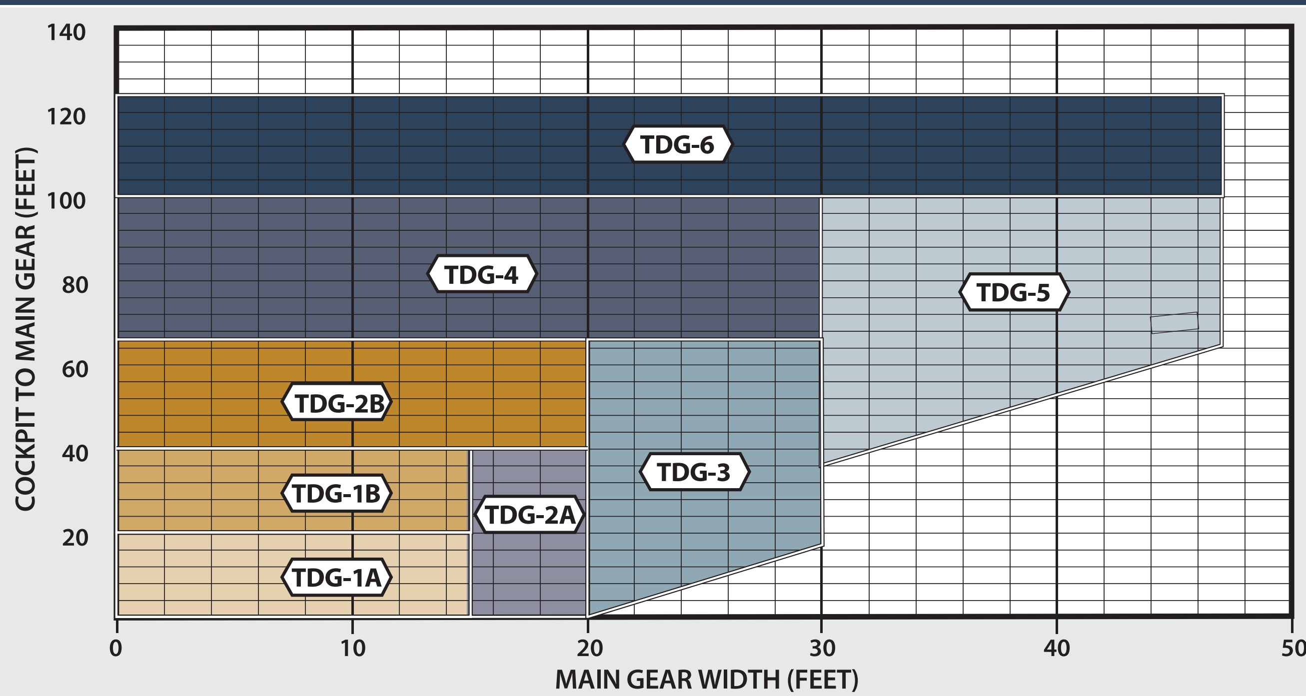
AIRCRAFT APPROACH CATEGORY (AAC)	
Category	**Approach Speed**
A	Less than 91 knots
B	91 knots or more but less than 121 knots
C	121 knots or more but less than 141 knots
D	141 knots or more but less than 166 knots
E	166 knots or more

AIRPLANE DESIGN GROUP (ADG)		
Group #	**Tail Height (ft)**	**Wingspan (ft)**
I	<20	<49
II	20-<30	49-<79
III	30-<45	79-<118
IV	45-<60	118-<171
V	60-<66	171-<214
VI	66-<80	214-<262

VISIBILITY MINIMUMS	
RVR* (ft)	**Flight Visibility Category (statute miles)**
VIS	3-mile or greater visibility minimums
5,000	Not lower than 1-mile
4,000	Lower than 1-mile but not lower than ¾-mile
2,400	Lower than ¾-mile but not lower than ½-mile
1,600	Lower than ½-mile but not lower than ¼-mile
1,200	Lower than ¼-mile

***RVR**: Runway Visual Range

TAXIWAY DESIGN GROUP (TDG)



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

Exhibit 2F
AIRCRAFT CLASSIFICATION PARAMETERS

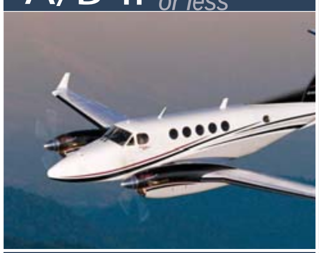
A-I

Aircraft	TDG
Beech Baron 55	1A
Beech Bonanza	1A
Cessna 150, 172	1A
Eclipse 500	1A
Piper Archer, Seneca	1A

B-I

Aircraft	TDG
Beech Baron 58	1A
Beech King Air 90	1A
Cessna 421	1A
Cessna Citation CJ1 (525)	1A
Cessna Citation 1(500)	2A
Embraer Phenom 100	1B

A/B-II 12,500 lbs. or less

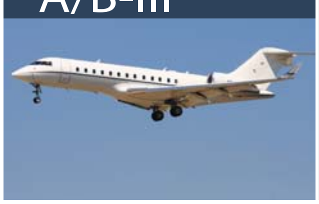


Aircraft	TDG
Beech Super King Air 200	2A
Cessna 441 Conquest	1A
Cessna Citation CJ2 (525A)	2A
Pilatus PC-12	1A

B-II over 12,500 lbs.

Aircraft	TDG
Beech Super King Air 350	2A
Cessna Citation CJ3(525B), V (560)	2A
Cessna Citation Bravo (550)	1A
Cessna Citation CJ4 (525C)	1B
Cessna Citation Latitude/Longitude	1B
Embraer Phenom 300	1B
Falcon 10, 20, 50	1B
Falcon 900, 2000	2A
Hawker 800, 800XP, 850XP, 4000	1B
Pilatus PC-24	1B

A/B-III

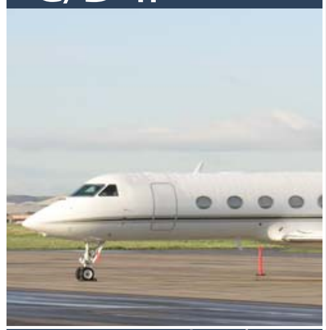


Aircraft	TDG
Bombardier Dash 8	3
Bombardier Global 5000, 6000, 7000, 8000	2B
Falcon 6X, 7X, 8X	2B

C/D-I

Aircraft	TDG
Lear 25, 31, 45, 55, 60	1B
Learjet 35, 36 (D-I)	1B

C/D-II

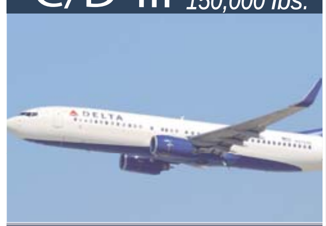


Aircraft	TDG
Challenger 600/604/800/850	1B
Cessna Citation VII, X+	1B
Embraer Legacy 450/500	1B
Gulfstream IV, 350, 450 (D-II)	2A
Gulfstream G200/G280	1B
Lear 70, 75	1B

C/D-III less than 150,000 lbs.

Aircraft	TDG
Gulfstream V	2A
Gulfstream G500, 550, 600, 650 (D-III)	2B

C/D-III over 150,000 lbs.



Aircraft	TDG
Airbus A319-100, 200	3
Boeing 737 -800, 900, BBJ2 (D-III)	3
MD-83, 88 (D-III)	4

C/D-IV

Aircraft	TDG
Airbus A300-100, 200, 600	5
Boeing 757-200	4
Boeing 767-300, 400	5
MD-11	6

D-V

Aircraft	TDG
Airbus A330-200, 300	5
Airbus A340-500, 600	6
Boeing 747-100 - 400	5
Boeing 777-300	6
Boeing 787-8, 9	5

TDG - Taxiway Design Group

Note: Aircraft pictured is identified in bold type.

RUNWAY CLASSIFICATION

Runway classifications, along with the aircraft classifications defined previously, are used to determine the appropriate FAA design standards to which the airfield facilities should be designed and built.

Runway Design Code (RDC) | The RDC is a code that signifies the design standards to which the runway should be built. The RDC is based on planned development and has no operational component. The AAC, ADG, and runway visual range (RVR) are combined to form the RDC of a particular runway. The RDC provides the information needed to determine certain applicable design standards. The first component, depicted by a letter, is the AAC and relates to aircraft approach speed (operational characteristic). The second component, depicted by a Roman numeral, is the ADG and relates to either the aircraft wingspan or tail height (physical characteristic), whichever is most restrictive. The third component relates to the visibility minimums, expressed by RVR values in feet of 1,200 (⅛-mile), 1,600 (¼-mile), 2,400 (½-mile), 4,000 (¾-mile), and 5,000 (1-mile). The RVR values approximate standard visibility minimums for instrument approaches to the runways. The third component should be labeled "VIS" for runways that are designed for visual approach use only.

Existing and Future/Ultimate Critical Aircraft

As stated previously, it is critical to have an accurate understanding of the types of aircraft that currently operate at the airport and are expected to use the airport in the future. Aircraft type can have a significant impact on airport design criteria and the type of facilities necessary to accommodate the aircraft that utilize the airport most frequently.

The most recent annual data was obtained from the FAA's Traffic Flow Management System Counts (TFMSC), a database maintained by the FAA to monitor the types of aircraft and frequency of usage at airports. Typically, information is added to the database when pilots file flight plans and/or when flights are detected by the National Airspace System (NAS) on radar. The TFMSC includes data for general aviation, commercial service (air carrier and air taxi), and military aircraft. Although the program can identify aircraft operating under instrument flight rules (IFR)-filed flight plans and on radar, it does not account for all aircraft operating without flight plans due to limited radar coverage; thus, the airport likely experiences additional operations that are not recorded in the TFMSC. Despite this likelihood for incomplete operational data, the TFMSC is a valuable resource for identifying the primary aircraft users and types of aircraft operating at the airport on a regular basis. Additionally, the TFMSC provides an accurate reflection of IFR activity. Operators of high-performance aircraft, such as turboprops and jets, tend to file flight plans at a high rate.

A TFMSC report was prepared to identify the primary aircraft types operating at Center Municipal Airport. A summary of this report is shown on **Exhibit 2G** and includes historical operational data since 2014. The data is limited, as the TFMSC reports just 524 operations in 2024[1], which is approximately 4.2 percent of the total operations estimated for 2024. Most of the operations (68.3 percent) reported in the

[1] 2024 data is based on the previous 12 months of data ending May 31, 2024.

TFMSC are by aircraft in B-II, which includes representative aircraft like the Citation Sovereign and the King Air 200/300/350 series. Aircraft in C-III are the next most frequent operators, according to the data, with 68 operations in 2024, followed by aircraft in B-I with 60 operations. As shown on **Exhibit 2G**, no single aircraft or family of aircraft has conducted 500 or more annual operations at the airport, which is the FAA's threshold for regular use and is used to determine the airport's critical aircraft.

Based on historical information provided in the TFMSC, it is reasonable to identify B-II as the airport's existing critical aircraft, with the King Air 200/300/350 series serving as the representative aircraft. In terms of the ultimate critical aircraft, it is important to consider the growth potential that exists at Center Municipal Airport now and over the next 20 years, as well as that of the region. The population of Shelby County is anticipated to grow, as are neighboring counties that could be considered secondary service areas for F17. Nationally, trends are moving towards larger and faster jets, and Center Municipal Airport already accommodates operations by AAC C aircraft; in fact, a Bombardier Global 5000 (a C-III aircraft) is currently based at the airport. Furthermore, the TASP classifies Center Municipal Airport as a Business/Corporate airport, which provides a high level of business jet/turbojet activity. Considering these factors, it is not unreasonable to plan for an increase in C and D operations at the airport.

A forecast of annual operations by AAC/ADG has been prepared through 2044, based on historical trends at the airport, the FAA's projections for the national fleet mix, and projected local activity. These forecasts are shown in **Table 2L**. For these reasons, **the ultimate critical aircraft for the airport is within AAC/ADG C-III, with the Global 5000 serving as the representative aircraft.**

TABLE 2L | Historical and Forecast Operations by AAC/ADG

Year	B-I	B-II	B-III	C-I	C-II	C-III
Historical						
2014	78	362	4	2	16	0
2015	112	470	0	10	46	0
2016	208	390	0	8	44	0
2017	174	336	0	16	10	0
2018	144	340	0	4	24	0
2019	92	374	0	0	16	0
2020	52	226	0	0	6	0
2021	108	346	0	2	16	2
2022	144	222	0	0	30	50
2023	96	302	0	2	30	74
Forecast						
2029	150	350	0	50	75	100
2034	250	400	5	100	250	250
2044	400	500	10	300	400	500

Note: A-I and A-II are not shown, as smaller/slower aircraft are unlikely to impact critical design aircraft.

Sources: FAA TFMSC; Coffman Associates

Existing and Future/Ultimate Airfield Design

Each runway at an airport is assigned an RDC. The RDC relates to specific FAA design standards that should be planned in relation to each runway, regardless of whether the airport currently meets the appropriate design standards (to be discussed in the next section). Runway 17-35 measures 5,501 feet long by 75 feet wide. Both runway ends are equipped with a lateral navigation (LNAV) global positioning

AAC/ ADG	Aircraft	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
A-I	A36 Bonanza	0	0	0	2	0	0	0	0	0	0	0
	Cirrus Vision Jet	0	0	0	0	0	0	0	0	2	0	0
	Lancair Evolution/Legacy	0	0	0	0	0	2	0	0	0	0	0
	Piper Malibu/Meridian	2	0	2	0	2	6	2	8	14	6	6
	Socata TBM 7/850/900	0	0	0	0	4	2	0	10	4	6	0
	Total	**2**	**0**	**2**	**2**	**6**	**10**	**2**	**18**	**20**	**12**	**6**
A-II	Cessna Caravan	0	0	0	0	2	2	0	2	2	4	0
	Pilatus PC-12	0	0	2	20	4	2	0	20	4	4	0
	Total	**0**	**0**	**2**	**20**	**6**	**4**	**0**	**22**	**6**	**8**	**0**
B-I	Aero Commander 690	0	0	0	0	0	0	2	0	0	0	0
	Beechjet 400	2	8	12	2	0	4	0	0	2	0	0
	Cessna 425 Corsair	0	0	0	0	0	0	0	0	2	2	0
	Challenger 300	0	2	2	0	0	0	0	0	0	0	0
	Citation CJ1	4	6	2	6	2	2	2	0	8	10	4
	Citation I/SP	0	2	0	4	4	6	2	2	4	0	0
	Citation M2	0	0	0	2	0	0	0	2	0	0	0
	Citation Mustang	8	2	2	4	2	0	0	0	0	2	6
	Eclipse 400/500	2	0	0	4	0	4	0	2	0	0	0
	Falcon 10	0	0	2	0	0	0	0	2	0	0	0
	Honda Jet	0	0	0	0	0	0	0	0	20	0	0
	King Air 90/100	28	0	0	0	0	0	0	0	0	0	0
	Learjet 31	0	2	0	2	2	2	0	0	6	4	0
	Mitsubishi MU-2	0	2	0	2	0	0	0	0	2	0	0
	Phenom 100	2	80	186	138	130	72	44	98	90	74	48
	Piper Cheyenne	12	8	0	2	0	0	0	0	2	0	0
	Premier 1	20	0	2	8	2	2	2	2	8	4	2
	T-6 Texan	0	0	0	0	2	0	0	0	0	0	0
	Total	**78**	**112**	**208**	**174**	**144**	**92**	**52**	**108**	**144**	**96**	**60**
B-II	Cessna Conquest	0	0	0	0	0	0	2	0	2	0	0
	Citation CJ2/CJ3/CJ4	2	0	14	4	4	2	0	2	2	4	4
	Citation II/SP/Latitude	48	28	10	0	6	0	2	4	4	20	18
	Citation V/Sovereign	68	94	92	88	122	86	20	108	66	60	70
	Citation XLS	0	4	2	0	2	0	4	4	4	8	8
	Embraer 500/450 Legacy	4	78	0	0	0	4	4	84	16	0	0
	Gulfstream 100/150	0	0	0	0	2	2	2	0	0	0	0
	King Air 200/300/350	26	10	30	24	16	14	28	66	108	120	150
	King Air 90/100	0	44	40	20	30	104	64	32	6	16	14
	King Air F90	0	0	0	0	0	0	0	0	0	2	0
	Phenom 300	212	210	202	198	156	162	96	44	14	66	90
	Pilatus PC-24	0	0	0	0	0	0	0	0	0	4	4
	Swearingen Merlin	2	2	0	2	2	0	4	2	0	2	0
	Total	**362**	**470**	**390**	**336**	**340**	**374**	**226**	**346**	**222**	**302**	**358**
B-III	Falcon 7X/8X	4	0	0	0	0	0	0	0	0	0	0
	Total	**4**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
C-I	Learjet 35/36	0	0	0	0	0	0	0	0	0	2	2
	Learjet 40 Series	0	6	4	14	4	0	0	2	0	0	0
	Learjet 50 Series	2	2	0	0	0	0	0	0	0	0	0
	Learjet 60 Series	0	0	4	0	0	0	0	0	0	0	4
	Piaggio Avanti	0	2	0	0	0	0	0	0	0	0	0
	Westwind II	0	0	0	2	0	0	0	0	0	0	0
	Total	**2**	**10**	**8**	**16**	**4**	**0**	**0**	**2**	**0**	**2**	**6**
C-II	Challenger 300	0	0	0	0	0	0	0	0	0	8	8
	Challenger 600/604	0	0	2	4	2	0	0	2	0	0	0
	Citation III/VI	4	0	0	0	0	0	0	0	0	4	0
	Citation X	2	2	0	2	4	0	0	0	2	0	0

AAC/ ADG	Aircraft	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
C-II cont.	Embraer ERJ-135/140/145	0	26	20	0	0	0	2	4	0	0	0
	Falcon 20/50	0	4	4	0	0	0	0	0	0	0	0
	Falcon 2000	0	8	6	2	2	6	2	6	8	10	12
	Falcon 900	6	0	0	0	0	0	0	0	4	2	0
	Gulfstream 100/150	0	2	0	0	0	0	0	0	0	0	0
	Gulfstream 200	0	0	0	0	0	2	0	0	10	0	0
	Gulfstream 280	0	0	4	0	0	0	0	0	0	4	4
	Hawker 800 (Formerly Bae-125-800)	4	2	8	2	14	8	0	4	6	2	2
	Learjet 70 Series	0	2	0	0	2	0	2	0	0	0	0
	Total	**16**	**46**	**44**	**10**	**24**	**16**	**6**	**16**	**30**	**30**	**26**
C-III	BAe 146	0	0	0	0	0	0	0	0	0	2	2
	Bombardier Global 5000	0	0	0	0	0	0	0	0	48	66	66
	Bombardier Global Express	0	0	0	0	0	0	0	2	2	6	0
	Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**50**	**74**	**68**
C-IV	Boeing 767-200/300	0	0	0	0	0	0	2	0	0	0	0
	Total	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**0**
D-II	Gulfstream 450	0	0	0	0	0	0	0	0	14	0	0
	Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**14**	**0**	**0**

Summary

AAC/ ADG	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
A-I	2	0	2	2	6	10	2	18	20	12	6
A-II	0	0	2	20	6	4	0	22	6	8	0
B-I	78	112	208	174	144	92	52	108	144	96	60
B-II	362	470	390	336	340	374	226	346	222	302	358
B-III	4	0	0	0	0	0	0	0	0	0	0
C-I	2	10	8	16	4	0	0	2	0	2	6
C-II	16	46	44	10	24	16	6	16	30	30	26
C-III	0	0	0	0	0	0	0	2	50	74	68
C-IV	0	0	0	0	0	0	2	0	0	0	0
D-II	0	0	0	0	0	0	0	0	14	0	0
Total	**464**	**638**	**654**	**558**	**524**	**496**	**288**	**514**	**486**	**524**	**524**

Aircraft Approach Category

AAC	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
A	2	0	4	22	12	14	2	40	26	20	6
B	444	582	598	510	484	466	278	454	366	398	418
C	18	56	52	26	28	16	8	20	80	106	100
D	0	0	0	0	0	0	0	0	14	0	0
Total	**464**	**638**	**654**	**558**	**524**	**496**	**288**	**514**	**486**	**524**	**524**

Airplane Design Group

ADG	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
I	82	122	218	192	154	102	54	128	164	110	72
II	378	516	436	366	370	394	232	384	272	340	384
III	4	0	0	0	0	0	0	2	50	74	68
IV	0	0	0	0	0	0	2	0	0	0	0
Total	**464**	**638**	**654**	**558**	**524**	**496**	**288**	**514**	**486**	**524**	**524**

Source: TFMSC 1/1/2014 thru 5/31/2024 - Data normalized annually
*2024 data is from 6/1/2023 thru 5/31/2024

Exhibit 2G
HISTORICAL TURBOPROP AND JET OPERATIONS

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system (GPS) approach with visibility minimums down to 1-mile. The resulting RDC for Runway 17-35 in the existing condition is B-II-5000 and the existing TDG is 2A. Based on the ultimate critical aircraft (C-III), planning for Runway 17-35 should reflect RDC C-III-4000 design standards, which account for the airport's potential to pursue visibility minimums down to ¾-mile.

Table 2K summarizes the airport and runway classifications currently and in the future. The next chapter, Facility Requirements and Development Alternatives, will outline the airside and landside elements necessary to meet the aviation needs that have been determined in this forecasting effort. Various development alternatives to meet facility needs will also be presented.

TABLE 2K | Airport and Runway Classifications

	Runway 17-35	
	Existing	**Ultimate**
Runway Design Code (RDC)	B-II-5000	C-III-4000
Airport Critical Aircraft	B-II-2A	C-III-2B
Critical Aircraft (Typ.)	King Air 200/300/350	Bombardier Global 5000
Taxiway Design Group (TDG)	2A	2B

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

Chapter Three

Facility Requirements & Development Alternatives

CHAPTER THREE – FACILITY REQUIREMENTS & DEVELOPMENT ALTERNATIVES

As detailed in previous chapters, an airport contains both airside and landside facilities. Airside facilities consist of the runways, taxiways, approach and departure facilities, navigational aids, lighting, markings, and signage that assist in the ground movement of aircraft. Landside facilities provide the interface between air and ground transportation and include the terminal building, hangars and tiedowns, aircraft parking aprons, automobile parking, and airport support facilities.

Cost-effective, safe, efficient, and orderly development of an airport should rely more on actual demand than on a time-based forecast figure. Thus, in order to develop a plan that is demand-based, rather than time-based, a series of planning horizon milestones have been established that take into consideration the reasonable range of aviation demand projections.

It is important to consider that the actual activity at the airport may be higher or lower over time 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. It is important to plan for these milestones so that airport officials can respond to unanticipated changes in a timely fashion. As a result, these milestones provide flexibility while potentially extending this plan's useful life if aviation trends slow over the period.

The most important reason for utilizing milestones is to allow the airport to develop facilities according to needs generated by actual demand levels. The demand-based schedule provides flexibility in development, as the schedule can be slowed or expedited according to actual demand at any given time over the planning period. The resultant plan provides airport officials with a financially responsible and needs-based program.

The milestones utilized in the study are:

- Short Term: 0-5 Years
- Intermediate Term: 6-10 Years
- Long Term: 11-20+ Years

AIRSIDE FACILITY REQUIREMENTS

RUNWAY SAFETY AREAS

The FAA has established several imaginary surfaces to protect aircraft operational areas and keep them free from obstructions that could affect the safe operation of aircraft. These surfaces include the runway safety area (RSA), runway object free area (ROFA), runway obstacle free zone (ROFZ), and runway protection zone (RPZ).

It is important that the RSA, ROFA, and ROFZ remain under direct ownership of the airport sponsor to ensure that these areas remain free of obstacles and can be readily accessed by maintenance and safety personnel. The airport should also own or maintain sufficient land use control over RPZ lands to ensure these areas are free of obstacles and have compatible land uses. Alternatives to owning RPZs include maintaining positive control through avigation easements or ensuring proper zoning measures are taken to maintain compatible land use. Existing safety areas for Runway 17-35 at Center Municipal Airport (F17) are depicted on **Exhibit 3A** and described in the following sections.

Runway Safety Area (RSA)

The RSA is an established surface surrounding a runway that is designed or prepared to increase safety and decrease potential damage if an aircraft undershoots, overshoots, or makes an excursion from the runway. The RSA is centered on the runway centerline and its dimensions are based on the established runway design code (RDC). The Federal Aviation Administration (FAA) states within Advisory Circular (AC) 150/5300-13B that the RSA must be cleared and graded and cannot contain hazardous surface variations. In addition, the RSA must be drained by grading or storm sewers and must be capable of supporting snow removal and aircraft rescue and firefighting (ARFF) equipment, as well as the occasional passage of aircraft without damaging the aircraft. The RSA must remain free of obstacles, other than those considered fixed by function, such as runway lights.

The FAA has placed a higher significance on maintaining adequate RSA at all airports. The FAA established the *Runway Safety Area Program* under Order 5200.8 (effective October 1, 1999), which 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 RSAs for all runways at each airport and perform airport inspections.

Table 3A summarizes the standard RSA dimensions in the existing and ultimate conditions, as well as whether these standards are met in each scenario.

TABLE 3A | RSA Standards

	Runway 17-35	
	Existing RDC B-II-5000	Ultimate RDC C-III-4000
RSA Dimensions	300' beyond runway x 150' wide	1,000' beyond runway[1] x 500' wide
Meets Standard?	Yes	No; RSA extends beyond airport property south of Runway 35 and is obstructed by State Highway 7 and vegetation

[1] RSA length is 1,000' beyond the departure end of the runway, but only a 600' length is needed prior to the threshold

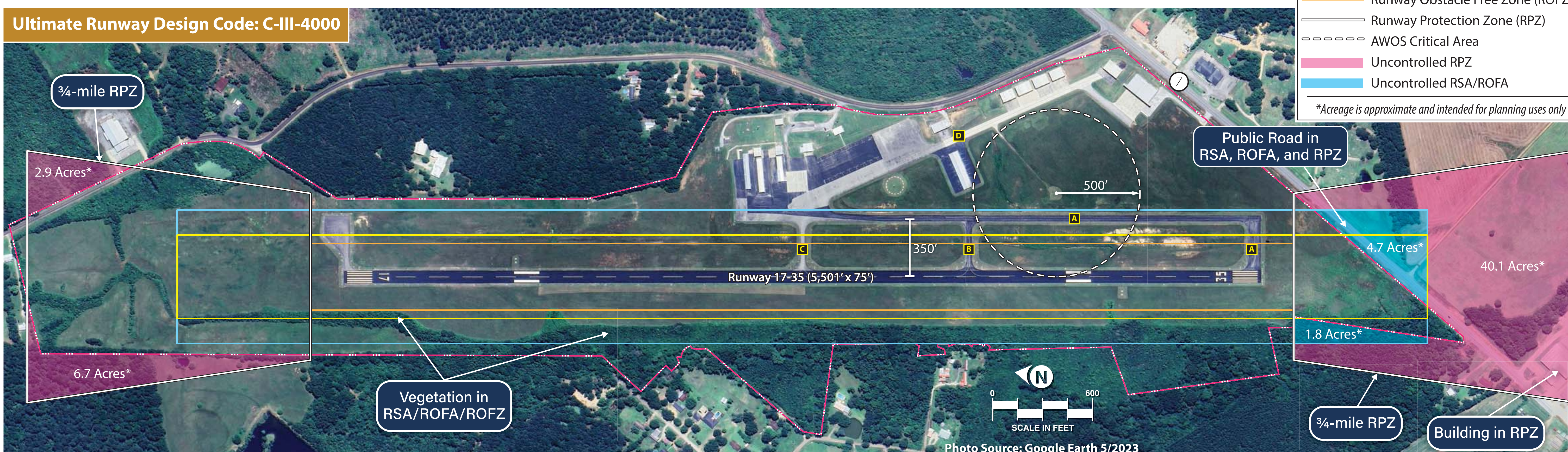
Source: FAA AC 150/5300-13B, Airport Design; Coffman Associates analysis

Runway Object Free Area (ROFA)

The ROFA can be described as a two-dimensional surface area that surrounds all airfield runways. This area must remain clear of obstructions, with the exception of those that are fixed by function, such as runway lighting systems. This safety area does not have to be level or graded like the RSA; however, the ROFA must be clear of any penetrations of the lateral elevation of the RSA. Like the RSA, the ROFA is centered on the runway centerline and its size is determined based on the established RDC.

Existing Runway Design Code: B-II-5000

Ultimate Runway Design Code: C-III-4000



LEGEND

- Airport Property Line
- Taxiway Designation
- Runway Safety Area (RSA)
- Runway Object Free Area (ROFA)
- Runway Obstacle Free Zone (ROFZ)
- Runway Protection Zone (RPZ)
- AWOS Critical Area
- Uncontrolled RPZ
- Uncontrolled RSA/ROFA

**Acreage is approximate and intended for planning uses only*

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Table 3B summarizes the standard ROFA dimensions in the existing and ultimate conditions, as well as whether these standards are met in each scenario.

TABLE 3B | ROFA Standards

	Runway 17-35	
	Existing RDC B-II-5000	Ultimate RDC C-III-4000
ROFA Dimensions	300' beyond runway x 500' wide	1,000' beyond runway[1] x 800' wide
Meets Standard?	No; ROFA contains vegetation	No; ROFA extends beyond airport property south of Runway 35 and is obstructed by State Highway 7 and vegetation

[1] RSA length is 1,000' beyond the departure end of the runway, but only a 600' length is needed prior to the threshold

Source: FAA AC 150/5300-13B, Airport Design; Coffman Associates analysis

Obstacle Free Zones (OFZ)

The runway obstacle free zone (ROFZ) can be defined as a portion of airspace centered about the runway, and its elevation at any point is equal to the elevation of the closest point on the runway centerline. The function of the ROFZ is to ensure the safety of aircraft conducting operations by preventing object penetrations to this portion of airspace, including penetrations by taxiing and parked aircraft. Any obstructions within this portion of airspace must be mounted on frangible couplings and be fixed in their positions by function.

Table 3C summarizes the standard ROFZ dimensions in the existing and ultimate conditions, as well as whether these standards are met in each scenario.

TABLE 3C | ROFZ Standards

	Runway 17-35	
	Existing RDC B-II-5000	Ultimate RDC C-III-4000
ROFZ Dimensions	200' beyond runway x 400' wide	200' beyond runway x 400' wide
Meets Standard?	No; ROFZ contains vegetation	No; ROFZ contains vegetation

Sources: FAA AC 150/5300-13B, Airport Design; Coffman Associates analysis

Runway Protection Zone (RPZ)

An RPZ is a trapezoidal area centered on the extended runway centerline beginning 200 feet from the end of the runway. This safety area has been established to protect the end of the runway from airspace penetrations and incompatible land uses. The RPZ dimensions are based on the established RDC and the approach visibility minimums serving the runway. While the RPZ is intended to be clear of incompatible objects or land uses, some uses are permitted with conditions and other land uses are prohibited. According to AC 150/5300-13B, the following land uses are permissible within the RPZ:

- Farming that meets the minimum buffer requirements
- Irrigation channels, as long as they do not attract birds
- Airport service roads, as long as they are not public roads and are directly controlled by the airport operator

- Underground facilities, as long as they meet other design criteria, such as RSA requirements, as applicable
- Unstaffed navigational aids (NAVAIDs) and facilities required for airport equipment 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 recognizes that land ownership, environmental, geographical, and other considerations can complicate land use compatibility within RPZs. Regardless, airport sponsors must comply with FAA grant assurances, including (but not limited to) Grant Assurance 21, *Compatible Land Use*. Sponsors are expected to take appropriate measures to "protect against, remove, or mitigate land uses that introduce incompatible development within RPZs." For a proposed project that would shift an RPZ into an area with existing incompatible land uses, such as a runway extension or the 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, agreements with property owners on land uses, easements, or other such measures. These efforts should be revisited during master plan or airport layout plan (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 and adopt a strong public stance opposing the incompatible land uses.

For new incompatible land uses that result from a sponsor-proposed action (e.g., an airfield project such as a runway extension, a change in the critical aircraft that increases the RPZ dimension, or lower minimums that increase the RPZ dimension), the airport sponsor is expected to conduct an alternatives evaluation. The intent of the alternatives evaluation is to "proactively identify a full range of alternatives and prepare a sufficient evaluation to be able to draw a conclusion about what is 'appropriate and reasonable.'" For incompatible development off-airport, the sponsor should coordinate with the FAA Airports District Office (ADO) as soon as the sponsor learns of the development, and the alternatives evaluation should be 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/or 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, etc.)
    - 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
- Practicability assessment based on the feasibility of the alternative in terms of cost, constructability, operational impacts, and other factors

Once the alternatives evaluation has been submitted to the ADO, the FAA will determine whether the sponsor has made an adequate effort to pursue and fully consider 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 shifts the responsibility of protecting the RPZ to the airport sponsor. The airport sponsor is expected to take action to control the RPZ or demonstrate that appropriate actions have been taken. It is ultimately up to the airport sponsor to permit or disallow existing or new incompatible land uses within an RPZ, with the understanding that the sponsor still has 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.

RPZs include both approach and departure RPZs. The approach RPZ is a function of the aircraft approach category (AAC) and approach visibility minimums associated with the approach runway end. The departure RPZ is a function of the AAC and departure procedures associated with 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 the airport sponsor should pursue. None of the runways at Center Municipal Airport have displaced thresholds, so the approach and departure RPZs on each runway occur in the same location 200 feet from the end of each runway. For planning purposes, the approach RPZ was used to create the most restrictive condition. The existing RPZs at Center Municipal Airport are presented on **Exhibit 3A** and detailed further in **Table 3D**.

TABLE 3D | Runway Protection Zones (RPZ) Summary

Runway	Visibility Minimums	RPZ Dimensions	Uncontrolled RPZ	Notes/Potential Incompatibilities
EXISTING RDC B-II-5000				
Runway 17	1-mile	• 1,000' length • 500' inner width • 700' outer width	Fully controlled	No incompatibilities
Runway 35	1-mile	• 1,000' length • 500' inner width • 700' outer width	5.9 acres	Approximately 5.9 acres within the existing Runway 35 RPZ are uncontrolled. The RPZ also traverses public roadways (State Highway 7).
ULTIMATE RDC C-III-4000				
Runway 17	¾-mile	• 1,700' length • 1,000' inner width • 1,510' outer width	9.6 acres	Approximately 9.6 acres within the ultimate Runway 17 RPZ are uncontrolled.
Runway 35	¾-mile	• 1,700' length • 1,000' inner width • 1,510' outer width	40.1 acres	Approximately 40.1 acres within the ultimate Runway 35 RPZ are uncontrolled. The RPZ also traverses public roadways (State Highway 7) and contains buildings.
Note: Acreages are approximate				

Source: Coffman Associates analysis

RUNWAY ORIENTATION

A runway's designation is based on its magnetic headings, which are determined by the magnetic declination for the area. The magnetic declination in the area of Center Municipal Airport is 1° 4'E. Runway 17-35 has a true heading of 171°/351°. Adjusting for the magnetic declination, the current magnetic heading of the runway is 170°/350°; thus, the current runway designation should be maintained.

FAA AC 150/5300-13B, *Airport Design*, recommends that a crosswind runway be made available when the primary runway orientation provides for less than 95 percent wind coverage for specific crosswind components. The 95 percent wind coverage is computed on the basis of not exceeding a 10.5-knot component for A-I and B-I aircraft; a 13-knot component for A-II and B-II; a 16-knot component for A-III, B-III, C-I through C-III, and D-I through D-III; and a 20-knot component for A-IV through E-VI.

Exhibit 1C, presented previously, details the associated wind coverage. In both all-weather and instrument flight rules (IFR) conditions, Runway 17-35 provides for greater than 98 percent coverage in all crosswind conditions. Based on this information, a crosswind runway at Center Municipal Airport is not eligible or justified for federal funding assistance and will not be considered as part of this study.

RUNWAY LENGTH

AC 150/5325-4B, *Runway Length Requirements for Airport Design*, provides guidance for determining runway length needs. The determination of runway length requirements for the airport is based on five primary factors:

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

The mean maximum daily temperature of the hottest month for Center Municipal Airport is 94.5 degrees Fahrenheit (°F), which occurs in August. The airport elevation is 318.6 feet mean sea level (MSL). Runway 17-35 has a longitudinal gradient of 0.50 percent.

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

General Aviation Aircraft

Most operations occurring at Center Municipal Airport are conducted using smaller general aviation (GA) aircraft that weigh less than 12,500 pounds. FAA AC 150/5325-4B, *Runway Length Requirements for Airport Design*, recommends that airports be designed to serve at least 95 percent of small airplanes. The advisory circular further defines the fleet categories as follows:

- **95 Percent of Small Airplane Fleet:** This category applies to airports that are primarily intended to serve medium-population communities, with a diversity of usage and a greater potential for increased aviation activities. This category also includes airports that are primarily intended to serve low-activity locations, small-population communities, and remote recreational areas.

- **100 Percent of Small Airplane Fleet:** This type of airport is primarily intended to serve communities located on the fringes of metropolitan areas or relatively large communities that are remote from metropolitan areas.

Center Municipal Airport is also utilized by aircraft that weigh more than 12,500 pounds, including small- to medium-sized business jet aircraft. Runway length requirements for business jets that weigh less than 60,000 pounds have also been calculated. These calculations take into consideration the runway gradient and landing length requirements for contaminated runways (wet). Business jets tend to need greater runway length when landing on wet surfaces because of their increased approach speeds. AC 150/5325-4B stipulates that runway length determination for business jets must consider a grouping of airplanes with similar operating characteristics. The AC provides separate family groupings of airplanes, each of which is based on its representative percentage of aircraft in the national fleet. The first grouping is those business jets that comprise 75 percent of the national fleet, and the second grouping is those that comprise 100 percent of the national fleet. **Table 3E** presents a partial list of common aircraft in each aircraft grouping. A third grouping considers business jets that weigh more than 60,000 pounds. Runway length determination for these aircraft must be based on the performance characteristics of the individual aircraft.

Table 3F summarizes the recommended runway lengths for different aircraft types that utilize F17. It should be noted that utilization of the 90 percent category for runway length determination for large airplanes that weigh less than 60,000 pounds is generally not considered by the FAA unless there is a demonstrated need at an airport (i.e., a business jet operator that flies out frequently with heavy loads).

TABLE 3E | Business Jet Categories for Runway Length Determination

Aircraft	MTOW (lbs.)
75 Percent of the National Fleet	
Lear 35	20,350
Lear 45	20,500
Cessna 550	14,100
Cessna 560XL	20,000
Cessna 650 (VII)	22,000
IAI Westwind	23,500
Beechjet 400	15,800
Falcon 50	18,500
75-100 Percent of the National Fleet	
Lear 55	21,500
Lear 60	23,500
Hawker 800XP	28,000
Hawker 1000	31,000
Cessna 650 (III/IV)	22,000
Cessna 750 (X)	36,100
Challenger 604	47,600
IAI Astra	23,500
Greater than 60,000 Pounds	
Gulfstream II	65,500
Gulfstream IV	73,200
Gulfstream V	90,500
Global Express	98,000
Gulfstream 650	99,600
MTOW = maximum takeoff weight	

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

TABLE 3F | General Aviation Runway Length Recommendations

RUNWAY LENGTHS RECOMMENDED FOR AIRPORT DESIGN	
Small airplanes with fewer than 10 passenger seats	
95 percent of these small airplanes	3,200'
100 percent of these small airplanes	3,800'
Small airplanes with 10 or more passenger seats	4,300'
Large airplanes that weigh 60,000 pounds or less	
75 percent of these large airplanes at 60 percent useful load	5,500'
100 percent of these large airplanes at 60 percent useful load	5,700'
75 percent of these large airplanes at 90 percent useful load	7,100'
100 percent of these large airplanes at 90 percent useful load	9,100'

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

Another method to determine runway length requirements for aircraft at Center Municipal Airport is to examine aircraft flight planning manuals under conditions specific to the airport. The existing and ultimate critical aircraft were analyzed for takeoff length requirements at a design temperature of 94.5°F at a field elevation of 318.6 feet MSL with a 0.50 percent runway grade. **Table 3G** provides a detailed runway length analysis, as obtained from Ultranav software, which computes operational parameters for specific aircraft based on flight manual data. The analysis includes the maximum takeoff weight (MTOW) allowable and the percent useful load, from 60 percent to 100 percent.

The analysis shows that the current length of 5,501 feet available on Runway 17-35 is adequate for each of the aircraft analyzed, up to 90 percent useful load. The ultimate critical aircraft, the Bombardier Global 5000, becomes weight-restricted at 90 percent and greater useful load.

TABLE 3G | Business Aircraft Takeoff Length Requirements

		TAKEOFF LENGTH REQUIREMENTS (FEET)				
		Useful Load				
Aircraft Name	MTOW	60%	70%	80%	90%	100%
King Air 200	12,500	3,373	3,479	3,588	3,703	3,823
King Air 350	15,000	3,410	3,552	3,708	3,954	4,265
Global 5000	92,500	4,281	4,754	5,250	5,769	6,310

Green figures are less than or equal to the longest runway length available at Center Municipal Airport; orange figures are greater than that length (5,501')
MTOW = maximum takeoff weight

Source: Ultranav software

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

TABLE 3H | Turbine Aircraft Landing Length Requirements

		LANDING LENGTH REQUIREMENTS (FEET)					
		Dry Runway Condition			Wet Runway Condition		
Aircraft Name	MLW	Part 91	80% Rule	60% Rule	Part 91	80% Rule	60% Rule
King Air 200	12,500	2,199	2,749	3,665	No Data	No Data	No Data
King Air 350	15,000	2,819	3,524	4,698	3,241	4,051	5,402
Global 5000	78,600	2,686	3,358	4,477	3,089	3,861	5,148

Green figures are less than or equal to the longest runway length available at Center Municipal Airport; orange figures are greater than that length (5,501')
MLW = maximum landing weight

Source: Ultranav software

The landing length analysis shows that all operations can land on the available runway length at Center Municipal Airport during dry runway conditions. During wet or contaminated runway conditions, the King Air 350 and the Global 5000 are capable of landing under each operational category. Landing data for wet runway conditions were not available for the King Air 200.

Runway Length Summary

Many factors are considered when determining appropriate runway length for safe and efficient operations of aircraft at Center Municipal Airport. The airport should strive to accommodate business jets and turboprop aircraft to the greatest extent possible, as demand dictates. At 5,501 feet long, Runway 17-35 can accommodate many of these aircraft under moderate loading conditions, even during hot temperatures and at high percentage useful loads. Some aircraft, including the ultimate critical aircraft, have runway length requirements that exceed the available length on Runway 17-35 when operating near MTOW.

Justification for any runway extension to meet the needs of turbine aircraft would require regular use (500 annual itinerant operations), which is the minimum threshold required to obtain FAA grant funding assistance. The existing critical aircraft, the King Air 200/300/350, can operate at 100 percent useful load. The ultimate critical aircraft, the Global 5000, requires a longer runway than what is currently available when operating at 90 percent and greater useful loads. When considering the FAA's aircraft groupings, 5,500 feet is the recommended runway length to accommodate 75 percent of large aircraft under 60,000 pounds at 60 percent useful load, while 5,700 feet is the recommended length to accommodate 100 percent of these aircraft at 60 percent useful load. While the current runway length is capable of serving many of the business jets that currently and are anticipated to operate at F17, it is important to plan for the potential for increased usage by larger aircraft, including those in categories C and D. As such, alternatives in the next section will evaluate options for extending Runway 17-35 up to 6,000 feet, which could better accommodate larger aircraft while providing an added safety margin for current operators, such as the Global 5000.

RUNWAY WIDTH

Runway width design standards are based primarily on the airport's critical aircraft but can also be influenced by the visibility minimums of published instrument approach procedures. At 75 feet wide, Runway 17-35 meets existing B-II-5000 design standards; however, the width standard increases to 100 feet wide in the ultimate C-III-4000 condition. Consideration should be given to widening Runway 17-35 to 100 feet if/when C-III is achieved (i.e., 500 or more annual operations by aircraft within the C-III family).

RUNWAY PAVEMENT STRENGTH

Airport pavements must be able to withstand repeated operations by aircraft of significant weight; therefore, the strength rating of a runway is an important consideration in facility planning. While each runway is assigned a specific strength rating, aircraft that weigh more than the published strength rating are not precluded from using the runway. All federally obligated airports must remain open to the public, and it is typically up to the pilot of an aircraft to determine if a runway can support the aircraft safely.

An airport sponsor cannot restrict an aircraft from using the runway simply because its weight exceeds the published strength rating. On the other hand, the airport sponsor has an obligation to properly maintain the runway and protect its useful life (typically for 20 years). According to the FAA publication *Airport/Facility Directory*, "Runway strength rating is not intended as a maximum allowable weight or as an operating limitation. Many airport pavements are capable of supporting limited operations with gross weights in excess of the published figures." The directory also states that aircraft that exceed an airport's pavement strength rating should contact the airport sponsor for permission to operate at the airport.

The current runway strength rating on Runway 17-35 is reported to be 30,000 pounds single wheel loading (S), which is adequate to accommodate the majority of aircraft that currently operate at the airport. The airport is also used by larger, heavier aircraft that have MTOWs greater than 30,000 pounds, including the Bombardier Global 5000, which serves as the representative aircraft for ultimate C-III design standards. This aircraft, which is currently based at F17, has an MTOW of 92,500 pounds on a dual main gear (D) configuration. As such, consideration should be given to strengthening the primary runway to 100,000 pounds D by the long term to better accommodate heavier aircraft.

SEPARATION STANDARDS

Runway/Taxiway Separation

The design standard for the separation between runways and parallel taxiways is a function of the critical aircraft and the instrument approach visibility minimum. The separation standard for Runway 17-35 in the existing RDC B-II-5000 condition is 240 feet from the runway centerline to the parallel taxiway centerline. Partial parallel Taxiway A is separated from the runway by 350 feet, meeting the standard in the existing condition. In the ultimate C-III-4000 condition, the separation standard increases to 400 feet from the primary runway centerline to a parallel taxiway centerline. The alternatives in the next section will examine options to ensure the standard runway-to-taxiway separation is met if/when the runway transitions to a C-III design.

Holding Position Separation

Holding position markings are placed on taxiways leading to runways. When approaching the runway, pilots should stop short of the holding position marking line. FAA design standards call for hold lines to be 200 feet from the runway centerline for B-II runways with approach minimums no lower than ¾-mile, and 250 feet from the runway centerline for C-III runways with approach minimums no lower than ¾-mile. The FAA also recommends that hold lines be parallel with the runway so that a pilot is fully perpendicular to the runway with a clear, unobstructed view of the entire runway length. If a 90-degree intersection with the runway is not practicable, a +/- 15-degree margin is allowable. At Center Municipal Airport, all hold lines leading to Runway 17-35 are 250 feet from the runway centerline and are perpendicular to the runway, meeting FAA design standards.

Aircraft Parking Area Separation

According to FAA AC 150/5300-13B, aircraft parking positions should be located to ensure that aircraft components (wings, tail, and fuselage) do not:

1. Conflict with the object free area for the adjacent runway or taxiways:
    a. Runway object free area (ROFA)
    b. Taxiway object free area (TOFA)
    c. Taxilane object free area (TLOFA)
2. Violate any of the following aeronautical surfaces and areas:
    a. Runway approach or departure surface
    b. Runway visibility zone (RVZ)
    c. Runway obstacle free zone (ROFZ)
    d. Navigational aid equipment critical areas

There are 16 marked aircraft parking positions at Center Municipal Airport, located near the terminal building. In their existing location, the row of tiedowns on the west side of the apron obstructs the existing and ultimate ADG III TLOFA, which is 158 feet wide, centered on the extended centerline of the taxilane (to be described in greater detail in the next section). Consideration should be given to removing or relocating these tiedowns so parked aircraft do not obstruct the TLOFA. There are no conflicts with any of the other areas described above.

TAXIWAYS

The design standards associated with taxiways are determined by the taxiway design group (TDG) or the ADG of the critical design aircraft. As determined previously, the applicable ADG for Runway 17-35 at Center Municipal Airport is ADG II at present, with an anticipated shift to ADG III in the ultimate condition. **Table 3J** presents the various taxiway design standards related to ADG II and III. The table also shows those taxiway design standards related to TDG. The TDG standards are based on the main gear width (MGW) and cockpit to main gear (CMG) distance of the critical design aircraft expected to use those taxiways. Different taxiway and taxilane pavements can and should be planned to the most appropriate TDG design standards, based on usage.

The existing/ultimate design for taxiways at the airport is TDG 2A/2B, based on the Beechcraft King Air 200/300/350 (existing critical aircraft) and the Bombardier Global 5000 (ultimate critical aircraft). Both TDG 2A and 2B standards dictate a taxiway/taxilane width of 35 feet. The entire taxiway system at Center Municipal Airport is at least 35 feet wide. Certain portions of the landside area that are utilized exclusively by small aircraft, such as the T-hangar areas, should adhere to TDG 1A/1B standards.

All taxiway widths on the airfield should be maintained, unless financial constraints dictate that taxiways that exceed 35 feet be narrowed to meet the standard. As such, the current widths could remain until rehabilitation is needed and the cost-benefit of maintain the additional width is evaluated. FAA grant availability can only be provided if the project meets eligibility thresholds, as determined by the FAA.

TABLE 3J | Taxiway Dimensions and Standards

STANDARDS BASED ON WINGSPAN	ADG II	ADG III
Taxiway and Taxilane Protection		
Taxiway Safety Area width (TSA)	79'	118'
Taxiway Object Free Area width (TOFA)	124'	171'
Taxilane Object Free Area width (TLOFA)	110'	158'
Taxiway and Taxilane Separation		
Taxiway Centerline to Parallel Taxiway Centerline	101.5'	144.5'
Taxiway Centerline to Fixed or Moveable Object	62'	85.5'
Taxilane Centerline to Parallel Taxilane Centerline	94.5'	138'
Taxilane Centerline to Fixed or Moveable Object	55'	79'
Wingtip Clearance		
Taxiway Wingtip Clearance (feet)	22.5'	26.5'
Taxilane Wingtip Clearance (feet)	15.5'	20'
STANDARDS BASED ON TDG	**TDG 1A/1B**	**TDG 2A/2B**
Taxiway Width Standard	25'	35'
Taxiway Edge Safety Margin	5'	7.5'
Taxiway Shoulder Width	10'	15'

ADG = airplane design group
TDG = taxiway design group

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

As illustrated on **Exhibit 3B**, the standard TOFA for taxiways in the existing B-II condition is 124 feet wide, increasing to 171 feet wide when the airport transitions to C-III. The TLOFA width varies, depending on the type(s) of aircraft using the taxilane. Both the TOFA and the TLOFA should be cleared of objects, except those needed for air navigation or aircraft ground maneuvering purposes. At Center Municipal Airport, the existing ADG II and ultimate ADG III TOFA associated with Taxiways A, B, and C are clear of obstructions. The pavement that has previously been identified as Taxiway D should be designated as a taxilane, per the FAA's distinction between taxiways and taxilanes. As this pavement is utilized by aircraft categorized within ADG III, an ADG III TLOFA would apply. The standard width of the ADG III TLOFA is 158 feet wide, centered on the taxilane. As described previously, the western tiedowns are located within the TLOFA, and aircraft parked on these locations would obstruct this safety area. Additionally, the T-hangar south of the terminal building obstructs the standard ADG III TLOFA. However, according to FAA AC 150/5300-13B, Change 1, the TLOFA may be calculated based on a specific aircraft. Using the FAA's methodology, the TLOFA for the Global 5000 (ultimate C-III critical aircraft at F17) is established at 134 feet wide, based on this aircraft's wingspan and the FAA's lateral deviation and safety buffer standards. At this width, the main taxilane's (currently identified as Taxiway D) TLOFA is clear of penetrations.

There are also potential TLOFA penetrations in the T-hangar area on the north side. The standard TLOFA width for ADG I, which would apply to this area, is 79 feet. As seen on **Exhibit 3B**, the separation between two of the T-hangar rows is 47 feet, narrowing to 36 feet between the T-hangar and box hangar on the east side. While this separation does not meet the ADG I standard, taxilanes can be designed based on the type(s) of aircraft using that pavement, with the TLOFA dimensions based on the largest wingspan of the aircraft based in these hangars. Using the FAA's calculation for reduction of taxiway/taxilane standards and factoring in the separation between the T-hangars, only aircraft with wingspans of 17 feet or less should plan to base in these hangars in order to maintain a clear TLOFA.

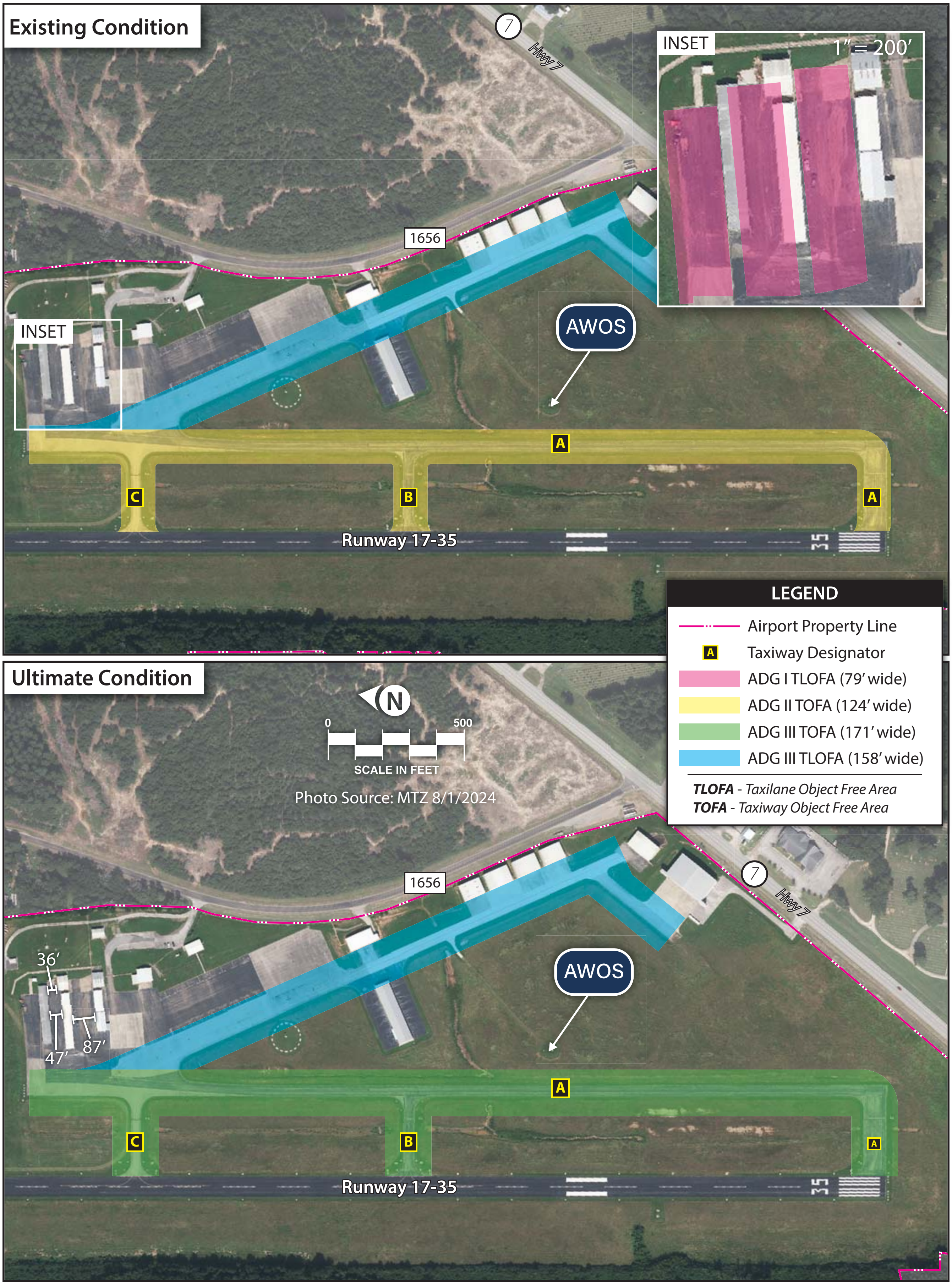

Exhibit 3B
TAXIWAY AND TAXILANE SAFETY AREAS

Taxiway and Taxilane 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 of an aircraft, vehicle, or person on the protected area of a surface designated for the landing and takeoff of aircraft." The following is a list of the taxiway design guidelines and the basic rationale behind each recommendation included in the current AC, as well as previous FAA safety and design recommendations.

1. **Taxiing Method**: Taxiways are designed for cockpit-over-centerline taxiing, with pavement that is 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, existing intersections should be upgraded to eliminate judgmental oversteering," which is when a pilot must intentionally steer the cockpit outside the marked centerline to ensure the aircraft remains on the taxiway pavement.

2. **Curve Design**: Taxiways should be designed so that the nose gear steering angle is no more than 50 degrees, which is the generally accepted value to prevent excessive tire scrubbing.

3. **Three-Path Concept**: To maintain pilot situational awareness, taxiway intersections should provide a pilot with a maximum of three choices of travel. Ideally, these are right, left, and a continuation straight ahead.

4. **Channelized Taxiing**: To support visibility of airfield signage, taxiway intersections should be designed to meet standard taxiway width and fillet geometry.

5. **Designated Hot Spots and Runway Incursion Mitigation (RIM) Locations**: A hot spot is a location on the airfield with elevated risk of a collision or runway incursion. For areas the FAA designates as hot spots or RIM locations, mitigation measures should be prioritized.

6. **Intersection Angles**: Turns should be designed to be 90 degrees, wherever possible. For acute-angle intersections, standard angles of 30, 45, 60, 120, 135, and 150 degrees are preferred.

7. **Runway Incursions**: Taxiways should be designed to reduce the probability of runway incursions.

   - *Increase Pilot Situational Awareness*: A pilot who knows where he/she is on the airport is less likely to enter a runway improperly. Complexity leads to confusion. Taxiway systems should be kept simple using the three-path 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, direct access to a runway should be avoided.

   - *Limit Runway Crossings*: The taxiway layout can reduce the opportunity for human error. The benefits are twofold: through a simple reduction in the number of occurrences and a reduction in air traffic controller workload.

- *Avoid High-Energy Intersections*: These are intersections in the middle third of a runway. 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, between both taxiways and runways, provide the best visibility. Acute-angle runway exits provide 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.

- *Direct 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 runways 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.

8. Runway/Taxiway Intersections

    - *Right Angle*: Right-angle intersections are the standard for all runway/taxiway intersections, except where there is a need for an acute-angled 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. Right angles 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. The construction of high-speed exits is typically only justified for runways that experience regular use by jet aircraft in approach categories C and above.

    - *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.

9. **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 a manner that forces pilots to consciously make turns. Taxiways originating from aprons and forming straight lines across runways 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 lighting and marking more difficult.

- *Direct Access from Apron to Runway*: Avoid taxiway connectors that cross over a parallel taxiway and directly onto a runway. Consider a staggered taxiway layout or no-taxi island that forces pilots to make a conscious decision to turn.

- *Apron to Parallel Taxiway End*: Avoid direct connection from an apron to a parallel taxiway at the end of a runway.

The taxiway system at Center Municipal Airport generally provides for the efficient movement of aircraft, and there are no FAA-designated hot spots at the airport. However, there are several non-standard taxiway geometry conditions, as detailed on **Exhibit 3C**, including the following:

- Taxiway C provides direct access to Runway 17-35 from the apron.
- The lack of a full-length parallel taxiway results in dual-use pavement, on which pilots are required to back-taxi to depart on Runway 17.
- The holding bay serving Runway 17 is non-standard. The FAA now considers these designs to be wide expanses of pavement and has set new standards for holding bay design.
- The taxiway fillet geometry is non-standard. Taxiway fillets are areas of additional pavement designed to maintain the taxiway edge safety margin (TESM) and serve to widen taxiways at the insides of turns, which increases the safety margin for taxiing aircraft when pilots are navigating turns.

Potential solutions to these non-standard conditions will be presented in the next section. Analysis in the next chapter will also consider improvements that could be implemented on the airfield to minimize runway incursion potential, improve efficiency, and conform to FAA standards for taxiway design.

NAVIGATIONAL AND APPROACH AIDS

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

Instrument Approach Aids

Center Municipal Airport has three published instrument approach procedures (shown previously on **Exhibit 1E**). These include lateral navigation (LNAV) global positioning system (GPS) approaches to each end of Runway 17-35, as well as a non-directional beacon (NDB) approach to Runway 17. Both GPS approaches have visibility minimums not lower than 1-mile for Category A and B aircraft. Category C aircraft flying these approaches have increased minimums of 1¼-mile for Runway 17 and 1¾-mile for Runway 35. Instrument approach procedures are not available for Category D aircraft. The straight-in and circling RNAV approach to Runway 17 and the circling approach to Runway 35 are not available for nighttime use.

Consideration should be given to enhancing instrument approach capabilities at the airport, including the potential for a localizer performance with vertical guidance (LPV) approach with lower visibility minimums. No ground-based equipment is necessary to achieve a ¾-mile LPV approach; however, as mentioned in the Runway Protection Zone section, lower approach minimums can increase the size of the RPZ, resulting in additional unowned RPZ land and/or causing new incompatible land uses to be introduced. The RPZs depicted on **Exhibit 3A** show the difference between the existing 1-mile RPZs and the ultimate ¾-mile RPZs. As shown in the graphic and discussed previously, the RPZs would increase significantly in size (13.77 acres versus 48.98 acres), resulting in additional areas of uncontrolled property and the introduction of new incompatible land uses. For planning purposes, the alternatives in the next section will depict an improved instrument approach with not lower than ¾-mile minimums on Runway 17, which is the preferred runway during IFR conditions.

Visual Approach Aids

In most instances, the landing phase of any flight must be conducted in visual conditions. Electronic visual approach aids are commonly used at airports to provide pilots with visual guidance information during landings to the runway. Both runway ends at Center Municipal Airport are equipped with two-box precision approach path indicator (PAPI-2) systems, which are visual approach aids that provide pilots with an indication of being above, below, or on the correct descent glidepath. In the ultimate condition, an upgrade to PAPI-4s should be considered to better accommodate turbine aircraft, especially once these aircraft begin to operate more frequently at F17.

Runway end identification lights (REILs) are flashing lights located at the runway threshold 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 threshold and distinguish runway end lighting from other lighting on the airport and in the approach areas. Neither runway end is equipped with REILs, and consideration should be given to installing REILs on each runway.

AIRFIELD MARKING, LIGHTING, AND SIGNAGE

Runway 17-35 has non-precision markings, which is consistent with the available instrument approach capabilities of the runway system. These markings should be maintained throughout the planning period.

Runway and taxiway lighting systems serve as the primary means of navigation in reduced visibility and nighttime operations. The runway is currently equipped with medium intensity runway lighting (MIRL), a common runway lighting system that can be activated via a pilot-controlled system. This system should be maintained through the planning period. The taxiways are equipped with green taxiway centerline reflectors, and consideration should be given to upgrading these to medium intensity taxiway lighting (MITL) on all taxiways.

Airfield signage serves as another means of navigation for pilots. Airfield signage informs pilots of their location on the airport and directs them to major airport facilities, such as runways, taxiways, and aprons. Lighted location and directional signs are installed on the airfield. This system is adequate and should be maintained through the planning period.

Exhibit 3C
NON-STANDARD TAXIWAY CONDITIONS

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WEATHER FACILITIES

Center Municipal Airport is equipped with a lighted wind cone and segmented circle. The wind cone provides pilots with information about wind conditions, while the segmented circle provides traffic pattern information to pilots.

The airfield is also equipped with an automated weather observation system (AWOS-3). The AWOS transmits on-site weather condition information to pilots and should be maintained; however, consideration should be given to relocating the AWOS. As shown on **Exhibit 3A**, the AWOS has a 500-foot critical area that must be kept free of obstructions that could interfere with its sensors. While there are currently no obstructions within the AWOS critical area, its current location limits the potential for landside development on the west side of the existing taxilane. The landside alternatives will give consideration to relocating the AWOS for potential future development in this area, as well as replacing aging sensors or other equipment.

ADVANCED AIR MOBILITY

Since the turn of the decade, private companies have been developing and testing advanced air mobility (AAM) technologies. AAM is a new concept of air transportation that uses electric vertical takeoff and landing (eVTOL) aircraft to move people and cargo between places that are not easily or currently served by surface or air modes. A common example is the air taxi, in which a person or small group of people could travel within or between metropolitan areas, including airports, using small eVTOL aircraft. Development of infrastructure in support of AAM is currently underway in test cities across the country, and AAM is expected to become a key component of the nation's air transportation network.

To plan for the eventual inclusion of facilities to accommodate AAM, the FAA has developed Engineering Brief (EB) 105, *Vertiport Design*, an interim document that addresses the design of vertiports. As eVTOL aircraft have not yet received airworthiness certification and do not have established safety records, preliminary design characteristics, expected performance capabilities of eVTOL aircraft, and assumptions regarding takeoff and landing area design for these aircraft have been used to develop the design standards for AAM facilities.

eVTOL aircraft and AAM represent an emerging, yet unproven, aviation market. Testing and initial adoption are likely to occur in large metropolitan areas before expanding to mid-sized and smaller markets. Full integration of eVTOL into the national airspace system may not occur for many more years; however, it is prudent for this planning study to consider the potential for such activity at F17, using the guidelines presented in EB 105, *Vertiport Design.* The alternatives section will include options for a potential future vertiport on airport property. Electrical infrastructure would be needed at the vertiport to provide power and recharging capabilities for these aircraft. Initial estimates from manufacturers range between a 500-kilowatt (kW) to 1.0-megawatt (MW) power supply per charger.

AIRSIDE FACILITY REQUIREMENTS SUMMARY

The intent of this section has been to outline the airside facilities required to meet potential aviation demands projected for Center Municipal Airport through the long-term planning period. A summary of the airside requirements is included on **Exhibit 3D**.

	EXISTING	ULTIMATE
Runway 17-35		
Runway Design Code (RDC)	B-II-5000	C-III-4000
Dimensions	5,501' x 75'	Consider extension; Increase width to 100’
Pavement Strength	30,000 lbs S	Increase to 100,000 lbs D
Safety Areas		
RSA	Standard RSA	Consider property acquisition & mitigation of new obstructions
ROFA	Remove obstructions in ROFA	Consider property acquisition & mitigation of new obstructions
ROFZ	Remove obstructions in ROFZ	Maintain clear ROFZ
RPZ	Portion of Runway 35 RPZ uncontrolled & contains public road; consider mitigation options	Portions of both RPZs uncontrolled & contains public road; consider mitigation options
Taxiways		
Design Group	2A	2B
Parallel Taxiway	Partial-Parallel Taxiway A	Full-Length Parallel Taxiway A
Parallel Taxiway Separation from Runway	350'	400'
Widths	Minimum 35'	Maintain
Holding Position Separation	250'	Maintain
Notable Conditions	Direct Access (Taxiway C); Dual-use Pavement; Non-standard holding bay; Non-standard fillets; Potential TOFA/TLOFA penetrations	Consider corrective measures
Navigational and Weather Aids		
Instrument Approaches	LNAV GPS (17, 35); NDB (17)	Consider LPV approach with lower minimums
Weather Aids	AWOS, wind cones, segmented circle, rotating beacon	Maintain equipment; upgrade to LED; relocate AWOS
Approach Aids	PAPI-2 (17, 35)	Consider upgrade to PAPI-4; install REILs on both runways
Lighting, Marking, Signage		
Runway Lighting	MIRL	Maintain
Runway Marking	Non-precision	Maintain
Taxiway Lighting	Edge reflectors	Install MITL

KEY

AWOS - Automated Weather Observing System
D - Dual Wheel Loading
GPS - Global Positioning System
LNAV - Lateral Navigation
LPV - Localizer Performance with Vertical Guidance
MIRL - Medium Intensity Runway Lighting
MITL - Medium Intensity Taxiway Lighting
PAPI - Precision Approach Path Indicator
REIL - Runway End Identification Lights
ROFA - Runway Object Free Area
ROFZ - Runway Obstacle Free Zone
RPZ - Runway Protection Zone
RSA - Runway Safety Area
S - Single Wheel Loading
TLOFA- Taxilane Object Free Area
TOFA- Taxiway Object Free Area

Exhibit 3D
AIRFIELD FACILITY REQUIREMENTS

AIRSIDE DEVELOPMENT ALTERNATIVES

This section identifies and evaluates various airside development factors at Center Municipal Airport to meet the requirements set forth in the previous section. Airside facilities are, by nature, the focal point of an airport complex. Because of their primary role and the fact that they physically dominate airport land use, airfield facility needs are often the most critical factor in the determination of viable development options. Each functional area interrelates and affects the development potential of the others; therefore, all areas are examined individually, and then coordinated as a whole, to ensure the final plan is functional, efficient, and cost-effective. The total impact of all these factors on the airport must be evaluated to determine if the investment in Center Municipal Airport will meet the aviation needs of the City of Center and the region during and beyond the 20-year planning period.

The alternatives to follow will examine airside improvement opportunities to meet existing and ultimate airfield design standards. The primary airside planning issues to be considered in this alternatives analysis are:

- Meeting ultimate RDC C-III-4000 design standards on Runway 17-35;
- Runway extension options to better accommodate turbine operations;
- Obstruction mitigation in existing/ultimate safety areas and incompatibility analysis in existing/ ultimate RPZs;
- Property acquisition to maintain control of safety areas for the existing/ultimate condition;
- Corrective measures for non-standard taxiway geometry (direct access, dual-use pavement, non-standard holding bays, and non-standard taxiway fillets);
- Added/upgraded airfield navigation and lighting equipment; and
- New and/or improved instrument approach capability.

AIRSIDE ALTERNATIVE 1

Depicted on **Exhibit 3E**, Airside Alternative 1 considers several airfield upgrades to meet ultimate RDC C-III-4000 design standards. Primary actions proposed in this alternative include the following:

- Widen Runway 17-35 to 100 feet, in accordance with C-III standards.
- Maintain the current runway length of 5,501 feet to minimize property acquisition needs associated with increased safety area dimensions.
- Displace the Runway 35 threshold by 295 feet to achieve a standard RSA and ROFA on the south end of the runway and publish declared distances.

  As shown previously on the bottom half of **Exhibit 3A**, the increased size of the C-III safety areas results in the RSA and ROFA extending off airport property to the south and encompassing a portion of State Highway 7. FAA standards call for these safety areas to be owned by the airport and maintained free of obstructions. The RSA and ROFA can be shifted onto airport property by displacing the Runway 35 threshold by approximately 295 feet and implementing declared distances. Declared distances are used to define the effective runway length for landing and takeoff when a standard safety area cannot be achieved. The declared distances are defined by the FAA as the following:

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

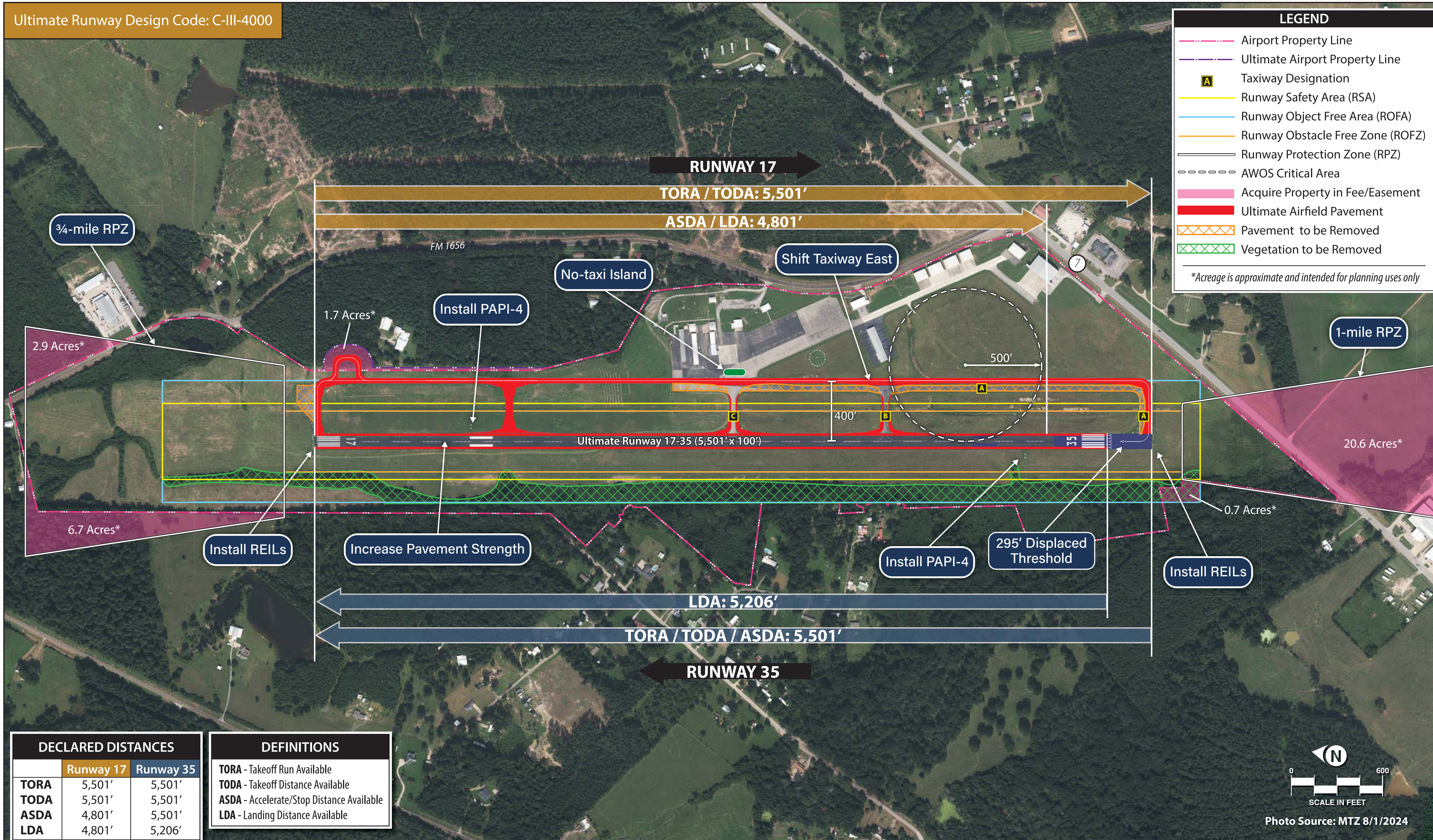
Table 3K and **Exhibit 3E** detail the runway length available for takeoff and landing operations with these declared distances in place. (Note that the TODA may be reduced further, following FAA airspace analysis.)

TABLE 3K | Declared Distances for Airside Alternative 1

	Runway 17	Runway 35
Takeoff Run Available (TORA)[1]	5,501'	5,501'
Takeoff Distance Available (TODA)[2]	5,501'	5,501'
Accelerate Stop Distance Available (ASDA)[3]	4,801'	5,501'
Landing Distance Available (LDA)[3]	4,801'	5,206'

[1]Departure RPZ begins 200 feet from the end of the TORA.
[2]TORA cannot be longer than TODA. Departure surface is set on TODA. TODA can be shortened to mitigate departure surface penetrations; if so, TORA is shortened, too.
[3]Available runway length plus RSA. Approach RPZ begins 200 feet from the landing threshold.
Source: FAA AC 150/5300-13B, Airport Design, Change 1; Coffman Associates analysis

While the impact to the airfield in terms of earthwork and construction would be minimal compared to other alternatives to be presented, the usable length of the runway would be reduced for some operations due to the implementation of declared distances. This alternative fully meets FAA design standards for mitigating RSA and ROFA deficiencies; however, the obvious drawback is a reduction in usable runway length, making it more restrictive for intended users, such as business jets. Additionally, FAA guidance states that the use of declared distances should be used as an interim practice to ensure flight safety until the airport is able to implement other improvements to the airport to meet design standards.



DECLARED DISTANCES

	Runway 17	Runway 35
TORA	5,501′	5,501′
TODA	5,501′	5,501′
ASDA	4,801′	5,501′
LDA	4,801′	5,206′

DEFINITIONS

TORA - Takeoff Run Available
TODA - Takeoff Distance Available
ASDA - Accelerate/Stop Distance Available
LDA - Landing Distance Available

Exhibit 3E
AIRSIDE ALTERNATIVE 1

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- Increase the pavement strength on Runway 17-35 to 100,000 lbs. dual wheel (D).

- Mitigate non-standard conditions in the ultimate RSA, ROFA, and ROFZ. As stated previously, these safety areas are to be owned by the airport sponsor and clear of obstructions. Factoring in the declared distances detailed above, approximately 0.7 acres of property within the ultimate ROFA are proposed to be acquired southwest of the Runway 35 threshold. Additionally, vegetation that extends along the west side of the runway is present in the RSA, ROFA, and ROFZ and is proposed to be removed.

- Improve the instrument approach capability. Currently, each runway end is equipped with an LNAV approach with 1-mile visibility minimums for Category A and B aircraft, with minimums increasing for Category C aircraft. Alternative 1 proposes lower visibility minimums to Runway 17 through the implementation of a non-precision LPV approach with minimums not lower than ¾-mile. To achieve this, the airport sponsor will need to coordinate with the FAA via the Instrument Flight Procedures (IFP) Gateway.

- Acquire property within the RPZs. Approximately 9.6 acres of property within the ultimate Runway 17 RPZ (which is larger in size due to the potential for an instrument approach with minimums not lower than ¾-mile) and 20.6 acres within the Runway 35 RPZ are proposed to be acquired, either fee simple (preferred) or protected through an avigation easement (recommended, at a minimum).

  It should be noted that a public road (FM 1656) would pass through the ultimate Runway 17 RPZ. This would also be the case if the current instrument approach procedure (i.e., LNAV approach with 1-mile minimums) were maintained, though the impact would be less than if an approach with minimums not lower than ¾-mile were implemented.

  The ultimate C-III RPZ associated with Runway 35 also contains incompatible land uses, including State Highway 7 and buildings. One option to mitigate incompatible land uses within RPZs is the use of declared distances. Previous discussion included the use of declared distances to provide sufficient safety area. If this same practice were utilized to provide for a standard RPZ off each runway end, there would be a significant reduction in available runway length. Because such an action would negatively impact the airport and its ability to serve turbine aircraft, this option is not being considered further.

- Upgrade the PAPI-2s on Runway 17-35 to PAPI-4s and install REILs at each runway end.

- Relocate Taxiway A east to allow for a 400-foot separation between Taxiway A and Runway 17-35, in accordance with C-III design standards.

- Extend Taxiway A to the Runway 17 threshold to provide a full-length parallel taxiway and eliminate the need for aircraft to back-taxi when departing Runway 17.

- Construct a standard holding bay on Taxiway A near the Runway 17 threshold. The current holding bay is an older design that does not meet the FAA's current standards. This holding bay is proposed to be removed, and a new holding bay is proposed to be constructed that includes dedicated lanes with a centerline. The TOFA associated with the proposed holding bay extends beyond the airport's property line, and approximately 1.7 acres of property would need to be acquired to protect this safety area.

- Mark apron pavement at the entrance to Taxiway C with a no-taxi island. A no-taxi island is an option to mitigate direct access from the apron to the runway. The intent of a no-taxi island is to force pilots to make a conscious turn prior to entering an active runway, thereby improving situational awareness and decreasing the risk of a runway incursion.

- Install MITL. Currently, there is no taxiway lighting at Center Municipal Airport; taxiways are identifiable in low visibility with green centerline reflectors. MITL is proposed on all existing and new taxiways to enhance safety.

AIRSIDE ALTERNATIVE 2

Airside Alternative 2, depicted on **Exhibit 3F**, illustrates a second option for meeting ultimate RDC C-III-4000 design standards, but without the use of declared distances. Proposed actions include the following:

- Reconstruct Runway 17-35, shifting the ultimate runway north and east to (1) provide a standard safety area (RSA and ROFA) on the south end without the need for declared distances, and (2) provide for a 400-foot separation between the runway and Taxiway A. The runway width is proposed to be increased to 100 feet, in accordance with C-III standards. The runway length is proposed to remain at 5,501 feet.

- Increase the pavement strength on Runway 17-35 to 100,000 lbs. D.

- Mitigate non-standard conditions in the ultimate RSA, ROFA, and ROFZ. This includes acquisition of approximately 2.0 acres of unowned property within the ultimate ROFA on the west side of the runway, as well as removal of vegetation present in the ultimate RSA, ROFA, and ROFZ.

- Improve the instrument approach capability. Like the previous alternative, an LPV GPS approach with minimums not lower than ¾-mile is proposed for Runway 17.

- Acquire property within the RPZs. Due to the shifted runway ends, a larger portion of the Runway 17 RPZ is uncontrolled and contains residential structures. Approximately 28.3 acres of property within the ultimate Runway 17 RPZ are proposed to be acquired and the residential land uses are proposed to be removed. A smaller portion of the ultimate Runway 35 RPZ is also unowned and is proposed for acquisition. Under this alternative, the Runway 35 RPZ would still traverse Highway 7 but would not contain any structures.

- Upgrade the PAPI-2s on Runway 17-35 to PAPI-4s and install REILs at each runway end.

- Extend Taxiway A to the ultimate Runway 17 threshold to provide a full-length parallel taxiway and eliminate the need for aircraft to back-taxi when departing Runway 17.

- Construct a standard holding bay on Taxiway A near the Runway 17 threshold and remove the existing holding bay and threshold connector.

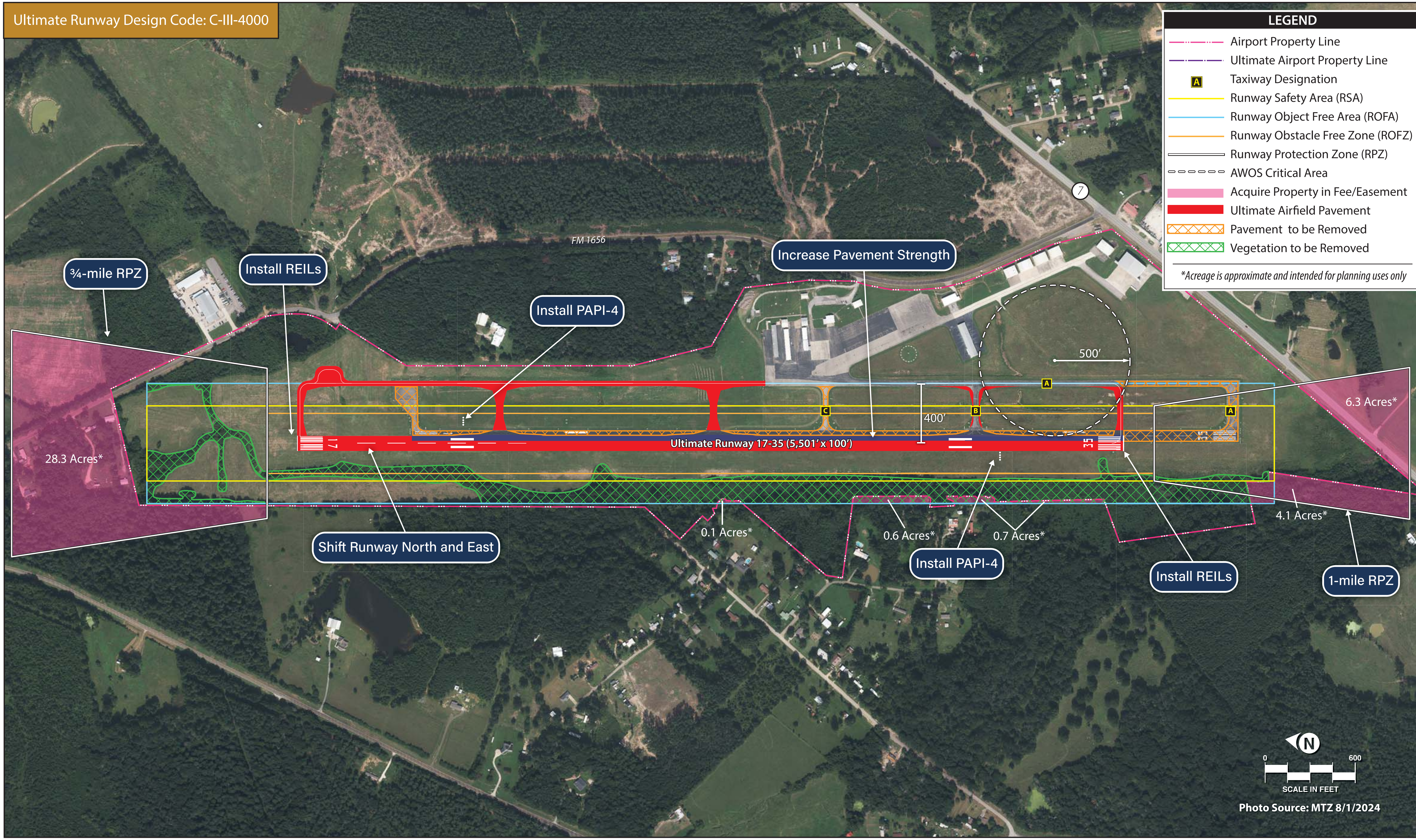

Exhibit 3F
AIRSIDE ALTERNATIVE 2

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- Remove Taxiway C and construct a new taxiway connector approximately 750 feet to the north to eliminate the direct-access condition. A second new connector is also proposed closer to the ultimate Runway 17 threshold.

- Install MITL. Currently, there is no taxiway lighting at Center Municipal Airport; taxiways are identifiable in low visibility with green centerline reflectors. MITL is proposed on all existing and new taxiways to enhance safety.

AIRSIDE ALTERNATIVE 3

Airside Alternative 3, presented on **Exhibit 3G**, illustrates a similar scenario to Alternative 2, but also considers the potential for a 6,000-foot runway, which would better accommodate turbine aircraft. The following actions are proposed under this alternative:

- Reconstruct Runway 17-35, shifting the ultimate runway north and east to (1) provide a standard safety area (RSA and ROFA) on the south end without the need for declared distances, and (2) provide for a 400-foot separation between the runway and Taxiway A. The runway width is proposed to be increased to 100 feet, in accordance with C-III standards. The runway length is proposed at 6,000 feet. At this length, 100 percent of the business jet fleet (aircraft that weigh more than 12,500 pounds but less than 60,000 pounds) could operate at 60 percent useful load, and the Global 5000 (the ultimate critical aircraft), could operate with greater than 90 percent useful load.

- Increase the pavement strength on Runway 17-35 to 100,000 lbs. D.

- Mitigate non-standard conditions in the ultimate RSA, ROFA, and ROFZ. This includes acquisition of approximately 2.0 acres of unowned property within the ultimate ROFA on the west side of the runway, as well as removal of vegetation present in the ultimate RSA, ROFA, and ROFZ.

  Due to the runway extension, the RSA and ROFA also extend beyond the airport's boundary on the north side and encompass residential structures. This area, which is approximately 4.3 acres in size, would need to be acquired fee simple and the structures would need to be removed. Further, FM 1656 passes through the ultimate ROFA, as shown on the exhibit. This condition should be avoided, and the portion of road extending from the start of the ultimate Runway 17 to FM 699 is proposed to be closed (as depicted in the exhibit) or rerouted around the ROFA.

- Improve the instrument approach capability. Like the previous alternatives, an LPV GPS approach with minimums not lower than ¾-mile is proposed for Runway 17.

- Acquire property within the RPZs. Approximately 32.6 acres of property within the ultimate Runway 17 RPZ are proposed to be acquired and the residential land uses are proposed to be removed. A portion of the ultimate Runway 35 RPZ is also unowned and is proposed for acquisition.

- Upgrade the PAPI-2s on Runway 17-35 to PAPI-4s and install REILs at each runway end.

- Extend Taxiway A to the ultimate Runway 17 threshold to provide a full-length parallel taxiway and eliminate the need for aircraft to back-taxi when departing Runway 17.

- Construct a standard holding bay on Taxiway A near the Runway 17 threshold and remove the existing holding bay. The existing threshold connector is proposed to be preserved, with new fillet pavement constructed, in accordance with TDG 2B standards.

- Remove Taxiway C and construct a new taxiway connector approximately 930 feet to the north to eliminate the direct-access condition.

- Install MITL. Currently, there is no taxiway lighting at Center Municipal Airport; taxiways are identifiable in low visibility with green centerline reflectors. MITL is proposed on all existing and new taxiways to enhance safety.

LANDSIDE FACILITY REQUIREMENTS

Elements included within this section include general aviation terminal facilities, aircraft hangars and tiedowns, aircraft parking aprons, automobile parking, and airport support facilities.

TERMINAL BUILDING AND VEHICLE PARKING REQUIREMENTS

The terminal facilities provide space for a variety of activities and pilot services. Existing GA terminal facilities at Center Municipal Airport are contained in a 2,500-square-foot (sf) building, which houses a pilots' lounge, a flight planning office, restrooms, and a small kitchen area.

The number of itinerant passengers expected to use terminal services during the design hour are taken into consideration to estimate terminal facility needs. These requirements are based on a range of designated square feet per design hour passenger (typically between 90 and 125 sf). For this study, a planning standard of 125 sf was used to estimate the space required. To determine the number of design hour passengers, the number of itinerant design hour operations is multiplied by the number of passengers expected on the aircraft. Design hour itinerant operations have been estimated at 15 percent of the design day itinerant operations occurring at the airport. As most of the aircraft operating at the airport allow for multiple passengers, a multiplier of 2.5 was established for the short term, growing to 4.0 by the long term. This is a reasonable multiplier, as the airport regularly accommodates itinerant operations by aircraft with seating capacities of four to 10 passengers – a trend that is expected to continue throughout the planning period.

Table 3L details current and projected terminal building requirements over the planning period. In terms of size, the existing terminal facility is adequate to accommodate airport users through the long term.

Vehicle parking spaces for airport users have also been evaluated. The airport currently offers four marked parking spaces in front of the terminal, with additional unmarked parking space available in the same lot. Parking space requirements were based on estimated existing and future itinerant traffic, as well as based aircraft at the airport. Although some based aircraft owners prefer to park their vehicles in their hangars, safety can be compromised when automobile and aircraft movements are intermixed.

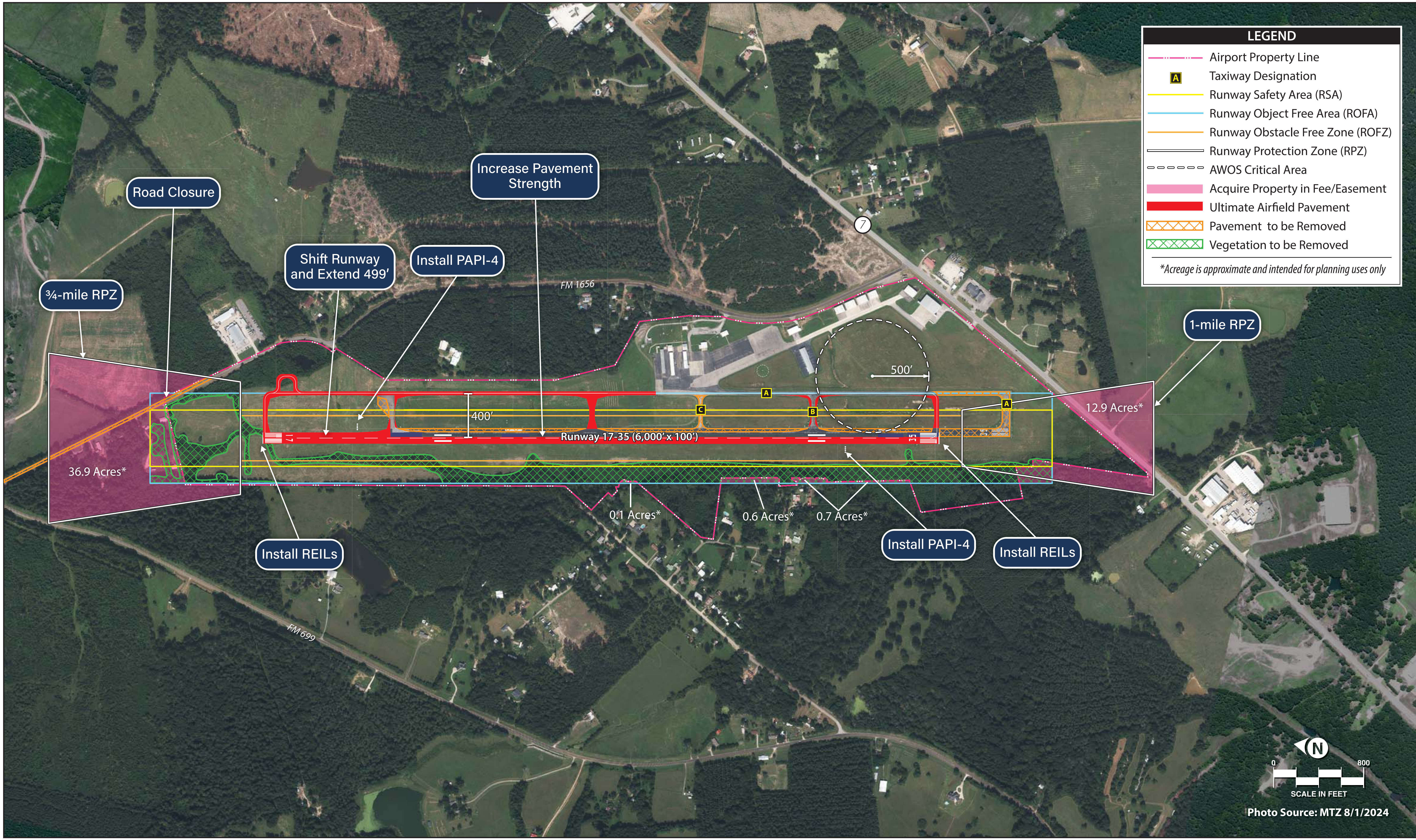

Exhibit 3G
AIRSIDE ALTERNATIVE 3

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This planning study assumes 30 percent of based aircraft will require a vehicle parking space. **Table 3L** details vehicle parking requirements for the airport. By the long term, 22 marked vehicle parking spaces are estimated to be needed to accommodate local and transient airport users.

TABLE 3L | GA Terminal Services Requirements

	Available	Short Term	Intermediate Term	Long Term
Design Hour Itinerant Operations	2	3	3	3
Multiplier	–	2.5	3.2	4.0
Design Hour Itinerant Passengers	–	7	9	12
Total Building Space (sf)	**2,500**	**900**	**1,100**	**1,500**
Vehicle Parking Spaces	**4**	**19**	**22**	**26**

Source: Coffman Associates analysis

AIRCRAFT STORAGE HANGARS AND APRON REQUIREMENTS

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 (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(s) of aircraft expected to be based at the airport in the future. For planning purposes, it is necessary to estimate hangar requirements based on forecast operational activity; however, actual hangar construction should be based on actual demand trends and financial investment conditions.

A variety of aircraft storage options are typically available at an airport, including shade hangars, T-hangars, linear box hangars, executive/box hangars, and bulk storage conventional hangars. Shade hangars are the most basic form of aircraft protection and are common in warmer climates. These structures provide a roof covering, but no walls or doors.

T-hangars are intended to accommodate individual small single-engine piston aircraft or, in some cases, individual multi-engine piston aircraft. T-hangars are so named because they are built in the shape of a "T," providing a space for the aircraft nose and wings but no space for turning the aircraft within the hangar; basically, the aircraft can be parked in only one position. T-hangars are commonly nested with several individual storage units to maximize hangar space. In these cases, taxiway 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 29 individual T-hangar units at Center Municipal Airport, or approximately 30,600 sf of T-hangar storage space.

Executive hangars are another hangar type commonly used for GA aircraft storage. These hangars provide additional storage space, usually with a footprint between 2,500 and 10,000 sf. Spaces this size allow for increased aircraft maneuverability and can provide for the storage of multiple aircraft within one such hangar. An executive hangar may also contain space for a small office. There are nine executive hangars, comprising approximately 38,600 sf of storage space, at Center Municipal Airport.

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 utilized by airport businesses, such as a fixed base operator (FBO). Center Municipal Airport has one conventional hangar, which offers approximately 16,000 sf of storage space. For planning purposes, executive and conventional hangars have been grouped together to develop an overall total for future capacity needs.

Planning for future aircraft storage needs is based on typical owner preferences and standard sizes for hangar space. For determining future aircraft storage needs, a planning standard of 1,200 sf per single-engine piston aircraft and 1,500 sf per multi-engine piston aircraft is utilized for T-hangars. For executive/conventional hangars, a planning standard of 3,000 sf is utilized for turboprop aircraft; 5,000 sf is utilized for business jet aircraft storage needs; and 1,500 sf is utilized for helicopter storage needs.

In total, there is approximately 85,200 sf of aircraft storage capacity at Center Municipal Airport. With 37 aircraft currently based at the facility and more anticipated to base at the airport by the end of the planning period, expansion of hangar facilities should be planned. **Table 3M** details the estimated hangar space requirements over the planning period. Over the long term, an additional 37,800 sf of hangar space is estimated to be needed, and more capacity will be needed for each storage type. Options to include these additional facilities will be explored in the next section. Construction of new hangars should be phased to meet existing demand and not tied to a particular date or timeframe. Construction can be undertaken by either the airport sponsor or private developer.

TABLE 3M | Aircraft Storage Requirements

	Current	Short Term	Intermediate Term	Long Term
Based Aircraft	37	39	42	48
T-Hangar Area (sf)	30,600	40,200	42,500	50,400
Executive/Conventional Hangar Area (sf)	54,600	54,600	66,600	72,600
Total Aircraft Storage (sf)	**85,200**	**94,800**	**109,100**	**123,000**

Source: Coffman Associates analysis

Parking apron and parking position requirements have also been calculated. Parking aprons should provide space for locally based aircraft that are not in storage hangars, as well as itinerant aircraft and aircraft that are used for training and air taxi operations. An industry planning standard of 650 square yards (sy) per local aircraft, 800 sy per itinerant aircraft, and 1,600 sy per large turboprop/jet aircraft was applied to determine required aircraft apron space. Aircraft parking position requirements have been calculated at five percent of based aircraft for local operations and 40 percent of busy day itinerant operations for transient GA operations. Because jet operations are anticipated to increase over the planning period, there may be demand for more turbine aircraft parking positions.

Table 3N details parking apron and position requirements over the planning period. Center Municipal Airport currently has approximately 20,500 sy of aircraft parking apron available, including 16 marked parking positions. As detailed in the table, both are sufficient through the long term.

TABLE 3N | Aircraft Apron and Parking Requirements

	Current	Short Term	Intermediate Term	Long Term
Local Aircraft Parking Positions	–	2	2	2
Transient GA Parking Positions	–	9	9	10
Corporate Jet Parking Positions	–	1	1	2
Helicopter Parking Positions	–	1	1	2
Total Aircraft Parking Positions	**16**	**13**	**13**	**16**
Total Apron Area (sy)	**20,500**	**10,700**	**10,800**	**14,100**

Source: Coffman Associates analysis

AIRCRAFT RESCUE AND FIREFIGHTING (ARFF)

Center Municipal Airport does not have an aircraft rescue and firefighting (ARFF) building or equipment located on the airfield. As a general aviation (GA) airport, the FAA does not require ARFF services to be provided. The airport is anticipated to remain a GA airport through the planning period, so on-site ARFF facilities are not planned.

AVIATION FUEL STORAGE

Fuel at Center Municipal Airport is stored in two fuel tanks: one 6,000-gallon tank for 100LL fuel and one 6,000-gallon tank for Jet A fuel. Based on historical fuel flowage records from the last three years, the airport has pumped an average of 16,832 gallons of Jet A fuel and 14,205 gallons of 100LL fuel annually. Dividing the total fuel flowage by the total number of operations provides a ratio of fuel flowage per operation. Between 2021 and 2023, the airport pumped approximately 1.15 gallons of Jet A fuel per turbine operation and 1.36 gallons of 100LL fuel per piston operation.

Maintaining a 14-day fuel supply would allow the airport to limit the impact of a disruption of fuel delivery. The airport currently has enough static fuel storage to meet the 14-day supply criteria for both Jet A and 100LL fuel. Based on these usage assumptions and projected design day operations, no additional storage for either fuel type is projected to be needed; however, consideration should be given to replacing the fuel tanks due to their age (30+ years), as well as potentially relocating them closer to the apron. **Table 3P** summarizes the forecasted fuel storage requirements through the planning period.

TABLE 3P | Fuel Storage Requirements

	Available	Current Need*	PLANNING HORIZON		
			Short Term	Intermediate Term	Long Term
Jet A					
14-Day Supply (gal.)	6,000	643	707	740	820
Annual Usage (gal.)	–	16,700	18,400	19,200	21,300
100LL					
14-Day Supply (gal.)	6,000	762	838	876	972
Annual Usage (gal.)	–	19,800	21,800	22,800	25,300

*Current need reflects average of last three years' fuel flowage.

Sources: Historical fuel flowage data provided by the airport; fuel supply projections prepared by Coffman Associates

Planning should also consider an additional tank to store unleaded aviation fuel (100UL). The FAA has recently approved the use of 100UL fuel in piston-powered aircraft, although unknowns regarding infrastructure and distribution remain; nevertheless, the alternatives will include placeholders for these facilities.

UTILITIES

The availability and capacity of the utilities serving the airport are important factors in determining the development potential of the airport property, as well as the land immediately adjacent to the facility. Ultimately, the availability of water, gas, sewer, and power sources are of primary concern when assessing available utilities. Given the forecast potential for future landside facility growth, the utility infrastructure serving the airport may need to be expanded to serve future development.

PERIMETER FENCING AND GATES

Perimeter fencing is used at airports primarily to secure the aircraft operational area and reduce wildlife incursions. The physical barrier of perimeter fencing:

- Gives notice of the legal boundary of the outermost limits of a facility or security-sensitive area;
- Assists in controlling and screening authorized entries into a secured area by deterring entry elsewhere along the boundary;
- Supports surveillance, detection, assessment, and other security functions by providing a zone for installing intrusion-detection equipment and closed-circuit television (CCTV);
- Deters casual intruders from penetrating a secured area by presenting a barrier that requires an overt action to enter;
- Demonstrates the intent of an intruder by their overt action of gaining entry;
- Causes a delay to obtain access to a facility, thereby increasing the possibility of detection;
- Creates a psychological deterrent;
- Optimizes the use of security personnel, while enhancing the capabilities for detection and apprehension of unauthorized individuals;
- Demonstrates a corporate concern for facility security; and
- Limits inadvertent access to the aircraft operations area by wildlife.

Center Municipal Airport is partially enclosed by fencing, with two motorized gates and one pedestrian gate providing access to the airfield along the fenced area. All existing fencing and gates should be maintained throughout the planning period. While GA airports are not required to be enclosed, consideration should be given to installing additional fencing to fully protect airport property, if feasible.

LANDSIDE FACILITY REQUIREMENTS SUMMARY

A summary of the landside facilities projected to be needed at Center Municipal Airport is presented on **Exhibit 3H**. Approximately 37,800 square feet of additional hangar space may be needed over the next 20 years, as well as additional terminal and tenant vehicle parking.

LANDSIDE DEVELOPMENT ALTERNATIVES

Generally, landside issues are related to those facilities necessary or desired for the safe and efficient parking and storage of aircraft, movement of pilots and passengers to and from aircraft, and overall revenue support functions, including airport support facilities. To maximize airport efficiency, it is

	Available	Short Term	Intermediate Term	Long Term
Aircraft Storage Hangar Requirements				
T-Hangar Area (sf)	30,600	40,200	42,500	50,400
Executive/Conventional Hangar Area (sf)	54,600	54,600	66,600	72,600
Total Hangar Storage Area (sf)	85,200	94,800	109,100	123,000
Aircraft Parking Apron				
Aircraft Parking Positions	16	13	13	16
Total Public Apron Area (sy)	20,500	10,700	10,800	14,100
General Aviation Terminal Facilities and Parking				
Building Space (sf)	2,500	900	1,100	1,500
Terminal and Tenant Marked Vehicle Parking	4	19	22	26
Support Facilities				
14-Day Fuel Storage - 100LL (gal)	6,000	838	876	972
14-Day Fuel Storage - Jet A (gal)	6,000	707	740	820

Exhibit 3H
LANDSIDE FACILITY REQUIREMENTS

important to locate facilities together when they are intended to serve similar functions. The best approach to landside facility planning is to consider the development like a community, for which land use planning is the guide. For airports, the land use guidance in the terminal area should generally be dictated by aviation activity levels. Consideration will also be given to non-aviation uses that can provide additional revenue support to the airport and support economic development for the region.

LANDSIDE ALTERNATIVE 1

Depicted on **Exhibit 3J**, Landside Alternative 1 focuses primarily on expansion of aircraft storage facilities, with most proposed development located near the existing AWOS site. Consideration has also been given to the construction of a vehicle access road and dedicated parking for tenants to segregate vehicle and aircraft movements as much as possible.

A 25-foot building restriction line (BRL) based on the airport's existing and ultimate instrument approach capability is also shown. The BRL is the product of Title 14 Code of Federal Regulations (CFR) Part 77 transitional surface clearance requirements. These requirements stipulate that no object may be located in the primary surface. For Center Municipal Airport, the primary surface is currently 500 feet wide, centered on the runway. If the airport is equipped with an instrument approach procedure with visibility minimums down to ¾-mile, the width of the primary surface increases to 1,000 feet. From the primary surface, the transitional surface extends outward at a slope of one vertical foot to every seven horizonal feet. The location of the BRL is dependent on structure height. **It should be noted that the BRL is not a standard; rather, it is a guideline to use when planning vertical infrastructure on the airport.** The FAA may require structures inside the BRL to be equipped with obstruction lights.

Landside Alternative 1 proposes the following:

1. Relocate the AWOS equipment to a new site west of the runway, approximately 1,000 feet south of the Runway 17 threshold and approximately 500 feet west of the runway centerline. This location meets the FAA's siting requirements for the AWOS but would require acquisition of approximately 8.0 acres of property and removal of trees and other vegetation that could interfere with the weather sensors.

2. Construct new executive box hangars (depicted at 75 by 75 feet) along the taxilane (identified previously as Taxiway D).

3. Construct a new hangar development area near the current AWOS. A new taxilane is proposed to extend from Taxiway A to provide access to this area from the airside. As pictured on the exhibit, two executive box hangars and one conventional hangar are proposed.

4. Construct a vehicle access road. This road is proposed to extend north from State Highway 7 and connect to the proposed box hangar area, which would include vehicle parking lots. A security gate is also proposed to limit access to authorized personnel and airport users only.

5. Construct two additional T-hangars and associated taxilanes north of the existing landside facilities.

6. Relocate the west side tiedowns located on the terminal apron outside the ultimate ADG III TLOFA, as aircraft parked in that area would be obstructions to the TLOFA.

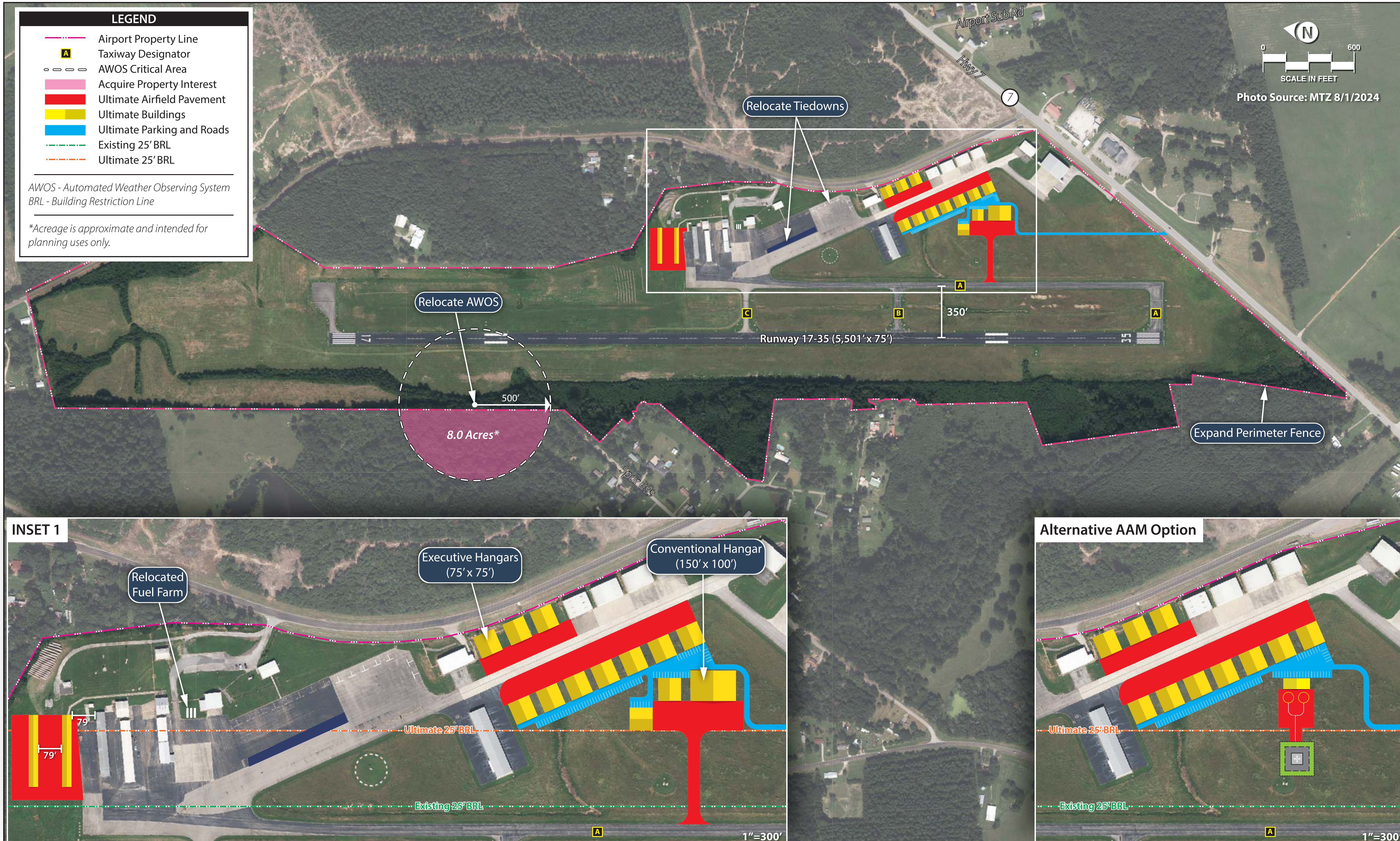

Exhibit 3J
LANDSIDE ALTERNATIVE 1

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7. Relocate the fuel farm located on the east side of airport property closer to the terminal apron. As seen on the exhibit, three new tanks are depicted on the east side of the apron, just south of the access gate. These are intended for the storage of Jet A, 100LL, and unleaded aviation fuel.

8. Consider the potential for AAM facilities at the airport. An alternate AAM option is shown in the lower right corner of the exhibit. These facilities are proposed in the current AWOS area and would include a dedicated terminal/office building for AAM users, as well as parking for eVTOL aircraft and a takeoff and landing area.

LANDSIDE ALTERNATIVE 2

Landside Alternative 2 is depicted on **Exhibit 3K**. This alternative explores the potential for property acquisition to expand the airport's footprint to allow for additional landside development to the north. Like Landside Alternative 1, a 25-foot BRL based on the airport's existing and ultimate instrument approach capability is shown.

Landside Alternative 2 proposes the following:

1. Relocate the AWOS equipment to a new site west of the runway, on the south end near the Runway 35 threshold. This location is approximately 1,200 feet down the runway and approximately 500 feet west of the runway centerline. Approximately 8.2 acres of property and removal of trees and other vegetation that could interfere with the weather sensors would be necessary.

2. Construct a new conventional hangar (depicted at 150 by 75 feet) north of the existing executive box hangars along the taxilane.

3. Construct a new hangar development area near the current AWOS. This includes two T-hangars, as well as executive box hangars, with new taxilane and apron pavement constructed.

4. Extend the taxilane to allow access to a new conventional hangar (sized at 150 by 100 feet).

5. Construct a vehicle access road to extend from the existing access road on the airport's south side. The new road would allow access to the new central hangar area. Vehicle parking is also planned.

6. On the north side, expand the existing taxilane that serves the northernmost T-hangar to provide access to two executive box hangars, as well as a new T-hangar located on the east side of airport property. This location currently contains the rotating beacon and the NDB equipment. The beacon is proposed to be relocated to a new site near the terminal building, and the NDB would be decommissioned through coordination with the FAA. NDBs are in the process of being phased out as part of the FAA's 2018 *Navigation Programs Strategy*, which calls for the gradual decommissioning of NDBs and very high frequency omnidirectional range (VOR) equipment as part of a transition to performance-based navigation.

7. Remove the west side tiedowns located on the terminal apron outside the ultimate ADG III TLOFA, as aircraft parked in that area would be obstructions to the TLOFA. Five new tiedowns are proposed on the south side of the apron.

8. Relocate the fuel farm located on the east side of airport property to the southeast corner of the terminal apron. Three new tanks are proposed for the storage of Jet A, 100LL, and unleaded aviation fuel.

9. Consider a second option for potential AAM facilities on the north side of the existing landside facilities. Like the previous alternative, the AAM facilities would include a terminal/office to accommodate users, as well as aircraft parking and a takeoff and landing area.

SUMMARY

This chapter is intended to present an outline of airside and landside facilities needed at Center Municipal Airport and potential alternatives to meet safety requirements and demand. Following review of the proposed development alternatives with the City of Center, the planning advisory committee, and the Texas Department of Transportation (TxDOT), the next step in the planning process is to arrive at a recommended development concept. Once a consolidated development plan is identified, a capital improvement program, including a list of prioritized projects tied to aviation demand and/or necessity, will be presented.

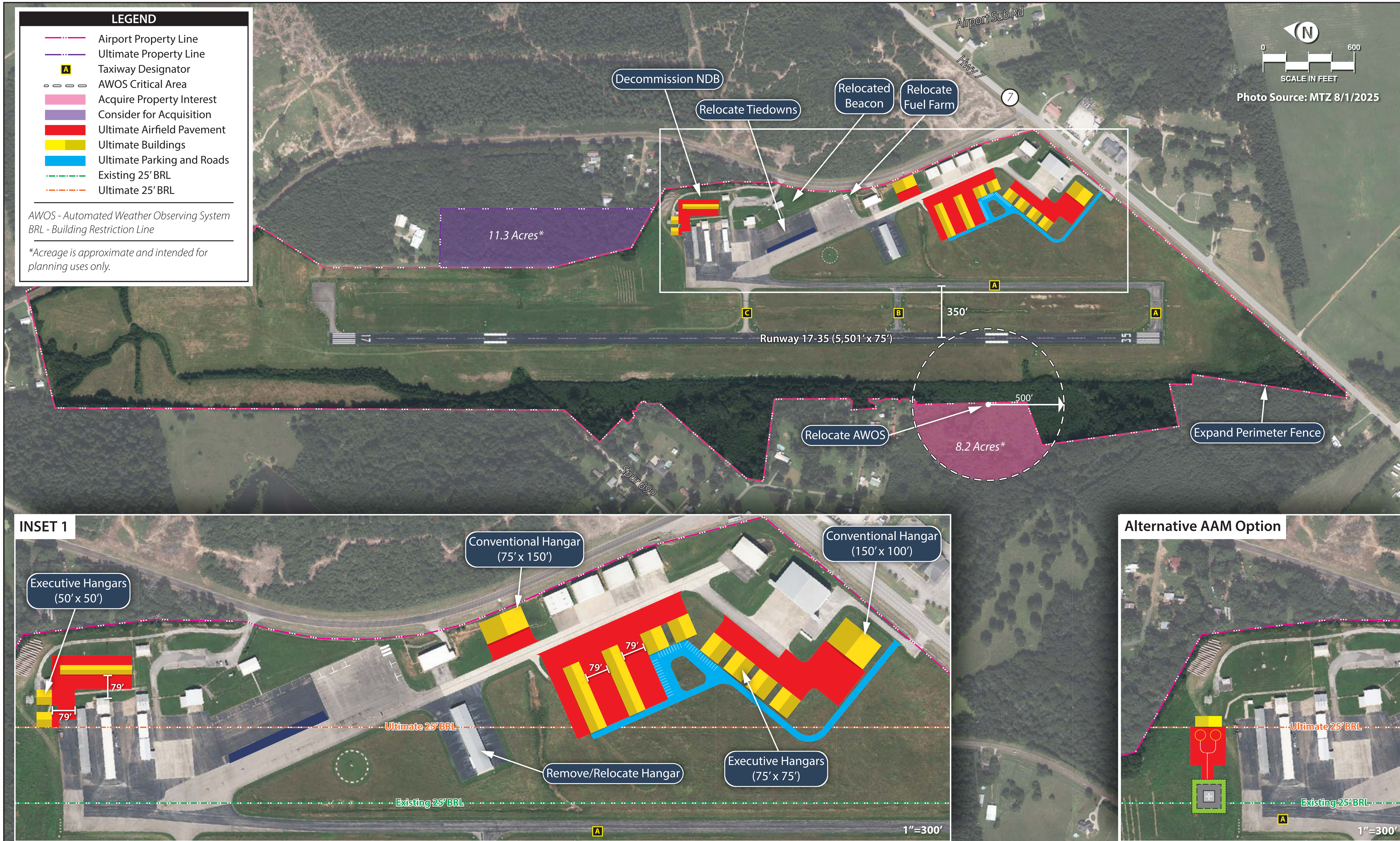

Exhibit 3K
LANDSIDE ALTERNATIVE 2

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Chapter Four

Recommended Development Concept

CHAPTER FOUR – RECOMMENDED DEVELOPMENT CONCEPT

Following consideration of each alternative described in the previous sections and discussion with the airport sponsor (City of Center), the Texas Department of Transportation (TxDOT) Aviation Division, and the planning advisory committee (PAC), an overall development concept has been recommended for Center Municipal Airport (F17). The concept, which is depicted on **Exhibit 4A**, plans for airside needs and landside deficiencies that were determined in the previous sections. The recommended development concept illustrates a plan to bring the airport into compliance with existing B-II design standards while planning for long-range needs at the airport, including a potential transition to a C-III design standard.

AIRSIDE

RUNWAY 17-35

Design Standards | Runway 17-35 is planned to be improved from existing runway design code (RDC) B-II-5000 standards to ultimate C-III-4000 design standards in the future. These design standards will plan for the runway to accommodate larger/faster business jet aircraft on a regular basis. The C-III-4000 design standards will apply when there are 500 documented operations by aircraft in this category, such as a Bombardier Global 5000, which has been identified as the airport's ultimate critical aircraft.

Runway Dimensions | Runway 17-35 is currently 5,501 feet long and 75 feet wide, which meets the existing B-II design standard for runway width. In the ultimate C-III condition, the runway width standard increases to 100 feet. As such, the recommended development concept plans for the runway to be widened to 100 feet. The existing 5,501-foot length is capable of accommodating 75 percent of business jets (less than 60,000 pounds) at 60 percent of their useful load. The ultimate critical aircraft, the Global 5000, can take off with greater than 80 percent of its useful load on the existing runway, according to Ultranav calculations (detailed in Chapter Three). As such, the current runway length is considered sufficient and there are no plans for an extension.

Pavement Strength | The existing pavement strength rating for Runway 17-35 is 30,000 pounds single wheel loading (S); there is no reported rating for multiple landing gear aircraft. It is recommended that a more comprehensive pavement strength evaluation that includes the ratings for multiple landing gear aircraft be conducted, with consideration given to strengthening the pavement to accommodate larger, heavier aircraft within the ultimate C-III design group, such as the Bombardier Global 5000 (the ultimate critical aircraft), which has an MTOW of 92,500 pounds on a dual main gear (D) configuration.

Safety Areas | Analysis in Chapter Three indicated that the existing runway safety area (RSA) meets FAA design standards and is free from obstructions; however, the runway object free area (ROFA) and runway obstacle free zone (ROFZ) are obstructed by vegetation. With the transition to C-III design standards, the RSA and ROFA increase in size, resulting in unowned/uncontrolled portions of safety area property and the introduction of obstructions. To meet ultimate design standards and protect these safety areas, the plan includes a relocation of the Runway 35 end, effectively shifting the RSA and ROFA onto airport property. Approximately 694 feet of runway pavement is planned to be removed from the south end, with 694 feet of new runway pavement constructed on the north end, allowing the airport to maintain its existing 5,501-foot length while maintaining the majority of the ultimate safety areas on existing airport property.

A small portion (approximately 0.7 acres) of the ultimate ROFA on the south end would remain outside the current property, so the plan includes acquisition of this property. Removal of obstructions (vegetation) in the ultimate RSA, ROFA, and ROFZ and grading of the ultimate RSA (as necessary) are also planned.

The plan also includes protection of property within the runway protection zones (RPZs) through fee simple acquisition (preferred) or via an avigation easement to limit development within these areas. Currently, only the Runway 35 RPZ extends beyond the airport boundary. State Highway 7 also passes through this RPZ, which is not a preferred condition. In the ultimate condition, the size of the RPZs increases, resulting in approximately 10.9 acres of uncontrolled property within the Runway 35 RPZ. The Runway 17 RPZ is also planned to increase in size due to the higher design standard and proposed reduction in visibility minimums. It will also shift to the north to correspond to the runway end relocation. Approximately 25.9 acres of property within the ultimate Runway 17 RPZ would extend beyond the airport's current boundary and is planned to be controlled through property acquisition (fee simple acquisition or controlled via an avigation easement). Ultimate Runway 17 also contains incompatible land uses, including FM 1656 and residential structures. If/when a transition to C-III occurs (at least 500 annual operations by aircraft in this family), the plan calls for removal of residential structures. No changes to public roadways are planned.

TAXIWAYS

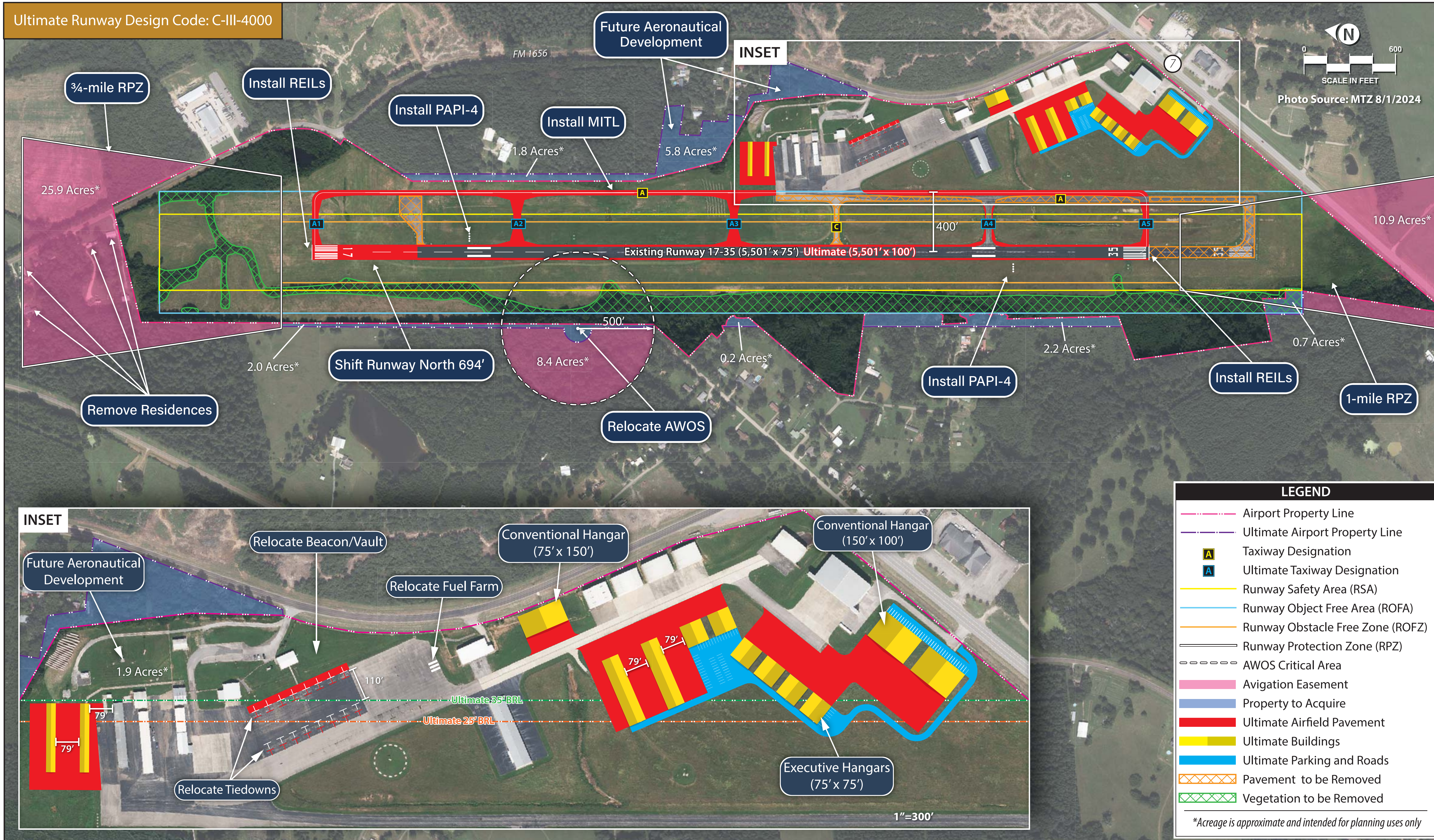
The taxiway system serving F17 currently consists of a partial-parallel taxiway, Taxiway A, which serves the south end of Runway 17-35, and Taxiway D, which provides access to hangars south of the terminal apron.

Taxiway A is separated from the runway by 350 feet, centerline to centerline, which exceeds the existing B-II design standard of 240 feet but falls short of the 400-foot separation requirement to meet C-III design standards. The previous chapter considered options for relocating either Runway 17-35 or Taxiway A to achieve the ultimate separation standard, pending the results of a geotechnical investigation on the runway that was conducted in October 2024 (included as **Appendix C**). The investigation concluded that Runway 17-35 is not in need of a full-depth reconstruction and the runway has the structural capacity to handle aircraft operating at the airport. As such, it would be more economical to shift Taxiway A 50 feet to the east, with existing pavement removed and new pavement constructed to meet the standard. Taxiway A is also planned to be extended to the north to provide access to the Runway 17 threshold via ultimate Taxiway A1, with two new connectors added (Taxiways A2 and A3). The existing non-standard holding bay serving Runway 17 is planned to be removed. All connectors are planned to be marked with holding positions separated from the runway centerline by 250 feet.

Existing Taxiway C is planned to be removed to resolve the direct-access condition that exists from the terminal apron to Runway 17-35.

Taxiway fillets on taxiways serving Runway 17-35 are planned to be expanded to meet taxiway design group (TDG) 2B design standards.

A medium intensity taxiway lighting (MITL) system is planned to be installed to replace the reflectors that currently serve to identify taxiway pavement at F17. This light-emitting diode (LED) system is planned for all existing and proposed taxiway pavement.


Ultimate Runway Design Code: C-III-4000
Future Aeronautical Development
INSET
FM 1656
¾-mile RPZ
Install REILs
Install PAPI-4
Install MITL
1.8 Acres*
5.8 Acres*
25.9 Acres*
10.9 Acres*
400′
Existing Runway 17-35 (5,501′ x 75′) Ultimate (5,501′ x 100′)
500′
2.0 Acres*
Shift Runway North 694′
8.4 Acres*
0.2 Acres*
2.2 Acres*
0.7 Acres*
Install PAPI-4
Install REILs
1-mile RPZ
Remove Residences
Relocate AWOS
SCALE IN FEET
0
600
Photo Source: MTZ 8/1/2024
INSET
Future Aeronautical Development
Relocate Beacon/Vault
Relocate Fuel Farm
Conventional Hangar (75′ x 150′)
Conventional Hangar (150′ x 100′)
1.9 Acres*
110′
79′
Ultimate 35′ BRL
Ultimate 25′ BRL
Relocate Tiedowns
Executive Hangars (75′ x 75′)
1″=300′
LEGEND
Airport Property Line
Ultimate Airport Property Line
Taxiway Designation
Ultimate Taxiway Designation
Runway Safety Area (RSA)
Runway Object Free Area (ROFA)
Runway Obstacle Free Zone (ROFZ)
Runway Protection Zone (RPZ)
AWOS Critical Area
Avigation Easement
Property to Acquire
Ultimate Airfield Pavement
Ultimate Buildings
Ultimate Parking and Roads
Pavement to be Removed
Vegetation to be Removed
*Acreage is approximate and intended for planning uses only

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The plan includes a redesignation of the taxiway system per FAA Engineering Brief No. 89, *Taxiway Nomenclature Convention*. Assigning taxiway designations makes it easier and safer for pilots to navigate the airfield. Taxiway designations should be simple and logical, using letters for parallel taxiways and two-character alphanumeric designations for connecting taxiways. Connecting taxiways between Runway 17-35 and parallel Taxiway A are identified as A1, A2, A3, A4, and A5 beginning at the north end of the runway. Taxiway D functions as a taxilane, rather than a taxiway, per FAA definition,[1] so it is planned to be redesignated as a taxilane. Redesignating the taxiway system will require updating the airfield location/directional signage system.

VISUAL APPROACH AIDS

Runway 17-35 is equipped with a two-box precision approach path indicator (PAPI-2) system on each runway end. The plan calls for an upgrade to four-box systems (PAPI-4s), which are recommended for runways that regularly accommodate jets, on each runway, as well as installation of runway end identifier lights (REILs).

INSTRUMENT APPROACH PROCEDURES

Currently, Center Municipal Airport has three instrument approach procedures: lateral navigation (LNAV) global positioning system (GPS) approaches to each end of Runway 17-35 and a non-directional beacon (NDB) approach to Runway 17. The lowest visibility minimums available are via the GPS approaches, which both have one-mile minimums for Category A and B aircraft. Category C aircraft, which are those with approach speeds between 121 and 141 knots, have increased minimums of 1¼-mile for Runway 17 and 1¾-mile for Runway 35.

It should also be noted that the straight-in and circling approaches to Runway 17, as well as the circling approach to Runway 35, are only available for daytime use. The reason for the nighttime restriction is likely due to airspace penetrations in the approach surfaces for each runway. An aeronautical survey was conducted as part of this planning study, providing obstruction data that can be used to determine if mitigation is feasible. The airport sponsor should coordinate with the FAA using the Instrument Flight Procedures (IFP) Information Gateway[2] to determine if nighttime use is possible and what mitigative actions, if any, can be taken to implement nighttime approach capability.

Consideration has been given to the inclusion of improved instrument approach procedures with lower visibility minimums. The plan includes the potential for reduced minimums on Runway 17 (lower than one-mile but not lower than ¾-mile), pending airspace analysis and obstruction removal as needed. These lower minimums, if pursued/achieved, will result in an increase to the dimensions of the primary surface and the Runway 17 RPZ, as previously discussed. Currently, the primary surface is 500 feet wide, as centered on the runway, and extends 200 feet beyond each runway end. With a reduction in visibility minimums down to ¾-mile, the width of the primary surface increases to 1,000 feet. As such, property acquisition along the east and west sides of the runway is planned to protect this area.

[1] FAA AC 150/5300-13B defines a taxilane as “a defined taxi path designed for low speed and precise maneuvering of aircraft. Taxilanes provide access from a taxiway to aircraft parking positions and other terminal areas. Taxi speeds on taxilanes are generally not more than 15 mph.”

[2] Instrument Flight Procedures Information Gateway https://www.faa.gov/air_traffic/flight_info/aeronav/procedures/

The plan also notes the eventual decommissioning of the NDB at the airport. The FAA is in the process of gradually phasing out NDBs within the National Airspace System (NAS) as part of a larger effort to transition to performance-based navigation (PBN).

WEATHER REPORTING EQUIPMENT

The airport is equipped with an automated weather observation system (AWOS-3) located east of Taxiway A, approximately 1,200 feet north of the Runway 35 threshold. While the location of the AWOS meets the FAA's siting criteria for weather reporting equipment and its 500-foot critical area is currently free from potential obstructions, this location limits hangar development potential along the taxilane (currently Taxiway D). For this reason, the plan includes a relocation of the AWOS to a new site west of Runway 17-35, approximately 1,050 feet from the existing Runway 17 threshold. Approximately 8.4 acres of land are proposed to be acquired or protected via avigation easement, and trees topped/removed to allow for an unobstructed critical area.

F17 is also equipped with a lighted wind cone and segmented circle, which are located west of the terminal apron. This equipment is planned to remain in place.

LANDSIDE

Hangars | Future landside development is illustrated on **Exhibit 4A** and identifies locations for expanded hangar storage capacity, including new T-hangars, executive hangars, and conventional hangars to meet potential future demand. Center Municipal Airport currently offers approximately 85,200 square feet (sf) of aircraft storage, with the future need increasing to 123,000 sf by the long term. In total, the recommended development concept shows approximately 113,200 sf of new aircraft storge, which exceeds the long-term need identified in Chapter Three but provides greater flexibility for long-range landside development planning.

On the north side of the landside area, two additional seven-unit T-hangars are planned. Moving south, a conventional hangar (sized 75 feet by 150 feet) is planned on the east side of the taxilane, while additional development on the west side of the taxilane includes two 10-unit T-hangars and six 75-foot by 75-foot executive box hangars. Two 150-foot by 100-foot conventional hangars are planned along State Highway 7, immediately southwest of the airport's existing conventional hangar. As previously stated, the AWOS is planned to be relocated to allow for development east of the taxilane.

It should be noted that the hangar layouts depicted are conceptual. The types, sizes, and locations for all future hangar development should be dictated by demand and the needs of each hangar developer and its customers. The conceptual layout is intended to be used as a guide for the airport sponsor when considering new landside facility developments. All new hangar construction is subject to an FAA 7460-1 airspace analysis and may require modifications in height or location or other mitigative actions to avoid airspace penetrations.

An ultimate building restriction line (BRL) is depicted on the exhibit. The BRL is based on Title 14 Code of Federal Regulations (CFR) Part 77 primary and transitional surface clearance requirements and identifies suitable building locations on the airport; however, the BRL is not a standard. Rather, it functions as a guideline to use when planning vertical infrastructure on the airport.

Apron and Aircraft Parking | There are approximately 20,500 square yards (sy) of public apron area available at F17, including 16 marked aircraft tiedowns. As determined in the previous chapter, it is not anticipated that additional aircraft parking apron will be needed through the planning period; however, the recommended development concept includes new apron pavement to support planned hangar development. The recommended development concept also includes reconfiguration of tiedowns located on the terminal apron closest to the taxilane (previously identified as Taxiway D). Currently, aircraft parked on the positions closest to the taxilane would obstruct its object free area. As such, the apron is planned to be expanded and all tiedowns shifted to the east to allow for an unobstructed object free area.

Terminal Building | The terminal building offers approximately 2,500 sf of space, which is adequate through the planning period. No expansions or other changes to the terminal building are planned.

Vehicle Parking and Access | The airport has a paved parking area adjacent to the terminal with four marked vehicle parking spaces. There is also a gravel area that can accommodate additional vehicles. Tenants generally park near their hangars. The recommended development concept maintains the terminal parking areas as-is but plans for vehicle parking and a new access road extending from State Highway 7 to support the new hangar development area.

Fuel Storage | F17 currently has two aboveground fuel tanks with capacities of 6,000 gallons of Jet A fuel and 10,000 gallons of 100LL fuel. The tanks are located north of the terminal building and parking area. Both tanks are considered sufficient in terms of capacity but are nearing the ends of their useful lifespans. The plan includes replacement of the Jet A and 100LL fuel tanks and relocation to the south end of the apron. The recommended plan also calls for a third tank to allow for the addition of unleaded aviation fuel, which has recently been approved by the FAA.

Perimeter Fencing | The airport is partially enclosed by fencing that includes both motorized and pedestrian gates. The remainder of the airport is planned to be fenced to prevent unauthorized/ inadvertent access onto the airfield.

Development Reserve Land | Center Municipal Airport encompasses approximately 150 acres. The majority of this area has already been developed for aeronautical use (both airside and landside). The remaining developable property has been identified as having aviation development potential, as shown by the planned hangars on **Exhibit 4A**. An additional 1.9-acre area located east of the existing T-hangars also has aviation development potential. As shown on the exhibit, the fuel farm, NDB, rotating beacon, and electrical vault are planned to be removed/relocated to allow for potential aeronautical use of this area, including the construction of additional hangar facilities. If there is additional demand for future landside development beyond what is shown within the airport's current property boundary, an additional 5.9 acres north and east of the existing landside facilities have been identified for potential acquisition for future aeronautical development.

Advanced Air Mobility (AAM) | Consideration was given to the inclusion of AAM facilities at F17 to allow for the integration of this new segment of aviation activity. Two sites were evaluated in the alternatives section of the previous chapter. Ultimately, it was determined through discussion with the airport sponsor that airport property would be better suited to the construction of traditional hangar facilities and associated apron pavement.

AIRPORT RECYCLING, REUSE, AND WASTE REDUCTION

The primary objective of this section is to provide the City of Center and its airport administration with recommendations for future improvements and processes that promote suitable principles in addressing airport operations and aviation demand. By making sustainability a priority in the planning process and identifying best management practices, the airport can become a more environmentally friendly economic hub.

REGULATORY GUIDELINES

***FAA Modernization and Reform Act of 2012* (FMRA) |** The FMRA, which amended Title 49 United States Code (USC), included several changes to the Airport Improvement Program (AIP). Two of these changes are related to recycling, reuse, and waste reduction at airports:

- Section 132(b) of the FMRA expanded the definition of airport planning to include "developing a plan for recycling and minimizing the generation of airport solid waste, consistent with applicable State and local recycling laws, including the cost of a waste audit."
- Section 133 of the FMRA added a provision that requires an airport that has or plans to prepare a master plan, and that receives AIP funding for an eligible project, to ensure the new or updated master plan addresses issues related to solid recycling at the airport, including the following:
    - The feasibility of solid waste recycling at the airport
    - Minimizing the generation of solid waste at the airport
    - Operation and maintenance requirements
    - A review of waste management contracts
    - The potential for cost savings or the generation of revenue

State of Texas Solid Waste Management | *Texas Administrative Code*, Title 30, Part 1, Chapter 330, *Municipal Solid Waste*,[3] was adopted to regulate waste management. This document provides policy and procedural guidance to state, substate, and local agencies in the proper management of solid waste and outlines sound methods of solid waste management and disposal for state, substate, and local agencies.

The Texas Commission on Environmental Quality (TCEQ) oversees the state's solid waste management implementation.[4] The Land Department within the TCEQ oversees waste management, recycling, reduction, and reuse, as well as cleanups and remediation. Duties assigned to the Land Department include overseeing the following:

- Processing, storage, transportation, and disposal of waste
- Permits, registrations, and compliance
- Household, industrial, municipal, and radioactive waste
- Septic systems, sludge, dredge, and injection

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3 Texas Administrative Code (https://texreg.sos.state.tx.us/public/readtac$ext.TacPage?sl=R&app=9&p_dir=&p_rloc=&p_tloc=&p_ploc=&pg=1&p_tac=&ti=30&pt=1&ch=330&rl=103)

4 Texas Commission on Environmental Quality, Land, Permitting and Managing Waste Disposal, Cleanups and Other Land-Based Activities (https://www.tceq.texas.gov/agency/land_main.html)

Duties assigned to the Recycling, Reducing, and Reusing office include overseeing the following:

- Recycling operations and composting
- Home and business resources
- Fats, oils, and grease
- Automotive and electronic waste
- Exchange network for business and industry

SOLID WASTE

Airport sponsors typically have purview over waste-handling services in facilities they own and operate, such as passenger terminal buildings, hangars, aircraft rescue and firefighting (ARFF) stations, and maintenance facilities. Tenants of airport-owned buildings/hangars or tenants that own their facilities are typically responsible for coordinating their own waste-handling services.

For airports, waste can generally be divided into eight categories:[5]

- **Municipal solid waste (MSW)** is more commonly known as trash or garbage and consists of everyday items that are used and then discarded, such as product packaging.

- **Construction and demolition (C&D) waste** is considered non-hazardous trash resulting from land clearing, excavation, demolition, and renovation or repair of structures, roads, and utilities. C&D waste includes concrete, wood, metal, drywall, carpet, plastic, pipe, cardboard, and salvaged building components. C&D waste is also generally labeled MSW.

- **Green waste** is a form of MSW yard waste that consists of tree, shrub, and grass clippings, as well as leaves, weeds, small branches, seeds, and pods.

- **Food waste** includes unconsumed food products or waste generated and discarded during food preparation and is also considered MSW.

- **Deplaned waste** is waste removed from passenger aircraft. Deplaned waste includes bottles, cans, mixed paper (i.e., newspapers, napkins, and paper towels), plastic cups, service ware, food waste, and food-soiled paper/packaging.

- **Lavatory waste** is a special waste that is emptied through a hose and pumped into a lavatory service vehicle. The waste is then transported to a triturator[6] facility for pretreatment prior to discharge in the sanitary sewage system. Chemicals in lavatory waste can present environmental and human health risks if mishandled; therefore, caution must be taken to ensure lavatory waste is not released to the public sanitary sewage system prior to pretreatment.

- **Spill clean and remediation wastes** are special wastes generated during cleanup of spills and/or remediation of contamination from several types of sites on an airport.

[5] FAA, Recycling, Reuse, and Waste Reduction at Airports, April 24, 2013
[6] A triturator turns lavatory waste into fine particulates for further processing.

- **Hazardous wastes** are governed by the *Resource Conservation and Recovery Act* (RCRA) and the regulations in Title 40 CFR Subtitle C, Parts 260 to 270. The U.S. Environmental Protection Agency (EPA) developed less stringent regulations for certain hazardous waste (universal waste), as described in 40 CFR Part 237, *The Universal Waste Rule*.

As shown on **Exhibit 4B**, there are multiple areas where an airport would potentially contribute to the waste stream, including the passenger terminal building, on-airport tenants (e.g., fixed base operators [FBOs], airport maintenance building, etc.), hangars, aircraft ground support equipment, and airport construction projects. To create a comprehensive waste reduction and recycling plan for the airport, all potential inputs must be considered.

EXISTING SERVICES

The City of Center manages the airport's operational waste (including hazardous materials). Tenants are responsible for their own solid waste and are instructed to dispose of hazardous waste, such as used oil, with their local oil change providers. Currently, there is no recycling program established at the airport.

SOLID WASTE MANAGEMENT SYSTEM

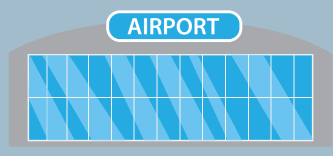
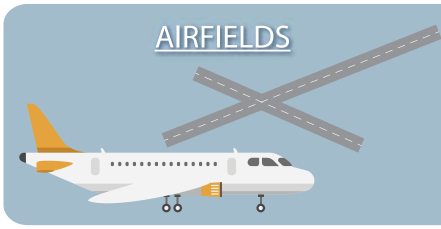
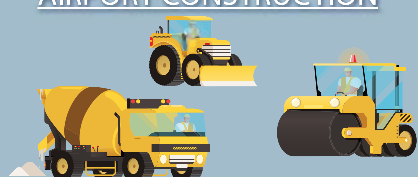
Airports generally utilize either a centralized or a decentralized waste management system. The differences between the two methods are described below and summarized on **Exhibit 4C**.

- **Centralized waste management system |** Under a centralized waste management system, the airport provides receptacles for the collection of waste, recyclable materials, and/or compostable materials and contracts for their removal by a single local provider.[7] A centralized waste management system allows for more participation from airport tenants who may not be incentivized to recycle on their own and can reduce the overall cost of service for all involved. A centralized strategy can be inefficient for some airports, as it requires more effort and oversight on the part of airport management; however, the centralized system is advantageous in that it involves fewer working components in the overall management system of the solid waste and recycling efforts. It also allows greater control by the airport sponsor over the type, placement, and maintenance of dumpsters, thereby saving space and eliminating the need for tenants to have individual containers.

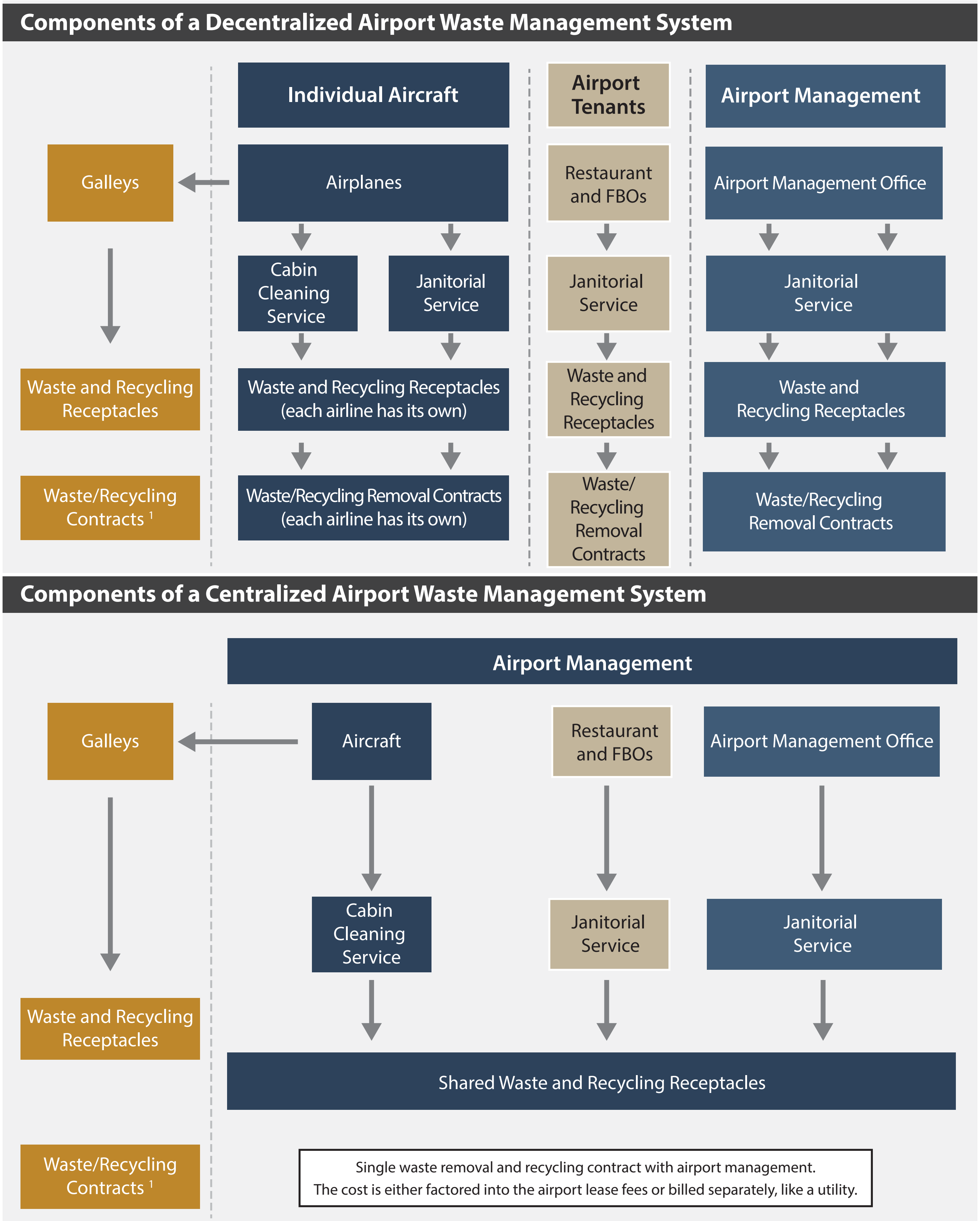
- **Decentralized waste management system |** Under a decentralized waste management system, the airport provides waste containers and contracts for the hauling of waste materials in airport-operated spaces only; airport tenants (such as FBOs, retail shops, and others) manage the waste from their leased spaces with separate contracts, billing, and hauling schedules. A decentralized waste management system can increase the number of receptacles on airport property and the number of trips by a waste collection service provider if tenants' and the airport's collection schedules differ.

[7] National Academies of Sciences, Engineering, and Medicine, Airport Cooperative Research Program, Synthesis 92, Airport Waste Management and Recycling Practices, 2018

AIRPORT WASTE STREAMS

AIRPORT AREA	POTENTIAL INPUTS	POTENTIAL OUTPUTS
TERMINALS 	Restaurants Shops Passengers Employees	Food Waste, Paper Plastic, Aluminum Cans Trash, Grease & Oil Green Waste Deplaned Waste
AIRFIELDS 	Aircraft Operations	Runway Rubber Green Waste
AIRCRAFT 	Aircraft Ground Support Equipment (GSE)	Vehicle Waste Plastic Wastewater Hazmat
AIRPORT CONSTRUCTION 	Construction Re-Construction Demolition	Reused Concrete Reused Asphalt Vehicle Waste Soils, Building Materials Wood, General Waste
ADMINISTRATIVE OFFICES 	Employees	Food Waste Paper, Plastic Aluminum Cans Trash

Source: Recycling, Reuse, and Waste Reduction at Airports, FAA (April 24, 2013)



[1] Galleys usually manage their own waste, even if an airport relies on a centralized system.

Source: Natural Resources Defense Council, Trash Landings: How Airlines and Airports Can Clean Up Their Recycling Programs, December 2006.

GOALS AND RECOMMENDATIONS

Solid Waste and Recycling Goals | Table 4A outlines objectives that could help reduce waste generation and increase recycling efforts at Center Municipal Airport. To increase the effectiveness of tracking progress at the airport, a baseline state of all suggested metrics should be established to provide a comparison over time.

TABLE 4A | Waste Management and Recycling Goals

Goals	Objectives
Create a centralized waste management system	• Audit existing waste management practices. • Improve waste and data management.
Create a recycling program	• Implement recycling marketing and promotion efforts at the FBO. • Require recycling services in all areas of the airport. • Incorporate recycling requirements and/or recommendations into tenant lease agreements. • Require contractors to implement strategies to reduce, reuse, and recycle C&D waste. • Eliminate purchase of items that are not recyclable (i.e., Styrofoam, plastic bags).

Source: Coffman Associates, Inc.

Recommendations | To maximize waste reduction and introduce recycling efforts at the airport, the following recommendations are made:

- *Create a centralized waste management system at the airport.* F17 currently participates in a decentralized waste management system because airport tenants are responsible for overseeing their own waste management. Airport staff could consider engaging tenants to create a centralized waste management system at the airport to streamline waste management efforts at F17.

- *Assign the responsibility of waste management to a dedicated individual or group*. Having one person or a group of people oversee and manage solid waste and recycling at the airport will create efficient and cost-saving solid waste management solutions. People dedicated to this operation aspect of the airport will be familiar with processes and will help identify areas of improvement and cost-saving measures.

- *Provide education for airport employees.* In order to minimize waste within the airport, it is crucial to inform and provide airport employees with a thorough education on waste management at both individual and group levels. As part of the onboarding process, new employees should be given the tools needed to achieve a thorough understanding of the airport's solid waste goals.

- *Audit the current waste management system*. The continuation of an effective program requires accurate data on current waste and recycling rates. An airport can gain insight into its waste stream in several ways, such as requesting weights from the hauler, tracking the volume, or reviewing the bills; however, managing the waste system starts with a waste audit, which is an analysis of the types of waste produced. A waste audit is the most comprehensive and intensive way to assess waste stream composition, opportunities for waste reduction, and capture of recyclables, and should include the following actions:

  - Examination of records
    - Evaluate waste-hauling and disposal records and contracts
    - Examine supply and equipment invoices
    - Identify other waste management costs (commodity rebates, container costs, etc.)
    - Track waste from the point of origin
    - Establish a baseline for metrics
  - Facility walk-through conducted by the airport
    - Gather qualitative waste information to determine major waste components and waste-generating processes
    - Identify the locations on the airport that generate waste
    - Identify what types of waste are generated by the airport to determine what can be reduced, reused, or recycled
    - Improve understanding of waste pickup and hauling practices
  - Waste sort
    - Provides quantitative data on total airport waste generation
    - Allows problem-solving design and enhances the recycling program for the airport

- *Create a tracking and reporting system*. Track solid waste generated to identify areas where a significant amount of waste is generated, which will help the airport estimate annual waste volumes. Understanding the cyclical nature of waste generation will allow the airport to estimate costs and identify areas of improvement.

- *Create a recycling program at the airport.* To guarantee the airport reduces the amount of waste hauled to the landfill, materials that cannot be reused or avoided should be recycled, if possible. The city should review internal review internal procedures to ensure there are no unacceptable items contaminating recycling containers or recyclables thrown in the trash. Clearly marked signage indicating what is and is not accepted, placed near solid waste and recycling containers, is another significant component of a consistent, effective recycling program.

- *Reduce waste through controlled purchasing practices and the consumption of nonessential products*. The airport can control the amount of waste generated by prioritizing the purchase of items or supplies that are reusable, recyclable, compostable, or made from recycled materials.

- *Provide education for airport tenants*. It is crucial to encourage tenant participation to ensure buy-in of any future recycling efforts that may be undertaken at F17. To ensure recycling is part of the airport's everyday business, airport administration should provide training and education to support personnel, tenants, and others who conduct business at the airport. In-person meetings with airport tenants could be held to create mutual understanding of the airport's solid waste and recycling goals and how tenants play a vital role in the airport's overall success.

ENVIRONMENTAL OVERVIEW

An analysis of potential environmental impacts associated with proposed airport projects is an essential consideration in the airport planning process. The primary purpose of this discussion is to review the recommended development concept (**Exhibit 4A**) and associated capital program at the airport to determine whether projects identified in the airport layout plan (ALP) narrative report could, individually or collectively, significantly impact existing environmental resources. Information contained in this section was obtained from previous studies, official internet websites, and analysis by the consultant.

The environmental inventory included in the first chapter of this ALP narrative report (**Table 1C**) provides baseline information about the airport environs. This section provides an overview of potential impacts to existing resources that could result from implementation of the planned improvements outlined on the recommended development concept.

If the FAA retains approval authority over a project, then the project is typically subject to the *National Environmental Policy Act* (NEPA). For projects not categorically excluded under FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures*, or under the new categorical exclusions provided in the recent *FAA Reauthorization Act of 2024* (Act), compliance with NEPA is generally satisfied through the preparation of an environmental assessment (EA). In instances where significant environmental impacts are expected, an environmental impact statement (EIS) may be required.

The Act has also introduced a variety of updated and new environmental guidelines. The primary environmental-related updates are outlined in three sections: Section 743, Section 783, and Section 788.

- Section 743 details the FAA's authority to regulate uses of airport property. The section details the FAA's authority over projects on land acquired without federal assistance and outlines limitations imposed on non-aeronautical review. Section 743 also states that a notice of intent for proposed projects outside FAA jurisdiction should be submitted by an airport sponsor to the FAA.
- Section 783 outlines that airport capacity enhancement projects, terminal development projects, and general aviation airport improvement projects will be subject to coordinated and expedited environmental review requirements. Section 783 also introduces a new process for determining which safety-related projects should be prioritized during the environmental review process.
- Section 788 establishes two new NEPA categorical exclusions that would cover environmental projects for the following types of projects:
  - (a) *Categorical Exclusion for Projects of Limited Federal Assistance*
    - (1) For projects that receive less than $6 million of federal funds and do not involve extraordinary circumstances or special purpose laws or have a total anticipated cost of not more than $35 million, with federal funds comprising less than 15 percent of the total estimated project cost
  - (b) *Categorical Exclusion in Emergencies*
    - (1) For the repair or reconstruction of any airport facility, runway, taxiway, or something similar in structure that is in operation or under construction when damaged by a state-declared emergency or for an emergency declared by the U.S. president pursuant to the *Robert. T. Stafford Disaster Relief and Emergency Assistance Act*

The following portion of the ALP narrative report is not designed to satisfy the NEPA requirements for a specific development project, but it provides a preliminary review of environmental issues that may need to be considered in more detail within the environmental review processes. It is important to note that the FAA is ultimately responsible for determining the level of environmental documentation required for airport actions.

Table 4B summarizes potential environmental concerns associated with implementation of the ultimate recommended development concept for F17. Analysis under NEPA includes effects or impacts a proposed action or alternative may have on the human environment (see 40 CFR §1508.1). Effects have recently been defined in the Council on Environmental Quality (CEQ) guidelines as foreseeable environmental effects of a proposed action, reasonably foreseeable adverse environmental effects that cannot be avoided, and a reasonable range of alternatives to the proposed action. These CEQ guidelines went into effect on July 1, 2024.[8]

TABLE 4B | Summary of Potential Environmental Concerns

AIR QUALITY	
FAA Order 1050.1F, Significance Threshold/ Factors to Consider	***The action would cause pollutant concentrations to exceed one or more of the National Ambient Air Quality Standards (NAAQS), as established by the United States (U.S.) Environmental Protection Agency (EPA) under the Clean Air Act, for any of the time periods analyzed, or to increase the frequency or severity of any such existing violations.***
Potential Environmental Concerns	**No Impact:** An increase in operations could occur over the 20+ year planning horizon of the ALP narrative report that would likely result in additional emissions. Shelby County is in attainment for all federal criteria pollutants. For construction and operation emissions, project-specific qualitative or quantitative emissions inventories or the application of screening thresholds may be required by the FAA, depending on the type(s) of environmental review needed for specific projects defined on the development concept plan. *Source: U.S. EPA, Green Book, Texas Nonattainment/Maintenance Status for Each County by Year for All Criteria Pollutants (https://www3.epa.gov/airquality/greenbook/anayo_tx.html), accessed February 2025*
BIOLOGICAL RESOURCES (INCLUDING FISH, WILDLIFE, AND PLANTS)	
FAA Order 1050.1F, Significance Threshold/ Factors to Consider	***The U.S. Fish and Wildlife Service (USFWS) or the National Marine Fisheries Service (NMFS) determines that the action would be likely to jeopardize the continued existence of a federally listed threatened or endangered species or would result in the destruction or adverse modification of federally designated critical habitat.*** ***The FAA has not established a significance threshold for non-listed species; however, factors to consider include whether an action would have the potential for:*** • ***Long-term or permanent loss of unlisted plant or wildlife species;*** • ***Adverse impacts to special status species or their habitats;*** • ***Substantial loss, reduction, degradation, disturbance, or fragmentation of native species' habitats or populations; or*** • ***Adverse impacts on a species' reproductive rates, non-natural mortality, or ability to sustain the minimum population levels required for population maintenance.***

(Continues)

8 Federal Register, Volume 89, No. 85, Wednesday, May 1, 2024

TABLE 4B | Summary of Potential Environmental Concerns (continued)

<table>
<tr><td>Potential Environmental Concerns</td><td>Potential Impact.

<u>Federally Protected Species</u>
Based on the USFWS Information for Planning and Consultation (IPaC) report, there is potential for seven threatened, proposed threatened, and proposed endangered species at F17:
• tricolored bat – proposed endangered
• piping plover – threatened
• red-cockaded woodpecker – threatened
• rufa red knot – threatened
• alligator snapping turtle – proposed threatened
• Texas heelsplitter – proposed endangered
• monarch butterfly – proposed threatened

<u>Designated Critical Habitat</u>
No Impact. There are no designated critical habitats within airport boundaries.

<u>Non-Listed Species</u>
Potential Impact. Non-listed species of concern include those protected by the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act. Bird species protected by the MBTA could be adversely affected if construction occurs during nesting and breeding seasons (March to September). Pre-construction surveys of vegetated areas at the airport are recommended for projects that involve ground clearing unless these projects occur outside the nesting and breeding seasons.

<u>State Protected Species</u>
Potential Impact. According to a record search conducted on the Texas Parks & Wildlife Department's Annotated County Lists of Rare Species, the following species have been listed as threatened within Shelby County:

• Bachman's sparrow – state threatened
• interior least tern – state endangered
• piping plover – state threatened
• swallow-tailed kite – state threatened
• white-faced ibis – state threatened
• wood stork – state threatened
• paddlefish – state threatened
• black bear – state threatened
• Rafinesque's big-eared bat – state threatened
• Louisiana pigtoe – state threatened
• sandbank pocketbook – state threatened
• southern hickorynut – state threatened
• Texas heelsplitter – state threatened
• Texas pigtoe – state threatened
• alligator snapping turtle – state threatened
• Texas horned lizard – state threatened

Impacts on these species should be assessed prior to development on a project-by-project basis. The recommended development concept depicts proposed development that would require tree removal, which could impact these species.</td></tr>
</table>

(Continues)

TABLE 4B | Summary of Potential Environmental Concerns (continued)

CLIMATE	
FAA Order 1050.1F, Significance Threshold/ Factors to Consider	***The FAA has not established a significance threshold for Climate. Refer to FAA Order 1050.1F, Desk Reference, and/or the most recent FAA Aviation Emissions and Air Quality Handbook for the most up-to-date methodology for examining impacts associated with climate change.***
Potential Environmental Concerns	**Unknown.** An increase in greenhouse gas (GHG) emissions could occur over the 20+ year planning horizon of the ALP narrative report. A project-specific analysis may be required based on the parameters of the individual projects; however, the FAA does not have an impact threshold to use to determine significance under NEPA at this time.
COASTAL RESOURCES	
FAA Order 1050.1F, Significance Threshold/ Factors to Consider	***The FAA has not established a significance threshold for Coastal Resources. Factors to consider include whether an action would have the potential to:*** • ***Be inconsistent with the relevant state coastal zone management plan(s);*** • ***Impact a coastal barrier resources system unit;*** • ***Pose an impact on coral reef ecosystems;*** • ***Cause an unacceptable risk to human safety or property; or*** • ***Cause adverse impacts on the coastal environment that cannot be satisfactorily mitigated.***
Potential Environmental Concerns	**No Impact.** The airport is over 100 miles inland from the nearest coastline and would not impact any coastal barrier resources.
***DEPARTMENT OF TRANSPORTATION ACT*, SECTION 4(f)** (NOW CODIFIED IN 49 USC § 303)	
FAA Order 1050.1F, Significance Threshold/ Factors to Consider	***The action involves more than a minimal physical use of a Section 4(f) resource or constitutes a constructive use based on an FAA determination that the aviation project would substantially impair the Section 4(f) resource. Resources that are protected by Section 4(f) are publicly owned land from a public park, recreation area, or wildlife and waterfowl refuge of national, state, or local significance, and publicly or privately owned land from a historic site of national, state, or local significance. Substantial impairment occurs when the activities, features, or attributes of the resource that contribute to its significance or enjoyment are substantially diminished.***
Potential Environmental Concerns	**No Impact.** There are no wilderness areas, wildlife or waterfowl refuges, public recreational areas, or National Register of Historic Places (NRHP)-listed resources that would be impacted by the proposed improvements at F17. There are also no known resources eligible for listing on the NRHP that would be impacted by proposed development.
FARMLANDS	
FAA Order 1050.1F, Significance Threshold/ Factors to Consider	***The total combined score on Form AD-1006, Farmland Conversion Impact Rating, ranges between 200 and 260. Form AD-1006 is used by the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) to assess impacts under the Farmland Protection Policy Act (FPPA).*** ***The FPPA applies when airport activities meet the following conditions:*** • ***Federal funds are involved;*** • ***The action involves the potential for the irreversible conversion of important farmlands to non-agricultural uses (important farmlands include pastureland, cropland, and forest considered to be prime, unique, or statewide or locally important land); or*** • ***None of the exemptions to the FPPA apply; these exemptions include:*** ○ ***Land that is not considered farmland under the FPPA, such as land already developed or already irreversibly converted; these instances include when land is designated as an urban area by the U.S. Census Bureau or the existing footprint includes rights-of-way;*** ○ ***Land that is already committed to urban development;*** ○ ***Land that is committed to water storage;*** ○ ***Construction of non-farm structures necessary to support farming operations; and*** ○ ***Construction/land development for national defense purposes.***

(Continues)

TABLE 4B | Summary of Potential Environmental Concerns (continued)

Potential Environmental Concerns	**Potential Impact.** According to the NRCS Web Soil Survey, the airport is comprised of soils that have been identified as prime farmland, farmland of statewide importance, prime farmland if drained, and not prime farmland. Proposed changes to the airside and landside areas of the airport (i.e., proposed runway shift to the north, future pavement, roads, and buildings) could convert farmlands protected by the FPPA. Impacts should be evaluated on a project-by-project basis in consultation with the State Soil Conservationist, and Form AD-1006 should be completed, when appropriate. *Source: USDA-NRCS, Web Soil Survey (https://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx)*
HAZARDOUS MATERIALS, SOLID WASTE, AND POLLUTION PREVENTION	
FAA Order 1050.1F, Significance Threshold/ Factors to Consider	***The FAA has not established a significance threshold for Hazardous Materials, Solid Waste, and Pollution Prevention; however, factors to consider include whether an action would have the potential to:*** • ***Violate applicable federal, state, tribal, or local laws or regulations regarding hazardous materials and/or solid waste management;*** • ***Involve a contaminated site;*** • ***Produce an appreciably different quantity or type of hazardous waste;*** • ***Generate an appreciably different quantity or type of solid waste or use a different method of collection or disposal and/or would exceed local capacity; or*** • ***Adversely affect human health and the environment.***
Potential Environmental Concerns	**No Impact.** There are no identified brownfields or Superfund sites within one mile of the airport. Prior to any proposed land acquisition depicted on **Exhibit 4A**, a Phase I site assessment should be conducted to provide a more detailed understanding of what hazardous materials may be located on the land to be acquired. The recommended development concept does not include land uses that would produce an appreciably different quantity or type of hazardous waste; however, if this type of land use is proposed, further NEPA review and/or permitting will be required. There are no known hazardous material or waste contamination sites currently on airport property. Due to existing regulatory management regarding hazardous materials, waste, and stormwater management, no impacts related to ultimate airport development are anticipated. The airport currently maintains a spill prevention, control, and countermeasure (SPCC) plan for its fuel farm. The construction of proposed hangars on the airport would increase solid waste. No long-term impacts related to solid waste disposal are expected. *Source: U.S. EPA, EJScreen Mapper (https://ejscreen.epa.gov/mapper/), accessed February 2025*
HISTORICAL, ARCHITECTURAL, ARCHAEOLOGICAL, AND CULTURAL RESOURCES	
FAA Order 1050.1F, Significance Threshold/ Factors to Consider	***The FAA has not established a significance threshold for Historical, Architectural, Archaeological, and Cultural Resources. Factors to consider include whether an action would result in a finding of adverse effect through the Section 106 process; however, an adverse effect finding does not automatically trigger the preparation of an EIS (i.e., a significant impact).***
Potential Environmental Concerns	**Potential Impact.** As summarized in Chapter One, there are no NRHP-listed resources within one mile of the airport; however, given the age of the airport, there is a chance historic resources and intact cultural resources may be present on the ground surface or subsurface.
LAND USE	
FAA Order 1050.1F, Significance Threshold/ Factors to Consider	***The FAA has not established a significance threshold for Land Use and there are no specific independent factors to consider. The determination that significant impacts exist is normally dependent on the significance of other impacts.***

(Continues)

TABLE 4B | Summary of Potential Environmental Concerns (continued)

Potential Environmental Concerns	**Potential Impact.** Proposed airport improvements include new hangars, aircraft and vehicular parking areas, the shift of the runway to the north of Runway 17, new lighting along Runway 17-35, new access roads for proposed hangar development, and the removal of vegetation. The removal of vegetation along the western side of the airport may impact residences living adjacent to the western property boundary, as the vegetation currently acts as a screening buffer against light spillage from airport operations. Additionally, the 5.9 acres of land proposed for future aeronautical development would be located near residential homes south of FM 1656 and could contribute to more noise near residences and additional light spillage from the airport due to the vegetation removal that would result from this development. **Exhibit 4A** depicts property to be acquired within the Runway 17 and Runway 35 RPZs. These property acquisitions are recommended to give the airport control over what land uses may be permitted within the airport's RPZs. The parcel of land to be acquired within the Runway 35 RPZ contains a public road (State Highway 7) and traverses a portion of Oaklawn Memorial Park, both of which are considered incompatible land uses within an RPZ.
NATURAL RESOURCES AND ENERGY SUPPLY	
FAA Order 1050.1F, Significance Threshold/ Factors to Consider	***The FAA has not established a significance threshold for Natural Resources and Energy Supply; however, factors to consider include whether the action would have the potential to cause demand to exceed available or future supplies of these resources.***
Potential Environmental Concerns	**No Impact.** Planned development at the airport could increase demands on energy utilities, water supplies and treatment, and other natural resources during construction; however, significant long-term impacts are not anticipated. If long-term impacts become a concern, coordination with local service providers is recommended.
NOISE AND NOISE-COMPATIBLE LAND USE	
FAA Order 1050.1F, Significance Threshold/ Factors to Consider	***The action would increase noise by day-night average sound level (DNL) 1.5 decibels (dB) or more for a noise-sensitive area that is exposed to noise at or above the 65-dB DNL noise exposure level or that will be exposed at or above the 65-dB DNL level due to a 1.5-dB DNL or greater increase when compared to the no action alternative for the same timeframe.*** ***Another factor to consider is that special consideration should be given to the evaluation of the significance of noise impacts on noise-sensitive areas within Section 4(f) properties where the land use compatibility guidelines in Title 14 CFR Part 150 are not relevant to the value, significance, and enjoyment of the area in question.***
Potential Environmental Concerns	**Potential Impact.** Within a one-mile radius, there are noise-sensitive land uses (i.e., residential neighborhoods adjacent to the airport on the east side of F17 across from FM 1656 Road and the western boundary of the airport along Spur 699, Sycamore, and 3734 Roads. Noise contours were not included in the scope for this study. It is important to note that operational growth will not result in noise impacts under FAA Order 1050.1F unless tied to a specific project. Impacts to noise-sensitive land uses are only evaluated through NEPA documentation for specific projects or through the voluntary Part 150 process.
SOCIOECONOMICS, ENVIRONMENTAL JUSTICE, AND CHILDREN'S ENVIRONMENTAL HEALTH AND SAFETY RISKS	
Socioeconomics	
FAA Order 1050.1F, Significance Threshold/ Factors to Consider	***The FAA has not established a significance threshold for Socioeconomics; however, factors to consider include whether an action would have the potential to:*** • ***Directly or indirectly induce substantial economic growth in an area (e.g., through establishing projects in an undeveloped area);*** • ***Disrupt or divide the physical arrangement of an established community;*** • ***Cause extensive relocation when sufficient replacement housing is unavailable;*** • ***Cause extensive relocation of community businesses that would cause severe economic hardship for affected communities;*** • ***Disrupt local traffic patterns and substantially reduce the levels of service of roads serving the airport and its surrounding communities; or*** • ***Produce a substantial change in the community tax base.***

(Continues)

TABLE 4B | Summary of Potential Environmental Concerns (continued)

Potential Environmental Concerns	**Potential Impact.** The proposed development on airport property could encourage economic growth for the City of Center. This growth could include new construction jobs, new jobs for the airport and other commercial uses, new housing, and increases to the local tax base. Several areas of the airport have been identified for ultimate aviation development in the ALP narrative report. Development of these areas could increase vehicle traffic and could change the level of service of roads within and leading to the airport, such as FM 1656. The long-term changes to the level of service are determined by the type(s) of use proposed and it may be necessary to perform a traffic study to ensure service is not substantially impacted and/or mitigation measures are addressed. In the short term, there could be temporary disruptions to surface traffic patterns during construction of improvements at the airport.
Environmental Justice	
FAA Order 1050.1F, Significance Threshold/ Factors to Consider	***The FAA has not established a significance threshold for Environmental Justice; however, factors to consider include whether an action would have the potential to lead to a disproportionately high and adverse impact to an environmental justice population (i.e., a low-income or minority population) due to:*** • ***Significant impacts in other environmental impact categories; or*** • ***Impacts on the physical or natural environment that affect an environmental justice population in a way the FAA determines is unique to and significant to that population.***
Potential Environmental Concerns	**Potential Impact.** Both low-income and minority populations have been identified in the vicinity of the airport. The closest residential areas are adjacent to the eastern and western sides of the airport and would not be relocated or displaced as a result of the proposed improvements depicted on **Exhibit 4A**. The proposed development closest to these residential areas would be 5.9 acres considered for future acquisition/aeronautical development on the east side and the removal of vegetation to the west. Both projects would result in the removal of vegetation that currently acts as a buffer from light spillage that results from the operation of the airport and its facilities. Ultimate development that could create noise during construction, such as building construction, vehicular parking lots, and access roads, should be analyzed on a project-by-project basis.
Children's Health and Safety Risks	
FAA Order 1050.1F, Significance Threshold/ Factors to Consider	***The FAA has not established a significance threshold for Children's Environmental Health and Safety Risks; however, factors to consider include whether an action would have the potential to lead to a disproportionate health or safety risk to children.***
Potential Environmental Concerns	**No Impact.** No disproportionately high or adverse impacts are anticipated to affect children living near the airport because of the proposed ultimate development. The airport is an access-controlled facility and children are not allowed within the fenced portions of the airport without adult supervision. All construction areas should be controlled to prevent unauthorized access.
VISUAL EFFECTS	
Light Emissions	
FAA Order 1050.1F, Significance Threshold/ Factors to Consider	***The FAA has not established a significance threshold for Light Emissions; however, a factor to consider is the degree to which an action would have the potential to:*** • ***Create annoyance or interfere with normal activities from light emissions; or*** • ***Affect the nature of the visual character of the area due to light emissions, including the importance, uniqueness, and aesthetic value of the affected visual resources.***
Potential Environmental Concerns	**Potential Impact.** Existing lighting at the airport includes a rotating beacon, medium intensity runway lighting (MIRL) along Runway 17-35, and a two-light precision approach path indicator (PAPI-2) system on Runway 17-35. New proposed lighting would include runway end indicator lights (REILs) on Runway 17 and Runway 35 and PAPI-4s along Runway 17-35. *(Continues)*

TABLE 4B | Summary of Potential Environmental Concerns (continued)

Potential Environmental Concerns (continued)	A runway shift to the north is proposed. Night lighting during construction phases within the runway environment is typically directed downward to the construction work area to prevent light from spilling outside airport boundaries. Other future projects are likely to include additional lighting during the operation of the airport's new structures and facilities. The proposed removal of vegetation on the west side of the area may also affect the amount of light spillage that would reach nearby residences, as the vegetation currently acts as a buffer between light spillage from the airport and residential homes.
Visual Resources/Visual Character	
FAA Order 1050.1F, Significance Threshold/ Factors to Consider	***The FAA has not established a significance threshold for Visual Resources/Visual Character; however, a factor to consider is the extent to which an action would have the potential to:*** • ***Affect the nature of the visual character of the area, including the importance, uniqueness, and aesthetic value of the affected visual resources;*** • ***Contrast with the visual resources and/or visual character in the study area; and*** • ***Block or obstruct the views of the visual resources, including whether these resources would still be viewable from other locations.***
Potential Environmental Concerns	**Potential Impact.** The proposed runway shift would relocate the Runway 17 threshold by 694 feet. As a result of the proposed vegetation removal along the west side of F17, nearby residences would lose the screening barrier that is currently present, which would visually alter the line of sight for residential land uses along Spur 699.
WATER RESOURCES	
Wetlands	
FAA Order 1050.1F, Significance Threshold/ Factors to Consider	***The action would:*** • ***Adversely affect a wetland's function to protect the quality or quantity of municipal water supplies, including surface waters and sole source and other aquifers;*** • ***Substantially alter the hydrology needed to sustain the affected wetland system's values and functions or those of a wetland to which it is connected;*** • ***Substantially reduce the affected wetland's ability to retain floodwaters or storm runoff, thereby threatening public health, safety, or welfare (the term welfare includes cultural, recreational, and scientific resources or property important to the public);*** • ***Adversely affect the maintenance of natural systems that support wildlife and fish habitat or economically important timber, food, or fiber resources of the affected or surrounding wetlands;*** • ***Promote the development of secondary activities or services that would cause the circumstances listed above to occur; or*** • ***Be inconsistent with applicable state wetland strategies.***
Potential Environmental Concerns	**Potential Impact.** Within airport boundaries, there are freshwater emergent wetlands and freshwater ponds located throughout the airport. (See **Exhibit 1L**.) Field surveys and wetland delineations may be required to determine the presence or absence of wetlands in project areas. Projects that may require additional study include the removal of vegetation on the west side of the airport, relocation of the AWOS, and acquisition of property on the east side. Removal or relocation of wetlands may require a Section 404 permit under the *Clean Water Act*, which regulates the discharge of dredged and/or fill material into waters of the United States, including wetlands. *Source: USFWS, National Wetlands Inventory (https://fwsprimary.wim.usgs.gov/wetlands/apps/wetlands-mapper/), accessed February 2025*

(Continues)

TABLE 4B | Summary of Potential Environmental Concerns (continued)

Floodplains	
FAA Order 1050.1F, Significance Threshold/ Factors to Consider	***The action would cause notable adverse impacts on natural and beneficial floodplain values. Natural and beneficial floodplain values are defined in Paragraph 4.k of Department of Transportation (DOT) Order 5650.2, Floodplain Management and Protection.***
Potential Environmental Concerns	**Potential Impact.** Based on a review of the Federal Emergency Agency (FEMA) Flood Insurance Rate Map (FIRM) panel, no digital data is available at the time of this study; thus, it is unknown if F17 is in a 100-year or 500-year floodplain. *Source: FEMA, Flood Map Service Center (https://msc.fema.gov/portal/search?AddressQuery=center%20municpal%20airport), accessed February 2025*
Surface Waters	
FAA Order 1050.1F, Significance Threshold/ Factors to Consider	***The action would:*** • ***Exceed water quality standards established by federal, state, local, and tribal regulatory agencies; or*** • ***Contaminate public drinking water supply such that public health may be adversely affected.***
Potential Environmental Concerns	**Potential Impact.** F17 is in the Prairie Creek-Tenaha Creek watershed, which contains two waterbodies: Prairie Creek and Tenaha Creek, located south of the airport. Long-term impacts to water quality from the proposed airfield improvements may need to be assessed, depending on future increases in impervious surfaces and how stormwater runoff is conveyed to airport stormwater infrastructure. A National Pollutant Discharge Elimination System (NPDES) general construction permit would be required for all projects that involve ground disturbance over one acre. FAA AC/5370-10H, *Standards for Specifying Construction of Airports*, Item C-102, *Temporary Air and Water Pollution, Soil Erosion, and Siltation Control*, should also be implemented during construction projects at the airport. *Source: U.S. EPA, How's My Waterway? (https://mywaterway.epa.gov/community/center%20municipal%20airport/overview), accessed February 2025*
Groundwater	
FAA Order 1050.1F, Significance Threshold/ Factors to Consider	***The action would:*** • ***Exceed groundwater quality standards established by federal, state, local, and tribal regulatory agencies: or*** • ***Contaminate an aquifer used for public water supply such that public health may be adversely affected.*** ***Factors to consider are when a project would have the potential to:*** • ***Adversely affect natural and beneficial groundwater values to a degree that substantially diminishes or destroys such values;*** • ***Adversely affect groundwater quantities such that the beneficial uses and values of such groundwater are appreciably diminished or can no longer be maintained and such impairment cannot be avoided or satisfactorily mitigated; or*** • ***Present difficulties based on water quality impacts when obtaining a permit or authorization.***
Potential Environmental Concerns	**No Impact.** Proposed projects will not substantially change the amount of water used by the airport. Additionally, the airport does not serve as a significant source of groundwater recharge and is not located near a sole source aquifer. The closest sole source aquifer is the Chicot Aquifer System Sole Source Aquifer, located approximately 54 miles southeast of the airport. *Source: U.S. EPA, Sole Source Aquifers (https://epa.maps.arcgis.com/apps/webappviewer/index.html?id=9ebb047ba3ec41ada1877155fe31356b), accessed February 2025*

(Continues)

TABLE 4B | Summary of Potential Environmental Concerns (continued)	
Wild and Scenic Rivers	
FAA Order 1050.1F, Significance Threshold/ Factors to Consider	***The FAA has not established a significance threshold for Wild and Scenic Rivers. Factors to consider are when an action would have an adverse impact on the values for which a river was designated (or is considered for designation) through:*** • ***Destroying or altering a river's free-flowing nature;*** • ***A direct and adverse effect on the values for which a river was designated (or is under study for designation);*** • ***Introducing a visual, audible, or another type of intrusion that is out of character with the river or would alter outstanding features of the river's setting;*** • ***Causing the river's water quality to deteriorate;*** • ***Allowing the transfer or sale of property interests without restrictions needed to protect the river or the river corridor; or*** • ***Any of these impacts that prevents a river on the Nationwide Rivers Inventory (NRI) or a Section 5(d) river that is not included in the NRI from being included in the Wild and Scenic River System or causing a downgrade in its classification (e.g., from wild to recreational).***
Potential Environmental Concerns	**No Impact.** There are no wild and scenic rivers or rivers listed on the NRI near the airport. The closest designated wild and scenic river identified is the Saline Bayou River, located 83 miles from the airport in Louisiana. The nearest NRI feature is the Sabine River, located 16 miles southeast of the airport. The recommended airport projects will not have adverse effects on the river's outstanding remarkable values (i.e., scenery, recreation, geology, fish, wildlife, and history). *Sources: National Wild and Scenic River System (https://www.rivers.gov/), accessed February 2025; Nationwide Rivers Inventory (https://www.nps.gov/maps/full.html?mapId=8adbe798-0d7e-40fb-bd48-225513d64977), accessed February 2025*

SUMMARY

This section has been prepared to help inform those making decisions about the future growth and development of the airport by describing, both narratively and graphically, the recommended development concept. The plan represents an airfield facility that fulfills aviation needs for the airport while conforming to safety and design standards to the extent practicable. It also provides a landside complex that can be developed as demand dictates. The ALP drawing set, which will be included as an appendix of this report, details these plans and includes airspace analysis and recommendations regarding obstruction mitigation.

Flexibility will be important to the future development at the airport, as activity may not occur as predicted. The recommended concept provides stakeholders with a general guide that, if followed, can maintain the airport's long-term viability and allow it to continue providing aviation services to the region.

Chapter Five

Capital Improvement Program

CHAPTER FIVE – CAPITAL IMPROVEMENT PROGRAM

While the Texas Department of Transportation (TxDOT) Aviation Division requires the airport to submit a five-year airport capital improvement program (ACIP) each year, the planning effort affords the opportunity to examine projects and their potential financing beyond the short-term (existing/future) planning horizon. Several factors, such as funding availability and justification, may influence the timing of projects in the long-term (ultimate) planning periods; therefore, greater flexibility must be considered regarding their implementation. The timing for capacity-related projects, such as hangar construction, will need to be based on demand and the types of aircraft using the facility. Other projects, such as obstruction removal and corrections to airfield geometry, focus on meeting FAA design standards and providing a safe operating environment. This planning study has been developed in a manner that provides the City of Center with maximum flexibility to adapt the concepts presented to potential changes over time. The short-term and long-term capital improvement program (CIP) for Center Municipal Airport (F17) is listed in **Table 5A**.

The list of necessary projects was identified and refined, and project-specific cost estimates were prepared by the Brannon Corporation. The cost estimates include design, construction administration, and contingencies that may arise on the projects. The majority of hangar development is assumed to be funded by private developers through ground lease agreements with the sponsor. For this reason, hangar development has been excluded from the airport's CIP. Capital costs presented here should be viewed only as order-of-magnitude estimates that are subject to further refinement during design; nevertheless, they are considered sufficient for planning purposes. It should be noted that each project should only be undertaken after further refinement of its design and costs through detailed architectural or engineering analyses.

Project funding sources are also identified, including the federal Airport Improvement Program (AIP), which is administered by the FAA. For projects that are eligible for federal/state funding, AIP/TxDOT grants provide up to 90 percent of the total project cost. The remaining 10 percent (or more) of project costs are funded locally by the city.[1] Another source for federal grants is the *Bipartisan Infrastructure Law* (BIL), which was signed into law in 2022 and plans for $25 billion to be invested into America's airports over the next five years.

The State of Texas distributes funding to general aviation airports from the Highway Trust Fund as the Texas Aviation Facilities Development Program. These funds are appropriated each year by the state legislature. State funding sources include the Routine Airport Maintenance Program (RAMP), which matches local government grants up to $100,000 for maintenance of airside and landside needs, and a terminal building program that funds terminal building construction on a 50/50 basis up to a total project cost of $1 million.

As detailed in the CIP, many of the projects listed are eligible for federal or state funding. Demand and justification for these projects must be provided prior to a grant being issued. Some projects identified in the CIP will require environmental documentation. The level of documentation necessary for each

[1] FY 2025 and FY 2026 are eligible for 95 percent federal funding with a local match of five percent.

project must be determined in consultation with TxDOT. There are three major levels of environmental review to be considered under the *National Environmental Policy Act* (NEPA): categorical exclusion (CatEx), environmental assessment (EA), and environmental impact statement (EIS). Each level requires more time to complete and more detailed information. Guidance on what level of documentation is required for specific projects is provided in FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures*. The environmental overview presented in Chapter Four addresses NEPA and provides an evaluation of various environmental categories for F17.

There are several local financing options to fund future development at airports, including airport revenue, issuance of a variety of bond types, and leasehold financing. These strategies could be used to fund the local matching share or complete a project if grant funding cannot be arranged.

As shown in **Table 5A**, the total CIP is estimated at approximately $41.8 million. The share eligible for FAA/TxDOT funding is estimated at $36.7 million, while the local share is estimated at $5.1 million. Project details are summarized as follows. In some cases, particularly in the ultimate term, projects have been grouped together for ease of long-range planning.

TABLE 5A | Capital Improvement Program

#	Project Description	Cost Estimate	Federal/TxDOT Share	Airport Sponsor/ Local Share
Existing/Future Projects (0-5 Years)				
FY 2025				
1	Obstruction Removal in Existing Safety Areas	$25,000	$23,750	$1,250
FY 2026				
2	Runway Rehabilitation	$6,000,0000	$5,700,000	$300,000
FY 2027				
3	Construct Partial Parallel Taxiway	$5,500,000	$4,950,000	$550,000
FY 2028				
4	Install MITL	$950,000	$855,000	$95,000
FY 2029				
5	Visual Approach Aid Upgrades	$700,000	$630,000	$70,000
TxDOT Coordination Projects				
6	Routine Pavement Maintenance	$1,800,000	$1,620,000	$180,000
7	Obstruction Removal	$75,000	$67,500	$7,500
Short-Term Projects Subtotal		**$15,050,000**	**$13,846,250**	**$1,203,750**
Ultimate Projects (6-20+ Years)				
8	Install Perimeter Fencing	$1,100,000	$990,000	$110,000
9	Replace/Relocate Fuel Tanks	$1,250,000	$100,000	$1,150,000
10	Relocate AWOS	$350,000	$315,000	$35,000
11	Expand Apron and Relocate Tiedowns	$400,000	$360,000	$40,000
12	Property Acquisition to Protect Ultimate RPZs	$375,000	$337,500	$37,500
13	Runway Relocation/Widening and Related Projects	$10,500,000	$9,450,000	$1,050,000
14	Construct Apron/Taxilane	$2,750,000	$2,475,000	$275,000
15	Construct Taxilane	$1,900,000	$1,710,000	$190,000
16	Construct Apron/Taxilane	$5,000,000	$4,500,000	$500,000
17	Relocate Rotating Beacon and Electrical Vault	$300,000	$100,000	$200,000
18	Acquire Property for Future Development	$75,000	–	$75,000
19	Routine Pavement Maintenance	$2,500,000	$2,250,000	$250,000
20	Obstruction Removal	$250,000	$225,000	$25,000
Ultimate Projects Subtotal		**$26,750,000**	**$22,812,500**	**$3,937,500**
CIP Total		**$41,800,000**	**$36,658,750**	**$5,141,250**

SHORT-TERM PLANNING PROJECTS

Projects identified in the short term are those anticipated to be needed over the next five years and are primarily safety-related.

#1 – Obstruction Removal in Existing Safety Areas

This project plans for the removal of vegetative obstructions in the existing runway object free area (ROFA) and runway obstacle free zone (ROFZ) west of Runway 17, as previously noted on **Exhibit 3A**.

#2 – Runway Rehabilitation

This project plans rehabilitation of Runway 17-35 to include a mill and overlay, marking, and striping. Engineering and construction administration costs are also included.

#3 – Construct Partial Parallel Taxiway

This project plans for the extension of Taxiway A to the north to connect with the existing Runway 17 threshold. The new taxiway pavement is planned to be constructed at a width of 35 feet and at a separation distance of 400 feet from the Runway 17-35 centerline, in accordance with ultimate C-III design standards. Taxiway connectors A2 and A3 (see **Exhibit 4A**) are also planned for construction with this project, along with removal of existing Taxiway C to eliminate the direct-access point from the terminal apron to the runway. The holding bay at Runway 17 is also planned for partial removal, with pavement preserved, where feasible, to serve as a threshold connector. Installation of medium intensity taxiway lighting (MITL), all pavement markings, and updated airfield signage to reflect taxiway redesignations are included with this project.

#4 – Install MITL

Taxiway pavement at F17 is currently delineated with reflectors. This project plans for the installation of MITL on all taxiways to enhance visibility and safety for taxiing aircraft.

#5 – Visual Approach Aid Upgrades

Runway 17-35 is currently equipped with two-box precision approach path indicators (PAPI-2s). This project plans for an upgrade to four-box PAPIs and the installation of runway end identification lights (REILs) on each runway end.

#6 – Routine Pavement Maintenance

As airfield pavements deteriorate over time, rehabilitation must be performed to extend their lifespan until a full reconstruction is necessary. This item serves as a placeholder for miscellaneous pavement maintenance projects that are anticipated to be needed over the next five years.

#7 – Obstruction Removal

There are a number of airspace obstructions (trees) at F17, as identified in the airport layout plan (ALP), which will be included as an appendix. The sponsor should coordinate with the FAA/TxDOT to prioritize the removal of these obstructions. Additional coordination with landowners will also be necessary prior to removal. This project serves as a placeholder to account for obstruction removal projects over the next five years.

ULTIMATE-TERM PLANNING PROJECTS

Projects identified in the ultimate term are those anticipated to be needed beyond the next five years; some may exceed the 20-year timeframe of this planning project. Generally, these projects are reflective of capacity enhancements, such as construction of apron and taxilane pavement to support future landside facilities. Relocation of Runway 17-35 and Taxiway A (south of the apron) are also included.

#8 – Install Perimeter Fencing

This project plans for expansion of the perimeter fencing at the airport to fully enclose the property and prevent unauthorized/inadvertent access to the airfield by people and wildlife.

#9 – Replace/Relocate Fuel Tanks

Center Municipal Airport has two 6,000-gallon fuel tanks: one for Jet A fuel and one for 100LL fuel. This project plans for replacement of the tanks, which are more than 30 years old, and relocation to the south end of the apron. An optional third tank is also included for the addition of unleaded aviation fuel, if/when demand for this fuel type arises.

#10 – Relocate AWOS

The location of the airport's automated weather observation system (AWOS-3) limits development potential on the airport, as the AWOS critical area must be maintained clear of objects or structures that could cause signal interference. This project plans for relocation of the equipment to the northwest side of airport property. To meet FAA siting requirements, the equipment placement falls just outside the airport's current boundary. This placement, combined with the need to maintain a clear critical area, necessitates the acquisition of approximately 8.7 acres of property, along with removal/topping of trees within the critical area.

#11 – Expand Apron and Relocate Tiedowns

This project includes an expansion of the terminal apron to the east. The additional pavement is necessary to reconfigure/relocate the existing tiedowns on the apron. This project includes removal of existing tiedown markings, which obstruct the ultimate taxiway object free area associated with existing Taxiway D (refer to **Exhibit 3B**), and installation/marking of new tiedowns, as shown on **Exhibit 4A**.

#12 – Property Acquisition to Protect Ultimate RPZs

A 26.2-acre portion of land within the ultimate Runway 17 runway protection zone (RPZ) and an 8.3-acre parcel within the ultimate Runway 35 RPZ are not controlled by the airport (refer to **Exhibit 4A**). This project plans for fee simple acquisition of these areas (where feasible) to limit development and includes the cost to prepare environmental documentation (likely a CatEx).

#13 – Runway Relocation/Widening and Related Projects

Runway 17-35 is planned to be shifted to the north, with 694 feet of new pavement constructed on the north end and 694 feet removed from the south end to shift the C-III safety areas onto airport property. The runway is also planned to be widened to 100 feet. Taxiway A is planned to be extended to the north and a new threshold connector (A1) constructed. On the south end, Taxiway A5 is planned to be constructed to connect to the ultimate Runway 35 threshold. Also included is the relocation of the southern portion of the taxiway to the east to meet the 400-foot separation requirement for the ultimate C-III runway environment. This project also includes expansion of the runway and taxiway lighting systems, airfield signage, relocation of the PAPIs/REILs, clearance of obstructions within the C-III safety areas, and environmental documentation.

#14 – Construct Apron/Taxilane Pavement for Future Landside Development

New hangars are planned south of the city-owned T-hangar near the current AWOS location. To support this future development, this project plans for the construction of new taxilanes and apron pavement to provide access to these facilities from the airside.

#15 – Construct Taxilane Pavement for Future Landside Development

Two new T-hangars are planned north of the existing landside facilities. This project includes construction of taxilane pavement to support this development.

#16 – Construct Apron/Taxilane Pavement for Future Landside Development

Additional box hangars are planned to be constructed on the south side of the airport, including a row of executive box hangars and two larger conventional hangars along State Highway 7. Construction of apron and taxilane pavement is included with this project, along with construction of a vehicle access road and parking to better segregate aircraft and vehicle movements. This road is planned to extend from the existing access point on State Highway 7.

#17 – Relocate Rotating Beacon and Electrical Vault

The rotating beacon and electrical vault are currently located north of the terminal building in an area that has potential for aeronautical development. If/when there is demand to develop this property for aeronautical use, this equipment and the non-directional beacon (NDB) must be relocated/removed. This project plans for relocation of the rotating beacon and electrical vault to a new site south of the terminal. The NDB is planned to be decommissioned and the equipment removed.

#18 – Acquire Property for Future Development

Approximately 5.8 acres of undeveloped land northeast of the existing landside area are planned to be acquired for future aeronautical development, if demand warrants additional expansion of hangar or other aviation-related infrastructure.

#19 – Routine Pavement Maintenance

As airfield pavements deteriorate over time, rehabilitation must be performed to extend their lifespan until a full reconstruction is necessary. This item serves as a placeholder for miscellaneous pavement maintenance projects that are anticipated to be needed in the ultimate period (years 6-20).

#20 – Obstruction Removal

This project serves as a placeholder to account for obstruction removal projects in the ultimate period. The sponsor should coordinate with the FAA/TxDOT to prioritize the removal of these obstructions. Additional coordination with landowners will also be necessary prior to removal.

PLAN IMPLEMENTATION

To implement the plan recommendations, it is key to recognize that planning is a continuous process and does not end with approval of this document. The airport should implement measures that allow it to track various demand indicators, such as based aircraft, hangar demand, and operations. The issues on which this study is based will remain valid for a number of years. The primary goal is for Center Municipal Airport to best serve the air transportation needs of the region while achieving economic self-sufficiency.

The CIP and phasing program presented will change over time. An effort has been made to identify and prioritize all major capital projects that would require federal or state grant funding; nevertheless, the airport and TxDOT should review the five-year CIP on an annual basis.

The value of this study lies in keeping the issues and objectives at the forefronts of the minds of decision-makers. In addition to adjustments in aviation demand, decisions regarding when to undertake the improvements recommended in this study will impact how long the plan remains valid. The format of this plan reduces the need for formal and costly updates by simply adjusting the timing of project implementation. Updates can be performed by airport management, thereby improving the plan's effectiveness; nevertheless, airports are typically encouraged to update their master plans and/or ALPs every seven to 10 years, or sooner if significant changes occur in the interim.

In summary, the planning process requires the City of Center to consistently monitor the progress of the airport. The information obtained from continually monitoring activity will provide the data necessary to determine if the development schedule should be accelerated or decelerated.

Appendix A

Glossary of Terms

GLOSSARY OF TERMS

A

Above Ground Level: The elevation of a point or surface above the ground.

Accelerate-Stop Distance Available (ASDA): See declared distances.

Advisory Circular: External publications issued by the FAA consisting of non-regulatory material providing for the recommendations relative to a policy, guidance and information relative to a specific aviation subject.

Air Carrier: An operator which: (1) performs at least five round trips per week between two or more points and publishes flight schedules which specify the times, days of the week, and places between which such flights are performed; or (2) transports mail by air pursuant to a current contract with the U.S. Postal Service. Certified in accordance with Federal Aviation Regulation (FAR) Parts 121 and 127.

Air Route Traffic Control Center (ARTCC): A facility established to provide air traffic control service to aircraft operating on an IFR flight plan within controlled airspace and principally during the enroute phase of flight.

Air Taxi: An air carrier certificated in accordance with FAR Part 121 and FAR Part 135 and authorized to provide, on demand, public transportation of persons and property by aircraft. Generally operates small aircraft "for hire" for specific trips.

Air Traffic Control: A service operated by an appropriate organization for the purpose of providing for the safe, orderly, and expeditious flow of air traffic.

Air Traffic Control System Command Center: A facility operated by the FAA which is responsible for the central flow control, the central altitude reservation system, the airport reservation position system, and the air traffic service contingency command for the air traffic control system.

Air Traffic Hub: A categorization of commercial service airports or group of commercial service airports in a metropolitan or urban area based upon the proportion of annual national enplanements existing at the airport or airports. The categories are large hub, medium hub, small hub, or non-hub. It forms the basis for the apportionment of entitlement funds.

Air Transport Association Of America: An organization consisting of the principal U.S. airlines that represents the interests of the airline industry on major aviation issues before federal, state, and local government bodies. It promotes air transportation safety by coordinating industry and governmental safety programs and it serves as a focal point for industry efforts to standardize practices and enhance the efficiency of the air transportation system.

Aircraft: A transportation vehicle that is used or intended for use for flight.

Aircraft Approach Category: A grouping of aircraft based on 1.3 times the stall speed in their landing configuration at their maximum certificated landing weight. The categories are as follows:

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

Aircraft Operation: The landing, takeoff, or touch-and-go procedure by an aircraft on a runway at an airport.

Aircraft Operations Area (AOA): A restricted and secure area on the airport property designed to protect all aspects related to aircraft operations.

Aircraft Owners And Pilots Association: A private organization serving the interests and needs of general aviation pilots and aircraft owners.

Aircraft Rescue And Fire Fighting: A facility located at an airport that provides emergency vehicles, extinguishing agents, and personnel responsible for minimizing the impacts of an aircraft accident or incident.

Airfield: The portion of an airport which contains the facilities necessary for the operation of aircraft.

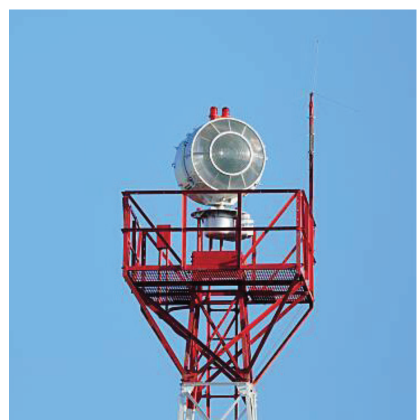
Airline Hub: An airport at which an airline concentrates a significant portion of its activity and which often has a significant amount of connecting traffic.

Airplane Design Group (ADG): A grouping of aircraft based upon wingspan. The groups are as follows:

- **Group I:** Up to but not including 49 feet.
- **Group II:** 49 feet up to but not including 79 feet.
- **Group III:** 79 feet up to but not including 118 feet.
- **Group IV:** 118 feet up to but not including 171 feet.
- **Group V:** 171 feet up to but not including 214 feet.
- **Group VI:** 214 feet or greater.

Airport Authority: A quasi-governmental public organization responsible for setting the policies governing the management and operation of an airport or system of airports under its jurisdiction.

Airport Beacon: A navigational aid located at an airport which displays a rotating light beam to identify whether an airport is lighted.


Airport Beacon

Airport Capital Improvement Plan: The planning program used by the Federal Aviation Administration to identify, prioritize, and distribute funds for airport development and the needs of the National Airspace System to meet specified national goals and objectives.

Airport Elevation: The highest point on the runway system at an airport expressed in feet above mean sea level (MSL).

Airport Improvement Program: A program authorized by the Airport and Airway Improvement Act of 1982 that provides funding for airport planning and development.

Airport Layout Drawing (ALD): The drawing of the airport showing the layout of existing and proposed airport facilities.

Airport Layout Plan (ALP): A scaled drawing of the existing and planned land and facilities necessary for the operation and development of the airport.

Airport Layout Plan Drawing Set: A set of technical drawings depicting the current and future airport conditions. The individual sheets comprising the set can vary with the complexities of the airport, but the FAA-required drawings include the Airport Layout Plan (sometimes referred to as the Airport Layout Drawing (ALD), the Airport Airspace Drawing, and the Inner Portion of the Approach Surface Drawing, On-Airport Land Use Drawing, and Property Map.

Airport Master Plan: A local planning document that serves as a guide for the long-term development of an airport.

Airport Movement Area Safety System: A system that provides automated alerts and warnings of potential runway incursions or other hazardous aircraft movement events.

Airport Obstruction Chart: A scaled drawing depicting the Federal Aviation Regulation (FAR) Part 77 surfaces, a representation of objects that penetrate these surfaces, runway, taxiway, and ramp areas, navigational aids, buildings, roads and other detail in the vicinity of an airport.

Airport Reference Code (ARC): A coding system used to relate airport design criteria to the operational (Aircraft Approach Category) to the physical characteristics (Airplane Design Group) of the airplanes intended to operate at the airport.

Airport Reference Point (ARP): The latitude and longitude of the approximate center of the airport.

Airport Sponsor: The entity that is legally responsible for the management and operation of an airport, including the fulfillment of the requirements of laws and regulations related thereto.

Airport Surface Detection Equipment: A radar system that provides air traffic controllers with a visual representation of the movement of aircraft and other vehicles on the ground on the airfield at an airport.

Airport Surveillance Radar: The primary radar located at an airport or in an air traffic control terminal area that receives a signal at an antenna and transmits the signal to air traffic control display equipment defining the location of aircraft in the air. The signal provides only the azimuth and range of aircraft from the location of the antenna.

Airport Traffic Control Tower (ATCT): A central operations facility in the terminal air traffic control system, consisting of a tower, including an associated instrument flight rule (IFR) room if radar equipped, using air/ground communications and/or radar, visual signaling and other devices to provide safe and expeditious movement of terminal air traffic.

Airside: The portion of an airport that contains the facilities necessary for the operation of aircraft.

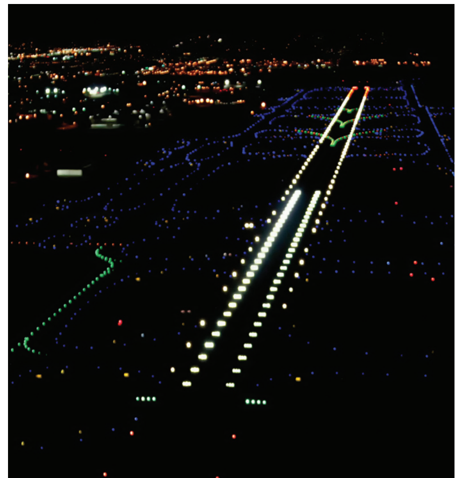
Airspace: The volume of space above the surface of the ground that is provided for the operation of aircraft.

Alert Area: See special-use airspace.

Altitude: The vertical distance measured in feet above mean sea level.

Annual Instrument Approach (AIA): An approach to an airport with the intent to land by an aircraft in accordance with an IFR flight plan when visibility is less than three miles and/or when the ceiling is at or below the minimum initial approach altitude.

Approach Lighting System (ALS): An airport lighting facility which provides visual guidance to landing aircraft by radiating light beams by which the pilot aligns the aircraft with the extended centerline of the runway on final approach and landing.



Approach Lighting System

Approach Minimums: The altitude below which an aircraft may not descend while on an IFR approach unless the pilot has the runway in sight.

Approach Surface: An imaginary obstruction limiting surface defined in FAR Part 77 which is longitudinally centered on an extended runway centerline and extends outward and upward from the primary surface at each end of a runway at a designated slope and distance based upon the type of available or planned approach by aircraft to a runway.

Apron: A specified portion of the airfield used for passenger, cargo or freight loading and unloading, aircraft parking, and the refueling, maintenance and servicing of aircraft.

Area Navigation: The air navigation procedure that provides the capability to establish and maintain a flight path on an arbitrary course that remains within the coverage area of navigational sources being used.

Automated Terminal Information Service (ATIS): The continuous broadcast of recorded non-control information at towered airports. Information typically includes wind speed, direction, and runway in use.

Automated Surface Observation System (ASOS): A reporting system that provides frequent airport ground surface weather observation data through digitized voice broadcasts and printed reports.

Automated Weather Observation System (AWOS): Equipment used to automatically record weather conditions (i.e., cloud height, visibility, wind speed and direction, temperature, dew point, etc.)

Automatic Direction Finder (ADF): An aircraft radio navigation system which senses and indicates the direction to a non-directional radio beacon (NDB) ground transmitter.

Avigation Easement: A contractual right or a property interest in land over which a right of unobstructed flight in the airspace is established.

Azimuth: Horizontal direction expressed as the angular distance between true north and the direction of a fixed point (as the observer's heading).

B

Base Leg: A flight path at right angles to the landing runway off its approach end. The base leg normally extends from the downwind leg to the intersection of the extended runway centerline. See "traffic pattern."

Based Aircraft: The general aviation aircraft that use a specific airport as a home base.

Bearing: The horizontal direction to or from any point, usually measured clockwise from true north or magnetic north.

Blast Fence: A barrier used to divert or dissipate jet blast or propeller wash.

Blast Pad: A prepared surface adjacent to the end of a runway for the purpose of eliminating the erosion of the ground surface by the wind forces produced by airplanes at the initiation of takeoff operations.

Building Restriction Line (BRL): A line which identifies suitable building area locations on the airport.


Blast Fence

C

Capital Improvement Plan: The planning program used by the Federal Aviation Administration to identify, prioritize, and distribute Airport Improvement Program funds for airport development and the needs of the National Airspace System to meet specified national goals and objectives.

Cargo Service Airport: An airport served by aircraft providing air transportation of property only, including mail, with an annual aggregate landed weight of at least 100,000,000 pounds.

Ceiling: The height above the ground surface to the location of the lowest layer of clouds which is reported as either broken or overcast.

Circling Approach: A maneuver initiated by the pilot to align the aircraft with the runway for landing when flying a predetermined circling instrument approach under IFR.

Class A Airspace: See Controlled Airspace.

Class B Airspace: See Controlled Airspace.

Class C Airspace: See Controlled Airspace.

Class D Airspace: See Controlled Airspace.

Class E Airspace: See Controlled Airspace.

Class G Airspace: See Controlled Airspace.

Clear Zone: See Runway Protection Zone.

Commercial Service Airport: A public airport providing scheduled passenger service that enplanes at least 2,500 annual passengers.

Common Traffic Advisory Frequency (CTAF): A radio frequency identified in the appropriate aeronautical chart which is designated for the purpose of transmitting airport advisory information and procedures while operating to or from an uncontrolled airport.

Compass Locator (LOM): A low power, low/medium frequency radio-beacon installed in conjunction with the instrument landing system at one or two of the marker sites.

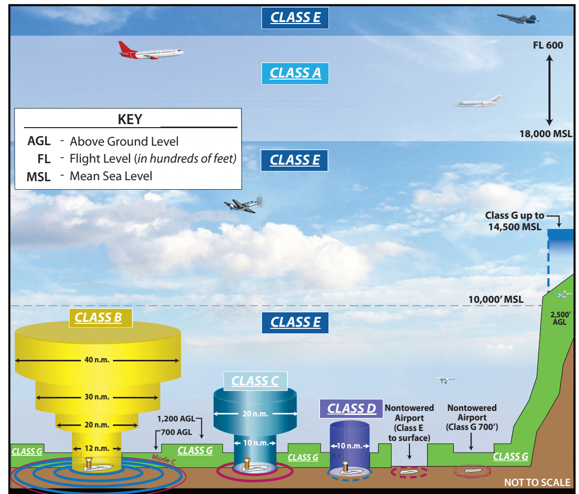
Conical Surface: An imaginary obstruction- limiting surface defined in FAR Part 77 that extends from the edge of the horizontal surface outward and upward at a slope of 20 to 1 for a horizontal distance of 4,000 feet.

Controlled Airport: An airport that has an operating airport traffic control tower.

Controlled Airspace: Airspace of defined dimensions within which air traffic control services are provided to instrument flight rules (IFR) and visual flight rules (VFR) flights in accordance with the airspace classification. Controlled airspace in the United States is designated as follows:

CLASS A: Generally, the airspace from 18,000 feet mean sea level (MSL) up to but not including flight level FL600. All persons must operate their aircraft under IFR.

CLASS B: Generally, the airspace from the surface to 10,000 feet MSL surrounding the nation's busiest airports. The configuration of Class B airspace is unique to each airport, but typically consists of two or more layers of air space and is designed to contain all published instrument approach procedures to the airport. An air traffic control clearance is required for all aircraft to operate in the area.



Airspace Classifications

CLASS C: Generally, the airspace from the surface to 4,000 feet above the airport elevation (charted as MSL) surrounding those airports that have an operational control tower and radar approach control and are served by a qualifying number of IFR operations or passenger enplanements. Although individually tailored for each airport, Class C airspace typically consists of a surface area with a five nautical mile (nm) radius and an outer area with a 10 nautical mile radius that extends from 1,200 feet to 4,000 feet above the airport elevation. Two-way radio communication is required for all aircraft.

CLASS D: Generally, that airspace from the surface to 2,500 feet above the airport elevation (charted as MSL) surrounding those airports that have an operational control tower. Class D airspace is individually tailored and configured to encompass published instrument approach procedure. Unless otherwise authorized, all persons must establish two-way radio communication.

CLASS E: Generally, controlled airspace that is not classified as Class A, B, C, or D. Class E airspace extends upward from either the surface or a designated altitude to the overlying or adjacent controlled airspace. When designated as a surface area, the airspace will be configured to contain all instrument procedures. Class E airspace encompasses all Victor Airways. Only aircraft following instrument flight rules are required to establish two-way radio communication with air traffic control.

CLASS G: Generally, that airspace not classified as Class A, B, C, D, or E. Class G airspace is uncontrolled for all aircraft. Class G airspace extends from the surface to the overlying Class E airspace.

Controlled Firing Area: See special-use airspace.

Crosswind: A wind that is not parallel to a runway centerline or to the intended flight path of an aircraft.

Crosswind Component: The component of wind that is at a right angle to the runway centerline or the intended flight path of an aircraft.

Crosswind Leg: A flight path at right angles to the landing runway off its upwind end. See "traffic pattern."

D

Decibel: A unit of noise representing a level relative to a reference of a sound pressure 20 micro newtons per square meter.

Decision Height/Decision Altitude: The height above the end of the runway surface at which a decision must be made by a pilot during the ILS or Precision Approach Radar approach to either continue the approach or to execute a missed approach.

Declared Distances: The distances declared available for the airplane's takeoff runway, takeoff distance, accelerate-stop distance, and landing distance requirements. The distances are:

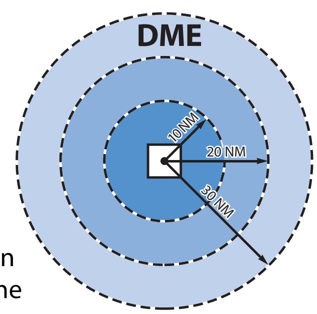
- **Takeoff Run Available (TORA):** The runway length declared available and suitable for the ground run of an airplane taking off.
- **Takeoff Distance Available (TODA):** The TORA plus the length of any remaining runway and/or clear way beyond the far end of the TORA.
- **Accelerate-stop Distance Available (ASDA):** The runway plus stopway length declared available for the acceleration and deceleration of an aircraft aborting a takeoff.
- **Landing Distance Available (LDA):** The runway length declared available and suitable for landing.

Department Of Transportation: The cabinet level federal government organization consisting of modal operating agencies, such as the Federal Aviation Administration, which was established to promote the coordination of federal transportation programs and to act as a focal point for research and development efforts in transportation.

Discretionary Funds: Federal grant funds that may be appropriated to an airport based upon designation by the Secretary of Transportation or Congress to meet a specified national priority such as enhancing capacity, safety, and security, or mitigating noise.

Displaced Threshold: A threshold that is located at a point on the runway other than the designated beginning of the runway.

Distance Measuring Equipment (DME): Equipment (airborne and ground) used to measure, in nautical miles, the slant range distance of an aircraft from the DME navigational aid.



DNL: The 24-hour average sound level, in decibels, obtained after the addition of ten decibels to sound levels for the periods between 10 p.m. and 7 a.m. as averaged over a span of one year. It is the FAA standard metric for determining the cumulative exposure of individuals to noise.

Downwind Leg: A flight path parallel to the landing runway in the direction opposite to landing. The downwind leg normally extends between the crosswind leg and the base leg. Also see "traffic pattern."

E

Easement: The legal right of one party to use a portion of the total rights in real estate owned by another party. This may include the right of passage over, on, or below the property; certain air rights above the property, including view rights; and the rights to any specified form of development or activity, as well as any other legal rights in the property that may be specified in the easement document.

Elevation: The vertical distance measured in feet above mean sea level.

Enplaned Passengers: The total number of revenue passengers boarding aircraft, including originating, stop-over, and transfer passengers, in scheduled and nonscheduled services.

Enplanement: The boarding of a passenger, cargo, freight, or mail on an aircraft at an airport.

Entitlement: Federal funds for which a commercial service airport may be eligible based upon its annual passenger enplanements.

Environmental Assessment (EA): An environmental analysis performed pursuant to the National Environmental Policy Act to determine whether an action would significantly affect the environment and thus require a more detailed environmental impact statement.

Environmental Audit: An assessment of the current status of a party's compliance with applicable environmental requirements of a party's environmental compliance policies, practices, and controls.

Environmental Impact Statement (EIS): A document required of federal agencies by the National Environmental Policy Act for major projects or legislative proposals affecting the environment. It is a tool for decision-making describing the positive and negative effects of a proposed action and citing alternative actions.

Essential Air Service: A federal program which guarantees air carrier service to selected small cities by providing subsidies as needed to prevent these cities from such service.

F

Federal Aviation Regulations: The general and permanent rules established by the executive departments and agencies of the Federal Government for aviation, which are published in the Federal Register. These are the aviation subset of the Code of Federal Regulations.

Federal Inspection Services: The provision of customs and immigration services including passport inspection, inspection of baggage, the collection of duties on certain imported items, and the inspections for agricultural products, illegal drugs, or other restricted items.

Final Approach: A flight path in the direction of landing along the extended runway centerline. The final approach normally extends from the base leg to the runway. See "traffic pattern."

Final Approach and Takeoff Area (FATO): A defined area over which the final phase of the helicopter approach to a hover, or a landing is completed and from which the takeoff is initiated.

Final Approach Fix: The designated point at which the final approach segment for an aircraft landing on a runway begins for a non-precision approach.

Finding Of No Significant Impact (FONSI): A public document prepared by a Federal agency that presents the rationale why a proposed action will not have a significant effect on the environment and for which an environmental impact statement will not be prepared.

Fixed Base Operator (FBO): A provider of services to users of an airport. Such services include, but are not limited to, hangaring, fueling, flight training, repair, and maintenance.

Flight Level: A measure of altitude used by aircraft flying above 18,000 feet. Flight levels are indicated by three digits representing the pressure altitude in hundreds of feet. An airplane flying at flight level 360 is flying at a pressure altitude of 36,000 feet. This is expressed as FL 360.

Flight Service Station (FSS): An operations facility in the national flight advisory system which utilizes data interchange facilities for the collection and dissemination of Notices to Airmen, weather, and administrative data and which provides preflight and in-flight advisory services to pilots through air and ground based communication facilities.

Frangible Navaid: A navigational aid which retains its structural integrity and stiffness up to a designated maximum load, but on impact from a greater load, breaks, distorts, or yields in such a manner as to present the minimum hazard to aircraft.

G

General Aviation: That portion of civil aviation which encompasses all facets of aviation except air carriers holding a certificate of convenience and necessity, and large aircraft commercial operators.

General Aviation Airport: An airport that provides air service to only general aviation.

Glideslope (GS): Provides vertical guidance for aircraft during approach and landing. The glideslope consists of the following:

- Electronic components emitting signals which provide vertical guidance by reference to airborne instruments during instrument approaches such as ILS; or
- Visual ground aids, such as PAPI, which provide vertical guidance for VFR approach or for the visual portion of an instrument approach and landing.

Global Positioning System (GPS): A system of satellites used as reference points to enable navigators equipped with GPS receivers to determine their latitude, longitude, and altitude.

Ground Access: The transportation system on and around the airport that provides access to and from the airport by ground transportation vehicles for passengers, employees, cargo, freight, and airport services.

Ground Based Augmentation System (GBAS): A program that augments the existing GPS system by providing corrections to aircraft in the vicinity of an airport in order to improve the accuracy of these aircrafts' GPS navigational position

H

Helipad: A designated area for the takeoff, landing, and parking of helicopters.

High Intensity Runway Lights (HIRL): The highest classification in terms of intensity or brightness for lights designated for use in delineating the sides of a runway.

High-speed Exit Taxiway: An acute-angled exit taxiway forming a 30 degree angle with the runway centerline, designed to allow an aircraft to exit a runway without having to decelerate to typical taxi speed.

Horizontal Surface: An imaginary obstruction-limiting surface defined in FAR Part 77 that is specified as a portion of a horizontal plane surrounding a runway located 150 feet above the established airport elevation. The specific horizontal dimensions of this surface are **a** function of the types of approaches existing or planned for the runway.

Hot Spot: A location on an airport movement area with a history of potential risk of collision or runway incursion, and where heightened attention by pilots and drivers is necessary.

I

Initial Approach Fix: The designated point at which the initial approach segment begins for an instrument approach to a runway.

Instrument Approach Procedure: A series of predetermined maneuvers for the orderly transfer of an aircraft under instrument flight conditions from the beginning of the initial approach to a landing, or to a point from which a landing may be made visually.

Instrument Flight Rules (IFR): Procedures for the conduct of flight in weather conditions below Visual Flight Rules weather minimums. The term IFR is often also used to define weather conditions **and the type of flight plan under which an aircraft is operating.**

Instrument Landing System (ILS): A precision instrument approach system which normally consists of the following electronic components and visual aids:

1. Localizer	3. Outer Marker	5. Approach Lights
2. Glide Slope	4. Middle Marker	

Instrument Meteorological Conditions: Meteorological conditions expressed in terms of specific visibility and ceiling conditions that are less than the minimums specified for visual meteorological conditions.

Itinerant Operations: Operations by aircraft that are arriving from outside the traffic pattern or departing the airport traffic pattern.

K

Knots: A unit of speed length used in navigation that is equivalent to the number of nautical miles traveled in one hour.

L

Landside: The portion of an airport that provides the facilities necessary for the processing of passengers, cargo, freight, and ground transportation vehicles.

Landing Distance Available (LDA): See declared distances.

Large Airplane: An airplane that has a maximum certified takeoff weight in excess of 12,500 pounds.

Local Operations: Aircraft operations performed by aircraft that operate in the local traffic pattern or within sight of the airport, that are known to be departing for or arriving from flights in local practice areas within a prescribed distance from the airport, or that execute simulated instrument approaches at the airport. Typically, this includes touch and-go training operations.

Localizer: The component of an ILS which provides course guidance to the runway.


Localizer

Localizer Type Directional Aid (LDA): A facility of comparable utility and accuracy to a localizer but is not part of a complete ILS and is not aligned with the runway.

Low Intensity Runway Lights: The lowest classification in terms of intensity or brightness for lights designated for use in delineating the sides of a runway.

M

Medium Intensity Runway Lights: The middle classification in terms of intensity or brightness for lights designated for use in delineating the sides of a runway.

Military Operations: Aircraft operations that are performed in military aircraft.

Military Operations Area (MOA): See special-use airspace

Military Training Route: An air route depicted on aeronautical charts for the conduct of military flight training at speeds above 250 knots.

Missed Approach Course (MAC): The flight route to be followed if, after an instrument approach, a landing is not affected, and occurring normally:

- When the aircraft has descended to the decision height and has not established visual contact; or
- When directed by air traffic control to pull up or to go around again.

Movement Area: The runways, taxiways, and other areas of an airport which are utilized for taxiing/hover taxiing, air taxiing, takeoff, and landing of aircraft, exclusive of loading ramps and parking areas. At those airports with a tower, air traffic control clearance is required for entry onto the movement area.

N

National Airspace System (NAS): The network of air traffic control facilities, air traffic control areas, and navigational facilities through the U.S.

National Plan Of Integrated Airport Systems (NPIAS): The national airport system plan developed by the Secretary of Transportation on a biannual basis for the development of public use airports to meet national air transportation needs.

National Transportation Safety Board: A federal government organization established to investigate and determine the probable cause of transportation accidents, to recommend equipment and procedures to enhance transportation safety, and to review on appeal the suspension or revocation of any certificates or licenses issued by the Secretary of Transportation.

Nautical Mile: A unit of length used in navigation which is equivalent to the distance spanned by one minute of arc in latitude, that is, 1,852 meters or 6,076 feet. It is equivalent to approximately 1.15 statute mile.

Navaid: A term used to describe any electrical or visual air navigational aids, lights, signs, and associated supporting equipment (i.e., PAPI, VASI, ILS, etc.)

Navigational Aid: A facility used as, available for use as, or designed for use as an aid to air navigation.

Noise Contour: A continuous line on a map of the airport vicinity connecting all points of the same noise exposure level.

Non-directional Beacon (NDB): A beacon transmitting non-directional signals whereby the pilot of an aircraft equipped with direction finding equipment can determine their bearing to and from the radio beacon and home on, or track to, the station. When the radio beacon is installed in conjunction with the Instrument Landing System marker, it is normally called a Compass Locator.

Non-precision Approach Procedure: A standard instrument approach procedure in which no electronic glide slope is provided, such as VOR, TACAN, NDB, or LOC.

Notice To Air Missions (NOTAM): A notice containing information concerning the establishment, condition, or change in any component of or hazard in the National Airspace System, the timely knowledge of which is considered essential to personnel concerned with flight operations.

O

Object Free Area (OFA): An area on the ground centered on a runway, taxiway, or taxilane centerline provided to enhance the safety of aircraft operations by having the area free of objects, except for objects that need to be located in the OFA for air navigation or aircraft ground maneuvering purposes.

Obstacle Free Zone (OFZ): The airspace below 150 feet above the established airport elevation and along the runway and extended runway centerline that is required to be kept clear of all objects, except for frangible visual NAVAIDs that need to be located in the OFZ because of their function, in order to provide clearance for aircraft landing or taking off from the runway, and for missed approaches.

Operation: The take-off, landing, or touch-and-go procedure by an aircraft on a runway at an airport.

Outer Marker (OM): An ILS navigation facility in the terminal area navigation system located four to seven miles from the runway edge on the extended centerline, indicating to the pilot that he/she is passing over the facility and can begin final approach.

P

Pilot-controlled Lighting: Runway lighting systems at an airport that are controlled by activating the microphone of a pilot on a specified radio frequency.

Precision Approach: A standard instrument approach procedure which provides runway alignment and glide slope (descent) information. It is categorized as follows:

- **CATEGORY I (CAT I):** A precision approach which provides for approaches with a decision height of not less than 200 feet and visibility not less than 1/2 mile or Runway Visual Range (RVR) 2400 (RVR 1800) with operative touchdown zone and runway centerline lights.
- **CATEGORY II (CAT II):** A precision approach which provides for approaches with a decision height of not less than 100 feet and visibility not less than 1200 feet RVR.
- **CATEGORY III (CAT III):** A precision approach which provides for approaches with minimal less than Category II.

Precision Approach Path Indicator (PAPI): A lighting system providing visual approach slope guidance to aircraft during a landing approach. A PAPI normally consists of four light units but an abbreviated system of two lights is acceptable for some categories of aircraft.


Precision Approach Path Indicator

Precision Approach Radar: A radar facility in the terminal air traffic control system used to detect and display with a high degree of accuracy the direction, range, and elevation of an aircraft on the final approach to a runway.

Precision Object Free Zone (POFZ): An area centered on the extended runway centerline, beginning at the runway threshold and extending behind the runway threshold that is 200 feet long by 800 feet wide. The POFZ is a clearing standard which requires the POFZ to be kept clear of above ground objects protruding above the runway safety area edge elevation (except for frangible NAVAIDS). The POFA is only in effect when the approach includes vertical guidance, the reported ceiling is below 250 feet, and an aircraft is on final approach within two miles of the runway threshold.

Primary Airport: A commercial service airport that enplanes at least 10,000 annual passengers.

Primary Surface: An imaginary obstruction limiting surface defined in FAR Part 77 that is specified as a rectangular surface longitudinally centered about a runway. The specific dimensions of this surface are a function of the types of approaches existing or planned for the runway.

Prohibited Area: See special-use airspace.

PVC: Poor visibility and ceiling. Used in determining Annual Service Volume. PVC conditions exist when the cloud ceiling is less than 500 feet and visibility is less than one mile.

R

Radial: A navigational signal generated by a Very High Frequency Omni-directional Range or VORTAC station that is measured as an azimuth from the station.

Regression Analysis: A statistical technique that seeks to identify and quantify the relationships between factors associated with a forecast.

Remote Communications Outlet (RCO): An unstaffed transmitter receiver/facility remotely controlled by air traffic personnel. RCOs serve flight service stations (FSSs). RCOs were established to provide ground-to-ground communications between air traffic control specialists and pilots at satellite airports for delivering enroute clearances, issuing departure authorizations, and acknowledging instrument flight rules cancellations or departure/landing times.

Remote Transmitter/receiver (RTR): See remote communications outlet. RTRs serve ARTCCs.

Reliever Airport: An airport to serve general aviation aircraft which might otherwise use a congested air-carrier served airport.

Restricted Area: See special-use airspace.

RNAV: Area navigation - airborne equipment which permits flights over determined tracks within prescribed accuracy tolerances without the need to overfly ground-based navigation facilities. Used enroute and for approaches to an airport.

Runway: A defined rectangular area on an airport prepared for aircraft landing and takeoff. Runways are normally numbered in relation to their magnetic direction, rounded off to the nearest 10 degrees. For example, a runway with a magnetic heading of 180 would be designated Runway 18. The runway heading on the opposite end of the runway is 180 degrees from that runway end. For example, the opposite runway heading for Runway 18 would be Runway 36 (magnetic heading of 360). Aircraft can takeoff or land from either end of a runway, depending upon wind direction.

Runway Alignment Indicator Light (RAIL): A series of high intensity sequentially flashing lights installed on the extended centerline of the runway usually in conjunction with an approach lighting system.

Runway Design Code: A code signifying the FAA design standards to which the runway is to be built.

Runway End Identification Lighting (REIL): Two synchronized flashing lights, one on each side of the runway threshold, which provide rapid and positive identification of the approach end of a particular runway.

REIL

Runway Gradient: The average slope, measured in percent, between the two ends of a runway.

Runway Protection Zone (RPZ): An area off the runway end to enhance the protection of people and property on the ground. The RPZ is trapezoidal in shape. Its dimensions are determined by the aircraft approach speed and runway approach type and minimal.

Runway Reference Code: A code signifying the current operational capabilities of a runway and taxiway.

Runway Safety Area (RSA): A defined surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot, or excursion from the runway.

Runway Visibility Zone (RVZ): An area on the airport to be kept clear of permanent objects so that there is an unobstructed line of sight from any point five feet above the runway centerline to any point five feet above an intersecting runway centerline.

Runway Visual Range (RVR): An instrumentally derived value, in feet, representing the horizontal distance a pilot can see down the runway from the runway end.

S

Scope: The document that identifies and defines the tasks, emphasis, and level of effort associated with a project or study.

Segmented Circle: A system of visual indicators designed to provide traffic pattern information at airports without operating control towers, often co-located with a wind cone.

Shoulder: An area adjacent to the edge of paved runways, taxiways, or aprons providing a transition between the pavement and the adjacent surface; support for aircraft running off the pavement; enhanced drainage; and blast protection. The shoulder Does Not Necessarily Need To Be Paved.

Slant-range Distance: The straight line distance between an aircraft and a point on the ground.

Small Aircraft: An aircraft that has a maximum certified takeoff weight of up to 12,500 pounds.

Special-use Airspace: Airspace of defined dimensions identified by a surface area wherein activities must be confined because of their nature and/or wherein limitations may be imposed upon aircraft operations that are not a part of those activities. Special-use airspace classifications include:

- **ALERT AREA:** Airspace which may contain a high volume of pilot training activities or an unusual type of aerial activity, neither of which is hazardous to aircraft.
- **CONTROLLED FIRING AREA:** Airspace wherein activities are conducted under conditions so controlled as to eliminate hazards to nonparticipating aircraft and to ensure the safety of persons or property on the ground.
- **MILITARY OPERATIONS AREA (MOA):** Designated airspace with defined vertical and lateral dimensions established outside Class A airspace to separate/segregate certain military activities from instrument flight rule (IFR) traffic and to identify for visual flight rule (VFR) traffic where these activities are conducted.
- **PROHIBITED AREA:** Designated airspace within which the flight of aircraft is prohibited.
- **RESTRICTED AREA:** Airspace designated under Federal Aviation Regulation (FAR) 73, within which the flight of aircraft, while not wholly prohibited, is subject to restriction. Most restricted areas are designated joint use. When not in use by the using agency, IFR/VFR operations can be authorized by the controlling air traffic control facility.
- **WARNING AREA:** Airspace which may contain hazards to nonparticipating aircraft.

Standard Instrument Departure (SID): A preplanned coded air traffic control IFR departure routing, preprinted for pilot use in graphic and textual form only.

Standard Instrument Departure Procedures: A published standard flight procedure to be utilized following takeoff to provide a transition between the airport and the terminal area or enroute airspace.

Standard Terminal Arrival Route (STAR): A preplanned coded air traffic control IFR arrival routing, preprinted for pilot use in graphic and textual or textual form only.

Stop-and-go: A procedure wherein an aircraft will land, make a complete stop on the runway, and then commence a takeoff from that point. A stop-and-go is recorded as two operations: one operation for the landing and one operation for the takeoff.

Stopway: An area beyond the end of a takeoff runway that is designed to support an aircraft during an aborted takeoff without causing structural damage to the aircraft. It is not to be used for takeoff, landing, or taxiing by aircraft.

Straight-in Landing/approach: A landing made on a runway aligned within 30 degrees of the final approach course following completion of an instrument approach.

T

Tactical Air Navigation (TACAN):
An ultrahigh frequency electronic air navigation system which provides suitably equipped aircraft a continuous indication of bearing and distance to the TACAN **station.**

Takeoff Runway Available (TORA):
See declared distances.

Takeoff Distance Available (TODA):
See declared distances.

Taxilane: A taxiway designed for low speed and precise taxiing. Taxilanes are usually, but not always, located outside the movement area and provide access to from taxiways to aircraft parking positions and other terminal areas.

Taxiway: A defined path established for the taxiing of aircraft from one part of an airport to another.

Taxiway Design Group: A classification of airplanes based on outer to outer Main Gear Width (MGW) and Cockpit to Main Gear (CMG) distance.

Taxiway Safety Area (TSA): A defined surface alongside the taxiway prepared or suitable for reducing the risk of damage to an airplane unintentionally departing the taxiway.

Terminal Instrument Procedures: Published flight procedures for conducting instrument approaches to runways under instrument meteorological conditions.

Terminal Radar Approach Control:
An element of the air traffic control system responsible for monitoring the enroute and terminal segment of air traffic in the airspace surrounding airports with moderate to high levels of air traffic.

Tetrahedron: A device used as a landing direction indicator. The small end of the tetrahedron points in the direction of landing.


Tetrahedron

Threshold: The beginning of that portion of the runway available for landing. In some instances, the threshold may be displaced.

Touch-and-go: An operation by an aircraft that lands and departs on a runway without stopping or exiting the runway. A touch-and-go is recorded as two operations: one operation for the landing and one operation for the takeoff.

Touchdown: The point at which a landing aircraft makes contact with the runway surface.

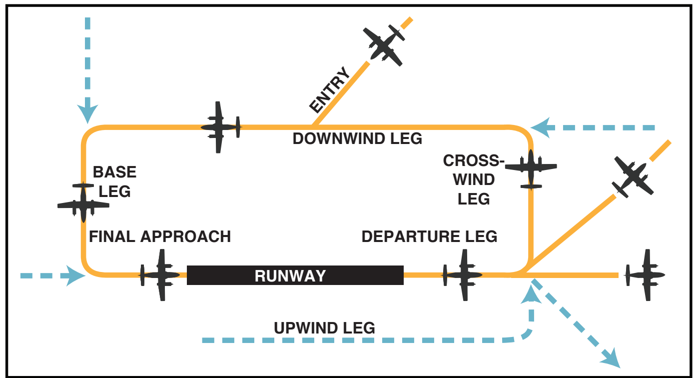
Touchdown and Lift-off Area (TLOF):
A load bearing, generally paved area, normally centered in the FATO, on which a helicopter lands or takes off.

Touchdown Zone (TDZ): The first 3,000 feet of the runway beginning at the threshold.

Touchdown Zone Elevation (TDZE):
The highest elevation in the touchdown zone.

Touchdown Zone Lighting: Two rows of transverse light bars located symmetrically about the runway centerline normally at 100-foot intervals. The basic system extends 3,000 feet along the runway.

Traffic Pattern: The traffic flow that is prescribed for aircraft landing at or taking off from an airport. The components of a typical traffic pattern are the upwind leg, crosswind leg, downwind leg, base leg, and final approach.



Traffic Pattern

U

Uncontrolled Airport: An airport without an airport traffic control tower at which the control of Visual Flight Rules traffic is not exercised.

Uncontrolled Airspace: Airspace within which aircraft are not subject to air traffic control.

Universal Communication (UNICOM):
A non-government communication facility which may provide airport information at certain airports. Locations and frequencies of UNICOMs are shown on aeronautical charts and publications.

Upwind Leg: A flight path parallel to the landing runway in the direction of landing. See "traffic pattern."

V

Vector: A heading issued to an aircraft to provide navigational guidance by radar.

Very High Frequency Omni-directional Range (VOR):
A ground-based electronic navigation aid transmitting very high frequency navigation signals, 360 degrees in azimuth, oriented from magnetic north. Used as the basis for navigation in the national airspace system. The VOR periodically identifies itself by Morse Code and may have an additional voice identification feature.

Very High Frequency Omni-directional Range/Tactical Air Navigation (VORTAC):
A navigation aid providing VOR azimuth, TACAN azimuth, and TACAN distance-measuring equipment (DME) at one site.

Victor Airway: A system of established routes that run along specified VOR radials, from one VOR station to another.

Visual Approach: An approach wherein an aircraft on an IFR flight plan, operating in VFR conditions under the control of an air traffic control facility and having an air traffic control authorization, may proceed to the airport of destination in VFR conditions.

Visual Approach Slope Indicator (VASI):
An airport lighting facility providing vertical visual approach slope guidance to aircraft during approach to landing. The VASI is now obsolete and is being replaced with the PAPI.

Visual Flight Rules (VFR): Rules that govern the procedures for conducting flight under visual conditions. The term VFR is also used in the United States to indicate weather conditions that are equal to or greater than minimum VFR requirements. In addition, it is used by pilots and controllers to indicate type of flight plan.

Visual Meteorological Conditions: Meteorological conditions expressed in terms of specific visibility and ceiling conditions which are equal to or greater than the threshold values for instrument meteorological conditions.

Visual Runway: A runway without an existing or planned instrument approach.

VOR: See "Very High Frequency Omni-directional Range."

VORTAC: See "Very High Frequency Omni-directional Range/Tactical Air Navigation."

W

Warning Area: See special-use airspace.

Wide Area Augmentation System: An enhancement of the Global Positioning System that includes integrity broadcasts, differential corrections, and additional ranging signals for the purpose of providing the accuracy, integrity, availability, and continuity required to support all phases of flight.

Windsock/Windcone: A visual aid that indicates the prevailing wind direction and intensity at a particular location.


Windsock/Windcone

Abbreviations

AAM: advanced air mobility

AC: advisory circular

ACIP: airport capital improvement program

ADF: automatic direction finder

ADG: airplane design group

ADS-B: automatic dependent surveillance-broadcast

AFSS: automated flight service station

AGL: above ground level

AIA: annual instrument approach

AIP: Airport Improvement Program

AIR-21: Wendell H. Ford Aviation Investment and Reform Act for the 21st Century

ALS: approach lighting system

ALSF-1: standard 2,400-foot high intensity approach lighting system with sequenced flashers (CAT I configuration)

ALSF-2: standard 2,400-foot high intensity approach lighting system with sequenced flashers (CAT II configuration)

AOA: Aircraft Operation Area

APRC: approach reference code

APV: instrument approach procedure with vertical guidance

ARC: airport reference code

ARFF: aircraft rescue and fire fighting

ARP: airport reference point

ARTCC: air route traffic control center

ASDA: accelerate-stop distance available

ASR: airport surveillance radar

ASOS: automated surface observation station

ASV: annual service volume

ATC: airport traffic control

ATCT: airport traffic control tower

ATIS: automated terminal information service

AVGAS: aviation gasoline - typically 100 low lead (100LL)

AWOS: automated weather observation station

BRL: building restriction line

CFR: Code of Federal Regulation

CIP: capital improvement program

DME: distance measuring equipment

DNL: day-night noise level

DPRC: departure reference code

DWL: runway weight bearing capacity of aircraft with dual-wheel type landing gear

DTWL: runway weight bearing capacity of aircraft with dual-tandem type landing gear

eVTOL: electric vertical takeoff and landing aircraft

FAA: Federal Aviation Administration

FAR: Federal Aviation Regulation

FBO: fixed base operator

FY: fiscal year

GA: general aviation

GPS: global positioning system

GS: glide slope

HIRL: high intensity runway edge lighting

IFR: instrument flight rules (FAR Part 91)

ILS: instrument landing system

IM: inner marker

LDA: localizer type directional aid

LDA: landing distance available

LIRL: low intensity runway edge lighting

LMM: compass locator at middle marker

LNAV: lateral navigation

LOC: localizer

LOM: compass locator at outer marker

LP: localizer performance

LPV: localizer performance with vertical guidance

MALS: medium intensity approach lighting system

MALSR: MALS with runway alignment indicator lights

MALSF: MALS with sequenced flashers

MIRL: medium intensity runway edge lighting

MITL: medium intensity taxiway edge lighting

MLS: microwave landing system

MM: middle marker

MOA: military operations area

MSL: mean sea level

MTOW: maximum takeoff weight

NAVAID: navigational aid

NDB: non-directional radio beacon

NEPA: National Environmental Policy Act

NM: nautical mile (6,076.1 feet)

NPDES: National Pollutant Discharge Elimination System

NPIAS: National Plan of Integrated Airport Systems

NPRM: notice of proposed rule making

ODALS: omni-directional approach lighting system

OFA: object free area

OFZ: obstacle free zone

OM: outer marker

PAPI: precision approach path indicator

PFC: porous friction course

PFC: passenger facility charge

PCI: pavement condition index

PCL: pilot-controlled lighting

PIW: public information workshop

POFZ: precision object free zone

PVC: poor visibility and ceiling

RCO: remote communications outlet

RDC: runway design code

REIL: runway end identification lighting

RNAV: area navigation

RPAS: remotely piloted unmanned aircraft system

RPZ: runway protection zone

RSA: runway safety area

RTR: remote transmitter/receiver

RVR: runway visibility range

RVZ: runway visibility zone

SALS: short approach lighting system

SASP: state aviation system plan

SEL: sound exposure level

SID: standard instrument departure

SM: statute mile (5,280 feet)

SRE: snow removal equipment

SSALF: simplified short approach lighting system with runway alignment indicator lights

STAR: standard terminal arrival route

SWL: runway weight bearing capacity for aircraft with single-wheel tandem type landing gear

TACAN: tactical air navigational aid

TAF: Federal Aviation Administration (FAA) Terminal Area Forecast

TDG: taxiway design group

TLOF: Touchdown and lift-off

TDZ: touchdown zone

TDZE: touchdown zone elevation

TODA: takeoff distance available

TORA: takeoff runway available

TRACON: terminal radar approach control

UAS: unmanned aircraft system

VASI: visual approach slope indicator

VFR: visual flight rules (FAR Part 91)

VHF: very high frequency

VOR: very high frequency omni-directional range

VORTAC: very high frequency omni-directional range/tactical air navigation

WAAS: wide area augmentation system

Appendix B

Forecast Approval Letter

August 19, 2024

Coffman Associates, Inc.
Mr. Mike Dmyterko
12920 Metcalf Ave. Suite 200,
Overland Park, KS 66213

Airport Operations/Based Aircraft Forecast Approval

Mr. Dmyterko,

TxDOT Aviation has completed review of forecast information for Center Municipal Airport. We have found the forecast to be supported by reasonable planning assumptions and current data and developed using acceptable forecasting methodologies. Accordingly, this forecast is approved for the use in the Airport Layout Plan with Narrative for Center Municipal Airport.

TxDOT Aviation approval of the baseline scenario in this forecast does not constitute justification for future projects. Justification for future projects will be made based on activity levels at the time the project is requested for development. Documentation of actual activity levels meeting planning activity levels will be necessary to justify AIP funding for eligible projects. Further, the approved forecast may be subject to additional analyses if the fundamental rationale of the forecast or the critical aircraft changes materially.

If you have any questions concerning this matter, please contact me at (512) 496-8557 or christian.cox@txdot.gov

Sincerely,

CCOX3 Digitally signed by CCOX3
DN: E=Christian.Cox@txdot.gov, CN=CCOX3, OU=AVN, OU=Divisions, OU=Users, OU=TxDOT, DC=dot, DC=state, DC=tx, DC=us
Date: 2024.08.19 11:23:28-05'00'

Christian Cox
TxDOT Business Ops Project Manager

eCC: Chad Nehring, City Manager

Appendix C

Runway 17-35 Pavement Investigation

Draft Report

Center Municipal Airport (F17)

Runway 17-35 Pavement Investigation

Prepared for
TxDOT – Aviation Division

Texas Department of Transportation

Prepared by

Mead & Hunt

OCTOBER 2024

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EXECUTIVE SUMMARY

TxDOT Aviation requested a pavement investigation for Center Municipal Airport (F17) due to upwelling issues encountered during a recent slurry seal and crack seal project. The investigation revealed 14 to 17 inches of asphalt over 7 to 10 inches aggregate base. Subgrade soils are clay, with CBR values of 1 and 9 in the sampled locations. Corings and borings were extended through pavement cracks to assess the failure method. Pavement cracks typically extended from the surface down. There are 3 distinct pavement layers with delamination of the top 2-inch lift occurring at each core location. Delamination is likely occurring due to hydraulic lift by water trapped between pavement layers. Removal and replacement of the delaminating layer and underlying weaker layer should remedy the seepage issues, with additional analysis and options described in this report.

INTRODUCTION AND SCOPE

OVERVIEW

This report was prepared by Mead & Hunt, Inc. (Consultant) as a stand-alone pavement investigation for Runway 17-35 at the Center Municipal Airport (F17). This report is intended to summarize the included geotechnical recommendations and provide design considerations for remediation of the observed distresses.

SCOPE OF WORK

In general, this investigation included the following elements:

1. Perform a visual inspection of the runway pavement.
2. Perform 5 pavement cores to determine pavement thickness.
3. Perform 5 borings to determine subgrade conditions and soil properties.
4. Provide options for rehabilitation or reconstruction based on the data collected.
5. Determine useful life of the pavement section.

DESIGN CRITERIA

The methods and techniques used in the geotechnical investigation conformed with ASTM and TxDOT standards. Pavement design is per Federal Aviation Administration (FAA) *Advisory Circular (AC) 150/5320-6G - Airport Pavement Design and Evaluation.*

BACKGROUND

Center Municipal Airport (F17) is a single runway airport with a single full-length parallel taxiway. General aviation aircraft range from small, single engine propeller aircraft to a small private business jet. Runway 17-35 was originally constructed circa 1985 at a length of 4,000-feet and a width of 75-feet. It was extended to the north circa 1992 to a length of 5,505-feet. It is constructed entirely of asphalt pavement with edge lights and taxiway exit signs along its entire length. Drainage is south-southeast along the runway safety area, with two storm drain crossings to the west.

During a recent slurry seal and crack seal project, it was observed that the crack sealant was being dislodged by water upwelling through the pavement cracks that were being sealed. The pavement and work areas were dry, but it was noted to have rained relatively recently.

VISUAL INSPECTION DURING GEOTECHNICAL LAYOUT

The visual inspection and geotechnical layout started at the north end of the runway. Pavements were observed to exhibit random cracking and paving joint cracking. Some areas exhibited tighter cracking patterns, approaching alligator cracking, but no rutting was identified. Pavement was not actively generating FOD, but open cracks had evidence of chipping in a few locations (less than 5%).

The visual inspection and geotechnical layout proceeded south. By the runway's midpoint (Taxiway C) the random cracking and paving joint cracking was consistent across the runway width. Some areas exhibited tighter cracking patterns, approaching alligator cracking, but no rutting was identified. A few local areas appeared ready to generate FOD, and open cracks had observed pavement staining, indicative of water leaching up through the pavement. The area of staining was small, typically less than 1/4" beyond the crack edge. Staining occurred at some point in roughly 25% of cracks over 0.1 inches. Staining was observed in sealed and unsealed cracks, but predominately not in paving lane cracks.

The visual inspection and geotechnical layout proceeded to the airfield's south end and lowest elevation. The most southerly portion of the runway exhibited the same random cracking and paving joint cracking consistent across the entire runway width, with a noticeable increase in crack severity (frequency and width). Block cracking at 5x5-foot spacing was suspected at some locations. Some areas exhibited tighter cracking patterns, approaching alligator cracking, but no rutting was identified. Some unsealed cracks on paving lanes, including the centerline paving lane, were generating small amounts of FOD. Many open cracks had observed pavement staining, indicative of water leaching up through the pavement. The area of staining was larger, with some stains exceeding 1-inch in width. Staining was not limited to larger cracks. Staining occurred in roughly 50% of cracks over 0.1 inch. Staining was observed in sealed and unsealed cracks, including continuous staining in one of the paving lane cracks.

GEOTECHNICAL INVESTIGATION

OVERVIEW

The investigation was to determine the existing pavement thicknesses and evaluate the need for reconstruction or rehabilitation of the runway. To determine the failure mode of cracks, 5 cores and 5 additional bores were made in the existing pavements and centered over existing cracks to determine if the surface cracks were reflective cracks from a lower level of pavement, or more related to failures of the surface course. Bore holes were also pre-cored to create a clean patch wall and to collect the core information. Subgrade soils were sampled to determine soil type and evaluate the likelihood of perched groundwater seeping up through the pavement.

RESULTS

The geotechnical investigation encountered extremely thick AC pavement (by current design methodologies), with only one 12-inch core (C-103) fully recoverable. The bore locations B-1, B-3, B-4, and B-5 revealed 17-inch thick asphalt pavement on 7 to 8 inches of aggregate base. Boring B-2 was 14-inches of asphalt on 10-inches aggregate base. This is a nominal 24-inch section, in both the original portion of the runway and the relatively newer extension.

Cores and core-walls revealed three distinct pavement layers. The surface course consisted of a 2-inch thick overlay. This overlay appears to have angular aggregates, of approximately 3/8" max rock size. The overlay section typically broke away clean, and each debonded from the layer below. The middle layer also appears to be a 2 or 2.5 inch overlay of the original construction. This section of asphalt appeared to be constructed of different aggregates (more tan) than the bottom and top lifts. The field notes indicate most surface cracks extended to this layer, with one core clearly showing a wide surface crack in the top layer extending through the middle layer and essentially stopping at the bottom layer. The bottom layer of pavement, constructed in multiple lifts, is 7.5 to 8 inches thick. No significant failures were observed in the bottom layer.

Subgrade soils are clays and fat clays, with sampled CBR values of 1.3 and 8.8 (1 and 8 nominal). More information would need to be gathered to determine the appropriate CBR for design, but experience has shown clays typically have CBR values below 4.

DESIGN CONSIDERATIONS

Original Considerations

Many interacting conditions can cause the observed upwelling of water from the surface layer. Past experience has shown seasonally high ground water and saturated subgrade to cause upwelling of water. Clay lenses in subgrade can cause perched water and saturated aggregate base, resulting in local failures of upwelling. These conditions can be exacerbated by poor drainage adjacent to pavements

The geotechnical investigation did not observe perched water nor saturated subgrades and the local area was well drained with positive slopes extending from the runway, indicating these are not likely causes.

Determination Based on Findings

The observed pavement failure patterns of tight block cracking, leading to alligator cracking, are indicative of load failure. Since there is no rutting, the failure is not coming from the supporting subgrade, but is a failure of the asphalt pavements. Direct asphalt pavement failure is indicative of pavement sections being too thin to carry the load. The 17-inch pavement section is more than sufficient for the loads seen by Center Municipal Airport. Therefore, it is concluded that the top 2-inch lift is acting independently from the lower pavement layers. This is further evident in the delamination of the top lift in each of the cores. Without a tight bond between the top lift and the lower lift, moisture accumulates between the layers, causing the top lift to essentially float and be subject to hydraulic forces during pavement loading.

RECOMMENDATIONS

Full-depth reconstruction of the pavements is not warranted.

Based on the pavement conditions observed during the investigation, the runway has the structural capacity to handle the aircraft loading at Center Municipal indefinitely.

The most recent 2-inch overlay and the underlying 2-inch to 2.5-inch layer should be removed. Delamination and related failures will continue to accelerate as there is no practical way to remove moisture between the pavement lifts. The bottom 9-inch layer can be protected in place. A new overlay, likely 5-inches set in 2 lifts, should be constructed to return the surface to existing grade.

Runway edge light cans are set in concrete rings, and do not appear significantly lower than the pavement edge. There would likely be a difficulty in lowering the final pavement edge elevation (for example with a single 3-inch overlay after a 5.5-inch removal) and still complying with minimum shoulder slope criteria. A detailed survey and pavement investigation can further define these parameters.

COST ESTIMATE

Item	Quantity	Unit	Unit Cost	Total
Asphalt (@5.5")	14,666	Ton	$200	$2,933,133
Demolish Asphalt (@5.5")	45,875	SY	$5	$229,375
Marking	1	LS	$200,000	$200,000
Contingency	1%	LS	20%	$672,502
			TOTAL	$4,035,009

The entire project does not have to be constructed at once. While the repair work should consider economy of scale, the project is large enough that effective repairs are possible across multiple phases / funding cycles. In fact, a single smaller project addressing the worst-case areas should confirm the findings and assumptions of this investigation prior to the complete pavement rehabilitation project. It should be noted that small patching projects addressing local failures will not prevent nor delay the pavement failure methods described here-in.

CONCLUSION

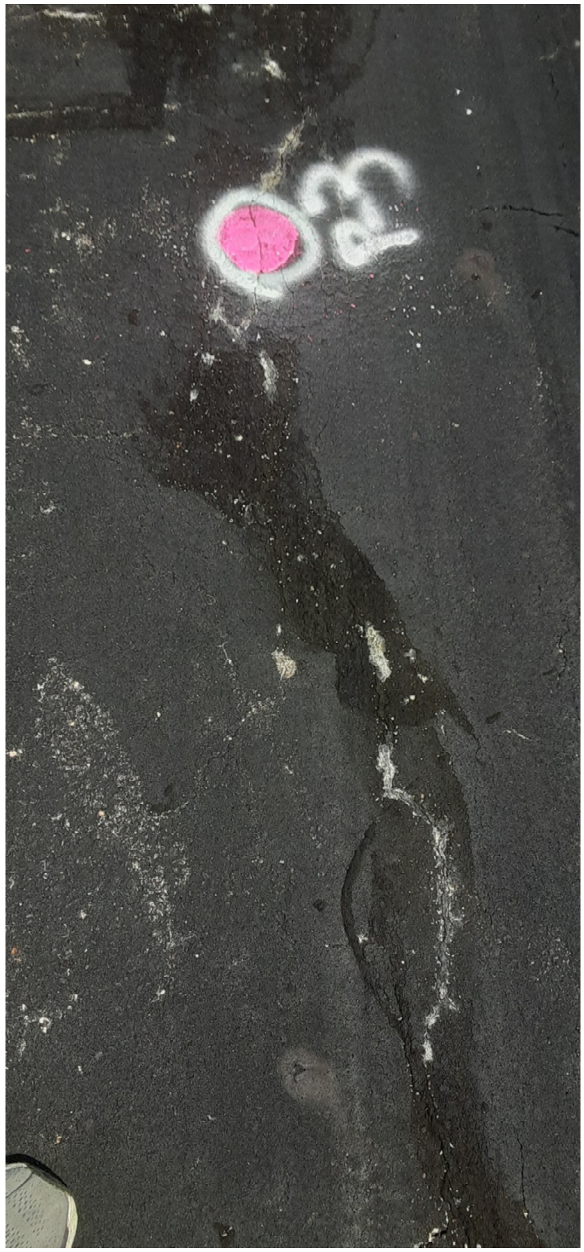
Due to the existing pavement thickness and integrity at lower depths, a full-depth reconstruction is not warranted. Ensuring that a tack coat is applied between the existing pavement and new pavement, as well as each lift of asphalt, will help prevent future similar issues. Full-depth reclamation could be considered a long-term alternative to reconstruction, as the existing aggregate base and asphalt sections are more than sufficient for design loads.

EXHIBIT A – PHOTOS

One inch drop off at edge of runway, positive drainage on unpaved shoulder (west side, 17 end, looking north).

Ringed runway edge light.

Paving joint cracking, random cracking, crack seal.
Notably few stains from upwelling.
Runway 17 end looking south.



Upwelling staining from cracks.

Random cracking, tight block cracking, notable upwelling staining at larger sealed cracks. Bore location 3, looking south.

Longitudinal paving joint with staining. Transverse cracks, sealed and unsealed, with staining. Runway 35 approach, looking south.

Overlaid pavement layers evident at runway/taxiway connection at south end of runway.

FOD-generating crack adjacent to sealed crack.
Evidence of upwelling. South end of Runway.

EXHIBIT B – GEOTECHNICAL REPORT

Draft Geotechnical Data Report

TxDOT Aviation – Center Municipal Airport (F17) Runway Investigation

Arias Job No. 2024-74

Prepared For

Mead & Hunt, Inc.
September 25, 2024

142 Chula Vista, San Antonio, Texas 78232 • Phone: (210) 308-5884 • Fax: (210) 308-5886

September 25, 2024
Arias Job No. 2024-74 Via Email: Chris.Swonke@meadhunt.com

Mr. Chris Swonke, P.E.
Project Manager
Mead & Hunt, Inc.
4099 McEwen, Suite 450
Dallas, TX 75209

RE: Geotechnical Data Report
TxDOT Aviation – Center Municipal Airport (F17) Runway Investigation
Center, Texas

Dear Mr. Swonke,

This draft Geotechnical Engineering Report presents the results of our geotechnical study for the proposed runway rehabilitation/reconstruction at the Municipal Airport in Center, Texas. This study was authorized on May 29, 2024, by Jeremy Lee of Mead & Hunt per Master Consultant Terms and Conditions of Agreement Service Work Order No. 3084900-241722.01-01

The purpose of this geotechnical data report is to provide pavement and subgrade soil borings and laboratory testing data for the Municipal Airport project in Center, Texas under Mead & Hunt existing TxDOT Aviation Facilities Improvements IDIQ contract. Our findings and recommendations should be incorporated into the design and construction documents for the proposed development.

The long-term success of the project will be affected by the quality of materials used for construction and the adherence of the construction to the project plans and specifications. The quality of construction can be evaluated by implementing Quality Assurance (QA) testing through a qualified and certified testing laboratory.

Thank you for the opportunity to be of service to you. If we may be of further service, please call or email with comments or questions.

Sincerely,

ARIAS & ASSOCIATES, INC.
TBPE Registration No: F-32

Mohadeseh Mahmoudi, E.I.T.
Geotechnical Engineer

Dexter Bacon, P.E.
Principal Engineer
Geotechnical Services

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INTRODUCTION

The Geotechnical Data Report presented herein is for the rehabilitation/reconstruction of the Municipal Airport Pavement in Center, Texas. This study was authorized, on May 29, 2024, by Jeremy Lee of Mead & Hunt per Master Consultant Terms and Conditions of Agreement Service Work Order No. 3084900-241722.01-01. The study was performed in general accordance with the services outlined in the Arias & Associates, Inc. (Arias) proposal.

SCOPE OF SERVICES

The scope of services for this Project was to:

1. Perform five (5) geotechnical borings for the proposed pavements to obtain soil samples for subsequent laboratory testing, as well as to characterize subsurface stratigraphic and groundwater conditions along the Project alignment,
2. Perform five (5) pavement cores at each of the boring locations, plus five (5) additional pavement cores at selected locations to determine pavement layer types and approximate layer thicknesses,
3. Perform laboratory testing on recovered soil samples to evaluate engineering soil properties, as well as for subsurface soil characterization; and,
4. Present the results of the field and laboratory test data in this GDR.

Analyses of slopes and/or retaining walls, as well as providing environmental services, are not included in our authorized scope of services for this project.

PROJECT DESCRIPTION

We understand that the runway at Center Municipal Airport is being assessed to determine the order of magnitude for rehabilitation. The location of the proposed pavement reconstruction is presented in the Vicinity Map included as Figure 1 of Appendix A. Site photographs are included in Figure 4 of Appendix A.

FIELD EXPLORATION

A total of five (5) borings were drilled along the Project alignment to a depth of 10 feet from the existing ground or pavement surface elevation. Pavement coring was performed at each of these boring locations, and an additional five pavement cores were taken at five specified locations.

The approximate exploration locations shown on the Boring Location Plan provided as Figure 2 in Appendix A. The locations were identified in the field by Arias personnel in consultation with Mead & Hunt, using a hand-held GPS unit so that underground utility locations could be identified and marked prior to the start of drilling. As-drilled boring locations and depths are summarized in the following Table 1.

Table 1: As-Drilled Boring Locations and Depths

Boring No.	As- Drilled GPS Coordinates		Depth, feet
	Latitude	Longitude	
B-1	N 31° 50’ 14.96”	W 94° 9’ 27.54”	10
B-2	N 31° 49’ 56.86”	W 94° 9’ 23.65”	10
B-3	N 31° 49’ 48.11”	W 94° 9’ 22.14”	10
B-4	N 31° 49’ 40.40”	W 94° 9’ 20.48”	10
B-5	N 31° 49’ 30.58”	W 94° 9’ 18.61”	10

Soil classifications and borehole logging were performed by our Field Technicians and Engineers-In-Training (E.I.T.’s) under the direct supervision of the project Senior Geotechnical Engineer. A truck-mounted drill rig fitted with a wet-rotary core barrel was used to collect pavement cores for the pavement borings. Various drilling methods coupled with the sampling procedures noted herein were used to advance borings and secure subsurface soil samples beneath the existing pavement structure or ground surface. The drilling methods employed for this Project included the use of continuous flight augers (ASTM D 1452), hollow-stem augers (ASTM D 6151), wet-rotary (ASTM D 5783), and/or air-rotary (ASTM D 5782) drilling techniques. Soil samples were obtained by pushing thin-walled tubes, driving split-barrel samplers, and/or by obtaining grab samples from the auger or air rotary cuttings. Arias’ field representative visually logged each recovered sample and placed a portion of the recovered sample into a plastic bag for transport to our laboratory.

Texas Cone Penetrometer (TCP) tests were performed starting at a depth of 5 feet, and then at 5-foot intervals thereafter, to evaluate the in-situ subsurface material conditions in general accordance with the TxDOT Test Method Tex-132-E as described subsequently. During the drilling operation, the cone for the TCP test was initially seated by driving it with 12 blows of the hammer, and then subsequently driving the cone in two consecutive 6-inch intervals. The number of blows for each of the 6-inch intervals was recorded. Where dense to very dense granular soil or hard to very hard clay, marl or clay-shale was encountered, the cone was initially seated by driving it with 12 blows of the hammer, and then the number of inches the cone was driven for two consecutive 50-blow increments was recorded. The number of blows per 6-inch interval, or the inches of penetration per 50-blow increment, are noted on the WinCore boring logs.

After completion of drilling, for borings drilled through pavements, cuttings and bentonite chips were used to backfill to within about 3 feet from the pavement surface, dry concrete mix was then used to fill up to the bottom of the pavement section, and the remainder was filled with tamped cold patch asphalt.

Soil classifications and borehole logging were conducted during the exploration as previously noted. The final soil classifications presented on the WinCore boring logs, which are provided in Appendix B, were determined by the Project Senior Geotechnical Engineer based on laboratory and field test results. The soil descriptions provided on the boring logs generally conform to the Unified Soils Classification System (USCS). A key to the terms and symbols used on the boring logs is provided in Appendix B.

The TCP values, which provide indications of the consistency (i.e. undrained shear strength) of cohesive soils and density (relative density) of the cohesionless soils, are used for classification purposes and in engineering evaluations. These TCP values are computed using one of the two methods previously discussed. Examples are noted below:

1. TCP value of 38 refers to 38 blows were necessary to drive the TCP 12 inches, or
2. TCP value of 100/7" refers to 100 blows were necessary to drive the TCP 7 inches.

The density of cohesionless soils and the consistency of cohesive soils are recorded on the TxDOT WinCore boring logs. The densities and consistencies are in accordance with Table 4-1 given on Pages 4-2 of the TxDOT Geotechnical Manual, dated March 2018, which is reproduced in part in Table 2 below.

Table 2: Density and Consistency of Soils by TxDOT Method

Density of Cohesionless Soils	Consistency of Cohesive Soils	TCP Values (blows per foot)
Very Loose	Very Soft	0 – 8
Loose	Soft	8 – 20
Slightly Compact	Stiff	20 – 40
Compact	Very Stiff	40 – 80
Dense	Hard	80 – 100/5"
Very Dense	Very Hard	100/ 0" – 100/5"

Note: Estimating the density of cohesionless soils and the consistency of cohesive soils as a function of the TCP value is approximate.

LABORATORY TESTING

As a supplement to the field exploration, laboratory testing was conducted to determine index properties including soil moisture content, Atterberg Limits, percent passing the U.S. Standard No. 200 sieve, particle size analysis of soils, unconfined compressive strength, Modified

Proctor test, and California Bearing Ratio (CBR). The laboratory testing assignments were determined by Arias in general accordance with the proposed work scope.

These laboratory test results are reported on the boring logs provided in Appendix B, which were prepared using the WinCore program. The test name, TxDOT or ASTM test method, and the column designations on the WinCore boring log where data are presented are summarized subsequently in Table 3.

Table 3: Laboratory Test Name, Method, and Log Designation

Test Name	Test Method	Log Designation
Determining Moisture Content in Soil Materials	Tex-103-E	Properties
Determining Liquid Limit of Soils	Tex-104-E	Properties
Determining Plastic Limit of Soils	Tex-105-E	Properties
Calculating the Plasticity Index of Soils	Tex-106-E	Properties
Particle Size Analysis of Soils	Tex-110-E	Additional Remarks
Determining the Amount of Materials in Soils Finer than the (No. 200) Sieve	Tex-111-E	Additional Remarks
Laboratory Classification of Soils for Engineering Purposes	Tex-142-E	Strata Description
Unit Dry Density (from Tube Samples)	ASTM D 7263	Additional Remarks
Unconfined Compressive Strength of Soil	ASTM D 2166	Additional Remarks

In addition to the field TCP testing, the strength of cohesive soils was estimated by performing hand-held pocket penetrometer (PP) tests on the recovered thin-walled tube samples. The PP values (at the respective test sample depths) are reported in tons per square foot (tsf) on the boring logs.

Remaining soil samples recovered from this exploration will be discarded following submittal of this report in final form.

Unconfined Compression Test Results

A total of 5 unconfined compression (Uc) tests were performed. The test results are reported on the boring logs in the “Additional Remarks” column as the compressive strength at failure in tons per square foot (tsf) and presented in Table 4 subsequently.

Table 4: Unconfined Compression Strength Test Results

Boring No.	Sample Depth Interval, feet	Moisture Content, %	Dry Density, pcf	Unconfined Compressive Strength, tsf (psi)
B-1	8 – 10	31	94	2.46 (34.2)
B-2	2 – 4	18	100	1.59 (22.1)
B-3	2 – 4	33	89	1.93 (26.8)
B-4	4 – 6	17	105	2.72 (37.8)
B-5	2 – 4	23	98	1.69 (23.5)

Grain Size Distribution

Sieve analysis was performed on select soil samples obtained from the soil borings (on base materials) to develop grain size distribution curves. The grain size distribution curves are presented in Appendix D.

Our interpreted D60 and D30 values are provided subsequently in Table 5. The D60 and D30 values are the diameter of the soil particle (in millimeters) below which 60% and 30% material (by weight), respectively, of the soil sample has a smaller diameter.

Table 5: D60 and D30 Values from Grain Size Distribution Curves

Boring No.	Depth (feet)	D60 (mm)	D30 (mm)
B-1	1.5	3.23	0.623
B-4	1.5	5.54	1.73
B-5	1.5	4.99	0.523

Grain size testing was also performed on select subgrade samples at the locations shown on the Grain Size Distribution graphs in Appendix D.

California Bearing Ratio

Bulk samples of the near-surface soils were obtained from four (4) locations as specified and requested by Mead & Hunt to aid in developing a subgrade-support value for the pavement design to be performed by Mead & Hunt. Laboratory testing performed on the bulk sample included Atterberg limits, percent passing the US Standard No. 200 sieve, moisture-density relationship, and California Bearing Ratio (CBR). The moisture-density relationship, using the Standard & Modified Proctor (ASTM D 698 & ASTM D1557) method, was performed to establish the optimum moisture content and the maximum dry density of the composite sample when subjected to a specified compactive effort. Laboratory CBR tests were performed using the three-point method. The CBR results are shown in the table below and included in **Appendix E.**

Table 6: CBR Test Results

Sample Location	B-1, B-2	B-4, B-5
Liquid Limit (LL)	57	37
Plasticity Index (PI)	31	22
Maximum Dry Density (pcf) ASTM D-698/ 1557	114.0	117.4
Optimum Moisture Content (%)	14.4	10.9
CBR at 95% of Maximum Dry Density	1.3	8.8

SUBSURFACE CONDITIONS

The geology, generalized stratigraphy, and groundwater conditions at the Project site are discussed in the following sections. The subsurface stratigraphic and groundwater conditions are based on conditions encountered at the boring locations at the time of exploration and to the depths explored.

Pavement Materials

Pavement coring was performed using a 4-inch diameter core barrel at all five boring locations, along with an additional five cores at specified locations. The pavement was cored prior to advancing the soil drilling operation; however, it was thicker than the capacity of our coring equipment. We cored to the full capacity of the instrument, which is approximately 12 inches deep. Initially, we were informed that the asphalt thickness ranged from 3 to 8 inches. As a result, we were only able to recover the entire core from C-103. For the remaining locations, we had to auger through the pavement to advance the borings.

After completion of coring, recovered asphalt cores were placed into a plastic bag for transport to our laboratory. Our findings indicate that the asphalt pavement thickness ranged from 12 to 17 inches. During coring, the pavement cores separated into layers at 2 inches and then at 4 inches. The full-length core could not be recovered due to equipment limitations. From the recovered core C-103, three layers of asphalt are distinct. The recovered cores reveal that cracks originate from the surface, extending down to 4 inches and potentially reaching depths of up to 6 inches. The pavement core photos are shown in Appendix C.

Table 7 presented subsequently includes: (1) the measured pavement thickness of the asphalt and base materials and (2) the subgrade soil type below the pavement section.

Table 7: Existing Pavement Structure at Pavement Boring Locations

Boring No.	Pavement Section, inches			Subgrade Soil
	Asphalt	Base	Total	
B-1	17	7	24	Light brown with gray Sandy lean clay (CL)
B-2	14	10	24	Light Brown and gray Fat Clay (CH)
B-3	17	7	24	Reddish Brown to gray Fat Clay (CH)
B-4	17	7	24	Light Brown and gray Lean Clay with sand (CL)
B-5	17	8	25	Light Brown and gray Lean Clay with sand (CL)
C-103	12	NA	--	--

Geology

According to the Geologic Atlas of Texas, the project site is primarily mapped as Wilcox Group (EPAwi). A brief description of this geologic unit is presented below.

Wilcox Group (EPAwi): Locally, the Wilcox is mostly mudstone with varying amounts of sandstone and lignite. In the upper and lowermost part, this group is commonly glauconitic. The mudstone is massive to thin bedded, with some silt and very fine sand laminae with color varying from light brown to dark gray. The sandstone is fine to very fine grained and light gray to brown in color. A Geologic Map of the project site is provided in Figure 3 of Appendix A.

Generalized Stratigraphy and Engineering Properties

The borings generally encountered Sandy Lean Clay, Lean Clay with Sands, Fat Clay, and Fat Clay with Sand. The general stratigraphy is provided below in Table 8.

Table 8: Generalized Subsurface Conditions

Stratum	Depth (ft)	Material Type	PI range	#200 range	PP	TCP Range
Cohesive	0.8 – 10	Light brown, light brown with gray, reddish brown to brown and gray, brown with gray; SANDY LEAN CLAY(CL), SILT With Sand (ML), LEAN CLAY with Sand (CL), FAT CLAY with Sand (CH), FAT CLAY (CH); Stiff, very soft, soft to stiff, soft	8 – 67	61 – 94	0.75 – 4.5	5 – 34

Where: Depth - Depth from existing ground surface during geotechnical study, feet
PI - Plasticity Index, %
#200 - Percent #200 sieve, %
PP - Pocket Penetrometer
TCP - Texas Cone Penetrometer Test (TCP) value reported as blows per 12 inches

Groundwater

A dry sampling method was used to obtain the samples at the project site. Groundwater was not encountered in any borings.

Groundwater levels will often change significantly over time and must be verified immediately prior to construction. Water levels in open boreholes may require several hours to several days to stabilize depending on the permeability of the materials. Groundwater levels at this site may differ during construction because fluctuations in groundwater levels can result from seasonal conditions, water level in nearby Lakes, rainfall, drought, or temperature effects. Pockets or seams of gravels, sands, silts or open fractures and joints can store and transmit “perched” groundwater flow or seepage.

Should dewatering be required, it is considered means and methods and it is the sole responsibility of the Contractor. It should be noted that subsurface material and groundwater conditions can vary away from the boring locations and can change significantly over time.

MOISTURE VARIATIONS AND ESTIMATED MOVEMENT

Structural damage can be caused by volume changes in clay soils. Clayey soils can shrink when they lose water and swell (grow in volume) when they gain water. The potential for expansive clayey soils to shrink and swell is typically related to the Plasticity Index (PI). Clayey soils with a higher PI generally have a greater potential for soil volume changes due to moisture content variations. The clayey soils found at this site are capable of swelling and shrinking in volume dependent on potentially changing soil water content conditions during or after construction. The term swelling soils implies not only the tendency to increase in volume when water is available, but also to decrease in volume or shrink if water is removed.

The clayey soils encountered at this site have a potential for shrinking and swelling due to fluctuations in soil moisture content. Several methods exist to evaluate swell potential of expansive clayey soils. Estimated potential heave at the project site was calculated utilizing the TxDOT method (Tex 124-E). Using this method, the maximum PVR of site was estimated to be approximately 6 inches considering the existing clayey soil moisture conditions at the time of the sampling activities.

It has been our experience that the PVR method can sometimes underestimate the potential shrink/swell movements. Fluctuations in the clayey soil moisture content generated from climatic conditions (*i.e*., droughts or floods) or as a result of development (*e.g.*, irrigation of landscaping in the immediate vicinity of the foundations, poor surface drainage, leaking plumbing or water lines) may result in greater shrink/swell movements than calculated.

We anticipate any structure that is located in the upper 15 feet will be subject to a PVR related movement of about 2 to 6 inches.

GENERAL COMMENTS

This report was prepared as an instrument of service for this Project exclusively for the use of TxDOT and the Mead & Hunt Project design team. Important information about this geotechnical report is provided in the GBA publication included in Appendix F.

Quality Assurance Testing

The long-term success of the Project will be affected by the quality of materials used for construction and the adherence of the construction to the Project plans and specifications. As Geotechnical Engineer of Record (GER), we should be engaged by the Owner to provide Quality Assurance (QA) testing. Our services will be to evaluate the degree to which constructors are achieving the specified conditions they are contractually obligated to achieve, and observe that the encountered materials during earthwork, wall and foundation installation are consistent with those encountered during this study. If Arias is not retained to provide QA testing, we should be immediately contacted if differing subsurface conditions are encountered during construction. Differing materials may require modification to the recommendations and/or data that we provided herein.

Arias has an established in-house laboratory that meets the standards of the American Standard Testing Materials (ASTM) specifications of ASTM E-329 defining requirements for Inspection and Testing Agencies for soil, concrete, steel and bituminous materials as used in construction. We maintain soils, concrete, asphalt, and aggregate testing equipment to provide the testing needs required by the Project specifications. Our equipment is calibrated by an independent testing agency in accordance with the National Bureau of Standards. In addition, Arias is accredited by the American Association of State Highway & Transportation Officials (AASHTO), the United States Army Corps of Engineers (USACE) and the Texas Department of Transportation (TxDOT) and maintains AASHTO Materials Reference Laboratory (AMRL) and Cement and Concrete Reference Laboratory (CCRL) proficiency sampling, assessments and inspections.

Furthermore, Arias employs a technical staff certified through the following agencies: the National Institute for Certification in Engineering Technologies (NICET), the American Concrete Institute (ACI), the American Welding Society (AWS), the Precast/Prestressed Concrete Institute (PCI), the Mine & Safety Health Administration (MSHA), the Texas Asphalt Pavement Association (TXAPA) and the Texas Board of Professional Engineers (TBPE). Our services are conducted under the guidance and direction of a Professional Engineer (P.E.) licensed to work in the State of Texas, as required by law.

In addition to QA testing, Arias can also provide Storm Water Pollution Prevention Plan (SWPPP) services during construction.

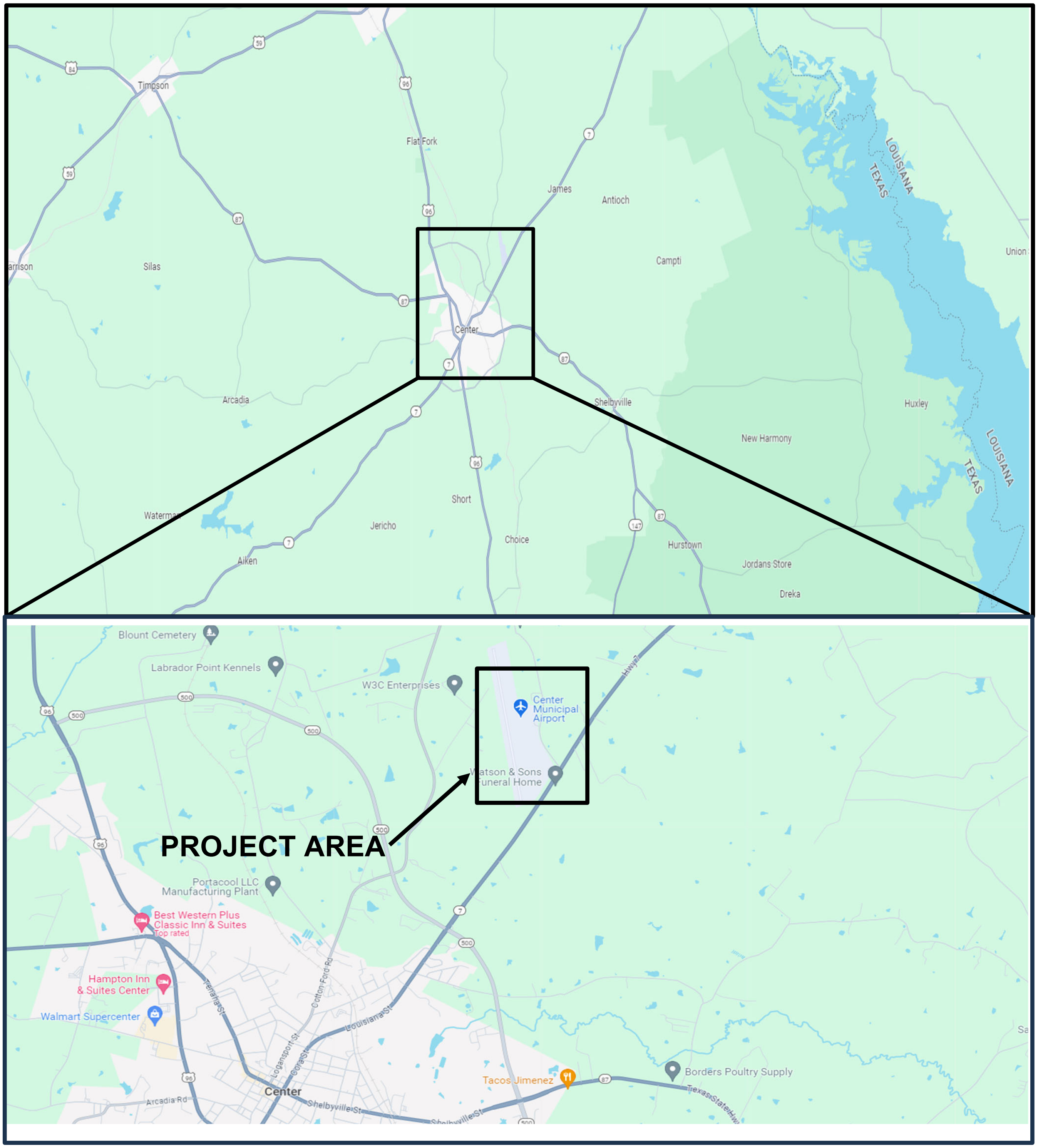
Subsurface Variations

Pavement section thicknesses and material types, and soil and groundwater conditions may vary away from the sample boring locations. Transition boundaries or contacts, noted on the boring logs to separate pavement and soil types, are approximate. Actual contacts may be gradual and vary at different locations.

Standard of Care

Subject to the limitations inherent in the agreed scope of services as to the degree of care and amount of time and expenses to be incurred, and subject to any other limitations contained in the agreement for this work, Arias has performed its services consistent with that level of care and skill ordinarily exercised by other professional engineers practicing in the same locale and under similar circumstances at the time the services were performed.

APPENDIX A: FIGURES AND SITE PHOTOGRAPHS



Source: Google Maps

ARIAS

1312 E. Corporate Drive, Suite B1, Arlington, Texas 76006
Phone: (817) 812-3500 • Fax: (817) 812-3502

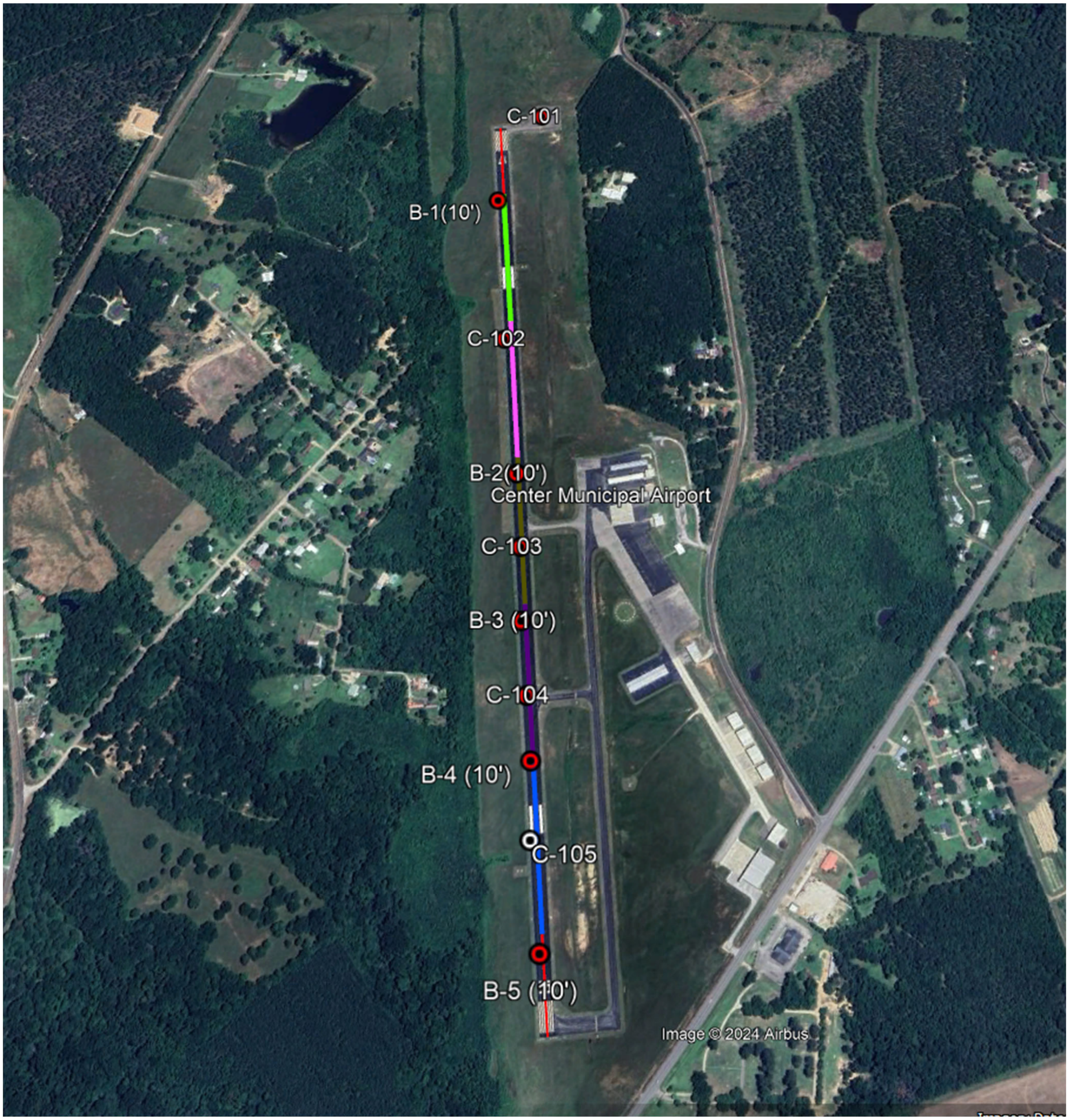
VICINITY MAP

Center Municipal Airport Runway Investigation

Center, TX 75935

Date: August 20, 2024	Job No.: 2024-74
Drawn By: MM	Checked By: BB
Approved By: BB	Scale: N.T.S.

Figure 1



Map Source: Google Earth Professional

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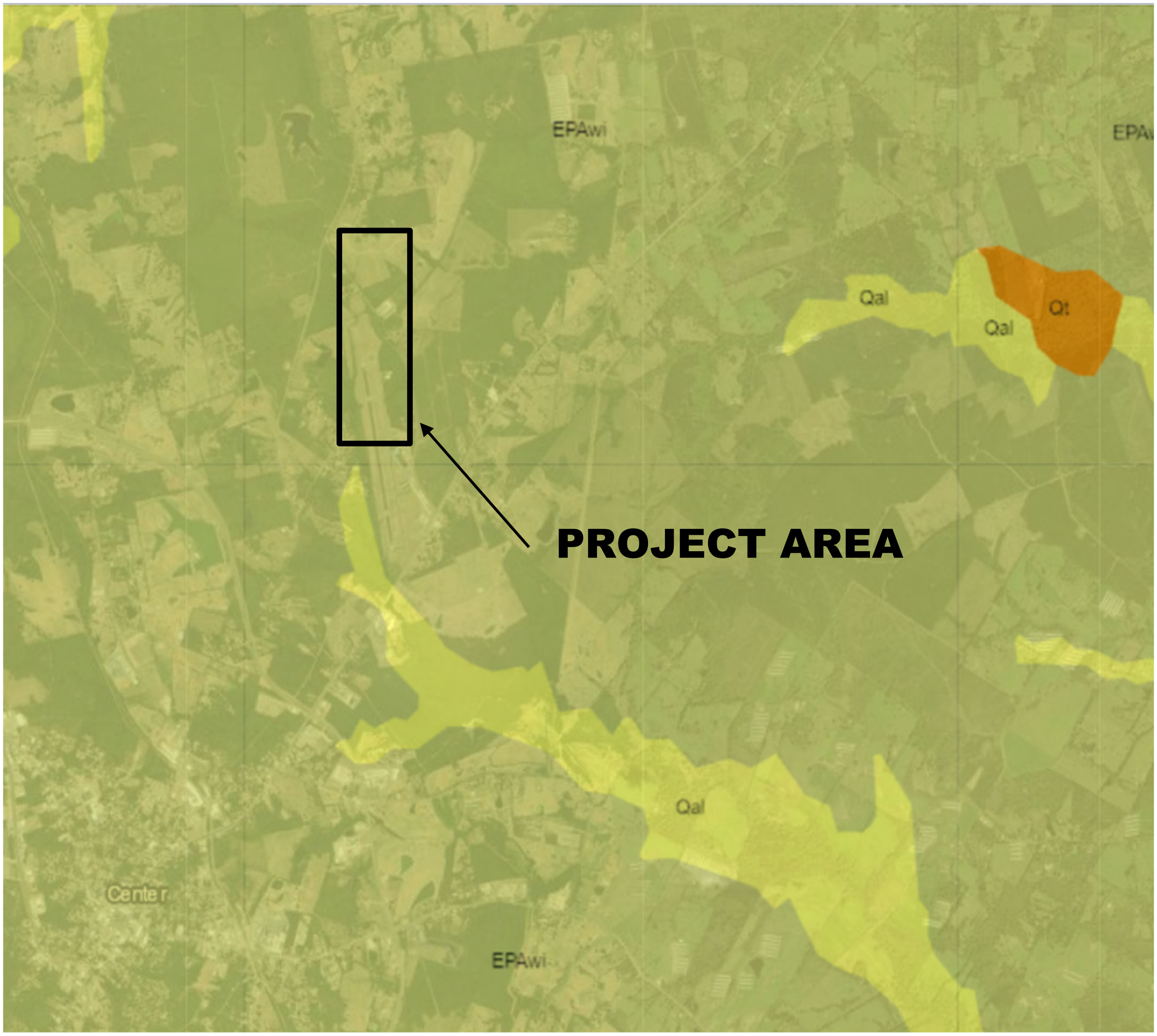
Boring Location Plan

Center Municipal Airport Runway Investigation

Center, TX 75935

Date: August 20, 2024	Job No.: 2024-74	**Figure 2**
Drawn By: MM	Checked By: BB	
Approved By: BB	Scale: N.T.S.	



LEGEND

EPAwi – Wilcox Group

ARIAS
1312 E. Corporate Drive, Suite B1, Arlington, Texas 76006
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Geologic Map

Center Municipal Airport Runway Investigation

Center, TX 75935

Date: August 23, 2024	Job No.: 2024-74
Drawn By: MM	Checked By: BB
Approved By: BB	Scale: N.T.S.

Figure 3

DRILLING SITE PHOTO-1 (8/8/2024)

DRILLING SITE PHOTO-2 (8/8/2024)

ARIAS

1312 E. Corporate Drive, Suite B1, Arlington, Texas 76006
Phone: (817) 812-3500 • Fax: (817) 812-3502

SITE PHOTOGRAPHS

Center Municipal Airport Runway Investigation

Center, TX 75935

Date: August 23, 2024	Job No.: 2024-74
Drawn By: MM	Checked By: BB
Approved By: BB	Scale: N.T.S.

Figure 4

APPENDIX B: BORING LOGS AND KEY TO TERMS

DRILLING LOG

WinCore
Version 3.3

County	Shelby	Hole	1	District	
Highway	Municipal Airport (F17)	Structure	Runway	Date	8/8/24
CSJ		Station		Grnd. Elev.	316.00 ft
		Offset		GW Elev.	N/A

Elev. (ft)	Depth	Texas Cone Penetrometer	Strata Description	Triaxial Test: Lateral Press. (psi)	Triaxial Test: Deviator Stress (psi)	MC	LL	PI	Wet Den. (pcf)	Additional Remarks
			ASPHALT, 17"							
314.5			BASE, 7"			2				-200=10%
314.			CLAY, stiff, light brown, sandy, lean (CL)			20	28	8		PP = 1.0 tsf; -200=61%
312.			SILT, stiff, light brown with gray, with sand and ferrous stains (ML)			23	0	0		PP = 2.0 tsf; -200=83%
	5	17 (6) 17 (6)								
						27				PP = 0.75 tsf - with ferrous stains below 6.5'
308.			CLAY, stiff, light brown with gray, with sand and ferrous stains, lean (CL)			31				PP = 3.0 tsf DD = 94 pcf; UC = 2.46 tsf
306.	10	11 (6) 10 (6)								

Remarks: Drilled at Center Municiple Airport. Latitude: 31.837489, Longitude: -94.157650. Automatic TCP Hammer. PP= Pocket Penetrometer (tsf). SFA: 0'-10'. Groundwater was not encountered during drilling. Surface elevation estimated by Google Earth.

The ground water elevation was not determined during the course of this boring.

Driler: St. Moses GeoDrilling, LLC — Logger: H. Bowman — Organization: Arias

DRILLING LOG

WinCore	County	Shelby	Hole	2	District	
Version 3.3	Highway	Municipal Airport (F17)	Structure	Runway	Date	8/8/24
	CSJ		Station		Grnd. Elev.	309.00 ft
			Offset		GW Elev.	N/A

Elev. (ft)	Texas Cone Penetrometer	Strata Description	Triaxial Test: Lateral Press. (psi)	Triaxial Test: Deviator Stress (psi)	MC	LL	PI	Wet Den. (pcf)	Additional Remarks
		ASPHALT, 14"							
307.8		BASE, 10"							
307.		CLAY, very soft, light brown, with ferrous stains and trace of sand, fat (CH)			18				PP = 2.0 tsf DD = 100 pcf; UC = 1.59 tsf
					24	91	67		PP = 3.5 tsf; -200=86%
5	1 (6) 4 (6)								- No recovery between 5'-6.5'
303.		CLAY, very soft, light brown and gray, with sand and ferrous stains, lean (CL)			30	48	29		PP = 1.75 tsf; -200=80%
					22				PP = 2.25
299. 10	3 (6) 3 (6)								

Remarks: Drilled at Center Municiple Airport. Latitude: 31.832433, Longitude: -94.156569. Automatic TCP Hammer. PP= Pocket Penetrometer (tsf). SFA: 0'-10'. Groundwater was not encountered during drilling. Surface elevation estimated by Google Earth.

The ground water elevation was not determined during the course of this boring.

Driller: St. Moses GeoDrilling, LLC Logger: H. Bowman Organization: Arias

DRILLING LOG

WinCore
Version 3.3

County	Shelby	Hole	3	District	
Highway	Municipal Airport (F17)	Structure	Runway	Date	8/8/24
CSJ		Station		Grnd. Elev.	303.00 ft
		Offset		GW Elev.	N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test: Lateral Press. (psi)	Triaxial Test: Deviator Stress (psi)	Properties: MC	Properties: LL	Properties: PI	Properties: Wet Den. (pcf)	Additional Remarks
			ASPHALT, 17"							
301.5			BASE, 7"			8	28	17		-200=47%
301.			CLAY, soft to stiff, reddish brown to brown and gray, with ferrous stains, fat (CH)							
						33				PP = 2.0 tsf DD = 89 pcf; UC = 1.93 tsf
						21	64	43		PP = 2.75 tsf; -200=94%
5		6 (6) 8 (6)								
						26				PP = 2.75 tsf
						25				PP = 4.5 tsf
293. 10		13 (6) 14 (6)								

Remarks: Drilled at Center Municiple Airport. Latitude: 31.830031, Longitude: -94.156150. Automatic TCP Hammer. PP= Pocket Penetrometer (tsf). SFA: 0'-10'. Groundwater was not encountered during drilling. Surface elevation estimated by Google Earth.

The ground water elevation was not determined during the course of this boring.

Driler: St. Moses GeoDrilling, LLC Logger: H. Bowman Organization: Arias

DRILLING LOG

WinCore
Version 3.3

County	Shelby	Hole	4	District	
Highway	Municipal Airport (F17)	Structure	Runway	Date	8/8/24
CSJ		Station		Grnd. Elev.	296.00 ft
		Offset		GW Elev.	N/A

Elev. (ft)	Depth	Texas Cone Penetrometer	Strata Description	Triaxial Test: Lateral Press. (psi)	Triaxial Test: Deviator Stress (psi)	MC	LL	PI	Wet Den. (pcf)	Additional Remarks
			ASPHALT, 17"							
294.5			BASE, 7"			5				-200=8%
294.			CLAY, soft to stiff, light brown to light brown and gray, with ferrous stains and sand, lean (CL)							
						22				PP = 3.25 tsf
						17	40	24		PP = 3.25 tsf; -200=70% DD = 105 pcf; UC = 2.72 tsf
	5	3 (6) 10 (6)								
						22				PP = 4.25 tsf
						20				PP = 2.25 tsf
286.	10	9 (6) 14 (6)								

Remarks: Drilled at Center Municiple Airport. Latitude: 31.827889, Longitude: -94.155633. Automatic TCP Hammer. PP= Pocket Penetrometer (tsf). SFA: 0'-10'. Groundwater was not encountered during drilling. Surface elevation estimated by Google Earth.

The ground water elevation was not determined during the course of this boring.

Driler: St. Moses GeoDrilling, LLC — Logger: H. Bowman — Organization: Arias

DRILLING LOG

WinCore
Version 3.3

County	Shelby	Hole	5	District	
Highway	Municipal Airport (F17)	Structure	Runway	Date	8/8/24
CSJ		Station		Grnd. Elev.	292.00 ft
		Offset		GW Elev.	N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test: Lateral Press. (psi)	Triaxial Test: Deviator Stress (psi)	MC	LL	PI	Wet Den. (pcf)	Additional Remarks
			ASPHALT, 17"							
290.5			BASE, 8"			10				-200=15%
290.			CLAY, soft, bown with gray, with ferrous stains, fat (CH)							
						23	58	38		PP = 1.5 tsf, -200=94% DD = 98 pcf; UC = 1.69 tsf
						27				PP = 2.75 tsf - ferrous stains below 4'
5		3 (6) 5 (6)								
286.			CLAY, stiff, light brown and gray, with sand and ferrous stains, lean (CL)							
						18	40	23		PP = 2.0 tsf; -200=80%
						18				PP = 2.0 tsf
282. 10		14 (6) 16 (6)								

Remarks: Drilled at Center Municiple Airport. Latitude: 31.825161, Longitude: -94.155169. Automatic TCP Hammer. PP= Pocket Penetrometer (tsf). SFA: 0'-10'. Groundwater was not encountered during drilling. Surface elevation estimated by Google Earth.

The ground water elevation was not determined during the course of this boring.

Driler: St. Moses GeoDrilling, LLC Logger: H. Bowman Organization: Arias

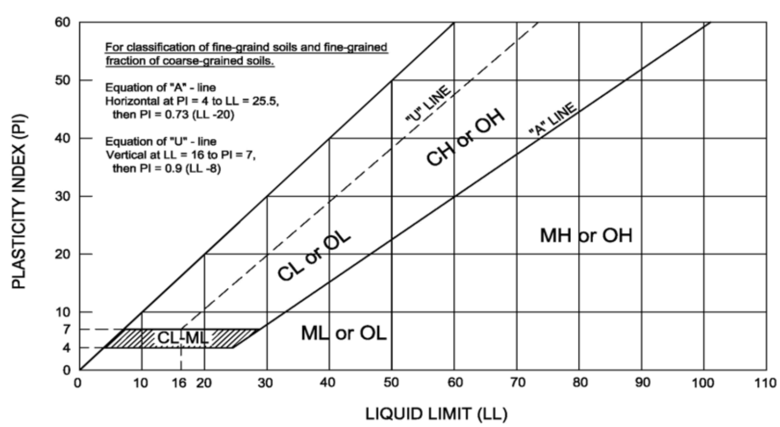
KEY TO TERMS AND SYMBOLS USED ON BORING LOGS

MAJOR DIVISIONS					GROUP SYMBOLS	DESCRIPTIONS
COARSE-GRAINED SOILS	More than half of material LARGER than No. 200 Sieve size	GRAVELS	More than Half of Coarse fraction is LARGER than No. 4 Sieve size	Clean Gravels (little or no Fines)	GW	Well-Graded Gravels, Gravel-Sand Mixtures, Little or no Fines
					GP	Poorly-Graded Gravels, Gravel-Sand Mixtures, Little or no Fines
				Gravels with Fines (Appreciable amount of Fines)	GM	Silty Gravels, Gravel-Sand-Silt Mixtures
					GC	Clayey Gravels, Gravel-Sand-Clay Mixtures
		SANDS	More than half of Coarse fraction is SMALLER than No. 4 Sieve size	Clean Sands (little or no Fines)	SW	Well-Graded Sands, Gravelly Sands, Little or no Fines
					SP	Poorly-Graded Sands, Gravelly Sands, Little or no Fines
				Sands with Fines (Appreciable amount of Fines)	SM	Silty Sands, Sand-Silt Mixtures
					SC	Clayey Sands, Sand-Clay Mixtures
FINE-GRAINED SOILS	More than half of material SMALLER than No. 200 Sieve size	SILTS & CLAYS		Liquid Limit less than 50	ML	Inorganic Silts & Very Fine Sands, Rock Flour, Silty or Clayey Fine Sands or Clayey Silts with Slight Plasticity
					CL	Inorganic Clays of Low to Medium Plasticity, Gravelly Clays, Sandy Clays, Silty Clays, Lean Clays
		SILTS & CLAYS		Liquid Limit greater than 50	MH	Inorganic Silts, Micaceous or Diatomaceous Fine Sand or Silty Soils, Elastic Silts
					CH	Inorganic Clays of High Plasticity, Fat Clays
FORMATIONAL MATERIALS		SANDSTONE				Massive Sandstones, Sandstones with Gravel Clasts
		MARLSTONE				Indurated Argillaceous Limestones
		LIMESTONE				Massive or Weakly Bedded Limestones
		CLAYSTONE				Mudstone or Massive Claystones
		CHALK				Massive or Poorly Bedded Chalk Deposits
		MARINE CLAYS				Cretaceous Clay Deposits
		GROUNDWATER			▼	Indicates Final Observed Groundwater Level
					▽	Indicates Initial Observed Groundwater Location

Density of Granular Soils	
Number of Blows per ft., N	Relative Density
0 - 4	Very Loose
4 - 10	Loose
10 - 30	Medium
30 - 50	Dense
Over 50	Very Dense

Consistency and Strength of Cohesive Soils		
Number of Blows per ft., N	Consistency	Unconfined Compressive Strength, q_u (tsf)
Below 2	Very Soft	Less than 0.25
2 - 4	Soft	0.25 - 0.5
4 - 8	Medium (Firm)	0.5 - 1.0
8 - 15	Stiff	1.0 - 2.0
15 - 30	Very Stiff	2.0 - 4.0
Over 30	Hard	Over 4.0

PLASTICITY CHART (ASTM D 2487-11)



KEY TO TERMS AND SYMBOLS USED ON BORING LOGS

TABLE 1 Soil Classification Chart (ASTM D 2487-11)

Criteria of Assigning Group Symbols and Group Names Using Laboratory Tests[A]					Soil Classification: Group Symbol	Soil Classification: Group Name[B]
COARSE-GRAINED SOILS More than 50% retained on No. 200 sieve	Gravels (More than 50% of coarse fraction retained on No. 4 sieve)	Clean Gravels (Less than 5% fines[C])	Cu ≥ 4 and 1 ≤ Cc ≤ 3[D]		GW	Well-Graded Gravel[E]
			Cu < 4 and/or [Cc < 1 or Cc > 3][D]		GP	Poorly-Graded Gravel[E]
		Gravels with Fines (More than 12% fines[C])	Fines classify as ML or MH		GM	Silty Gravel[E,F,G]
			Fines classify as CL or CH		GC	Clayey Gravel[E,F,G]
	Sands (50% or more of coarse fraction passes No. 4 sieve)	Clean Sands (Less than 5% fines[H])	Cu ≥ 6 and 1 ≤ Cc ≤ 3[D]		SW	Well-Graded Sand[I]
			Cu < 6 and/or [Cc < 1 or Cc > 3][D]		SP	Poorly-Graded Sand[I]
		Sands with Fines (More than 12% fines[H])	Fines classify as ML or MH		SM	Silty Sand[F,G,I]
			Fines classify as CL or CH		SC	Clayey Sand[F,G,I]
FINE-GRAINED SOILS 50% or more passes the No. 200 sieve	Silts and Clays Liquid limit less than 50	inorganic	PI > 7 and plots on or above "A" line[J]		CL	Lean Clay[K,L,M]
			PI < 4 or plots below "A" line[J]		ML	Silt[K,L,M]
		organic	Liquid limit - oven dried / Liquid limit - not dried	<0.75	OL	Organic Clay[K,L,M,N] / Organi Silt[K,L,M,O]
	Silts and Clays Liquid limit 50 or more	inorganic	PI plots on or above "A" line		CH	Fat Clay[K,L,M]
			PI plots on or below "A" line		MH	Elastic Silt[K,L,M]
		organic	Liquid limit - oven dried / Liquid limit - not dried	<0.75	OH	Organic Clay[K,L,M,P] / Organic Silt[K,L,M,Q]
HIGHLY ORGANIC SOILS	Primarily organic matter, dark in color, and organic odor				PT	Peat

[A] Based on the material passing the 3-inch (75mm) sieve

[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name

[C] Gravels with 5% to 12% fines require dual symbols:
- GW-GM well-graded gravel with silt
- GW-GC well-graded gravel with clay
- GP-GM poorly-graded gravel with silt
- GP-GC poorly-graded gravel with clay

[D] $Cu = D_{60}/D_{10}$ $Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$

[E] If soil contains ≥ 15% sand, add "with sand" to group name

[F] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM

[G] If fines are organic, add "with organic fines" to group name

[H] Sand with 5% to 12% fines require dual symbols:
- SW-SM well-graded sand with silt
- SW-SC well-graded sand with clay
- SP-SM poorly-graded sand with silt
- SP-SC poorly-graded sand with clay

[I] If soil contains ≥ 15% gravel, add "with gravel" to group name

[J] If Atterberg limits plot in hatched area, soil is a CL-ML, silty clay

[K] If soil contains 15% to < 30% plus No. 200, add "with sand" or "with gravel," whichever is predominant

[L] If soil contains ≥ 30% plus No. 200, predominantly sand, add "sandy" to group name

[M] If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name

[N] PI ≥ 4 and plots on or above "A" line

[O] PI < 4 or plots below "A" line

[P] PI plots on or above "A" line

[Q] PI plots below "A" line

TERMINOLOGY

Boulders	Over 12-inches (300mm)
Cobbles	12-inches to 3-inches (300mm to 75mm)
Gravel	3-inches to No. 4 sieve (75mm to 4.75mm)
Sand	No. 4 sieve to No. 200 sieve (4.75mm to 0.075mm)
Silt or Clay	Passing No. 200 sieve (0.075mm)
Calcareous	Containing appreciable quantities of calcium carbonate, generally nodular

Parting	Inclusion < 1/8-inch thick extending through samples
Seam	Inclusion 1/8-inch to 3-inches thick extending through sample
Layer	Inclusion > 3-inches thick extending through sample

Stratified	Alternating layers of varying material or color with layers at least 6mm thick
Laminated	Alternating layers of varying material or color with the layers less than 6mm thick
Fissured	Breaks along definite planes of fracture with little resistance to fracturing
Slickensided	Fracture planes appear polished or glossy sometimes striated
Blocky	Cohesive soil that can be broken down into small angular lumps which resist further breakdown
Lensed	Inclusion of small pockets of different soils, such as small lenses of sand scattered through a mass of clay
Homogeneous	Same color and appearance throughout

KEY TO TERMS AND SYMBOLS USED ON BORING LOGS

Hardness Classification of Intact Rock

Class	Hardness	Field Test		Approximate Range of Uniaxial Compression Strength kg/cm² (tons/ft²)
I	Extremely hard	Many blows with geologic hammer required to break intact specimen.		> 2,000
II	Very hard	Hand held specimen breaks with hammer end of pick under more than one blow.		2,000 – 1,000
III	Hard	Cannot be scraped or pealed with knife, hand held specimen can be broken with single moderate blow with pick.		1,000 – 500
IV	Soft	Can just be scraped or peeled with knife. Indentations 1mm to 3mm show in specimen with moderate blow with pick.		500 – 250
V	Very soft	Material crumbles under moderate blow with sharp end of pick and can be peeled with a knife, but is too hard to hand-trim for triaxial test specimen.		250 – 10

Rock Weathering Classifications

Grade	Symbol	Diagnostic Features
Fresh	F	No visible sign of Decomposition or discoloration. Rings under hammer impact.
Slightly Weathered	WS	Slight discoloration inwards from open fractures, otherwise similar to F.
Moderately Weathered	WM	Discoloration throughout. Weaker minerals such as feldspar decomposed. Strength somewhat less than fresh rock, but cores cannot be broken by hand or scraped by knife. Texture preserved.
Highly Weathered	WH	Most minerals somewhat decomposed. Specimens can be broken by hand with effort or shaved with knife. Core stones present in rock mass. Texture becoming indistinct, but fabric preserved.
Completely Weathered	WC	Minerals decomposed to soil, but fabric and structure preserved (Saprolite). Specimens easily crumbled or penetrated.
Residual Soil	RS	Advanced state of decomposition resulting in plastic soils. Rock fabric and structure completely destroyed. Large volume change.

Rock Discontinuity Spacing

Description for Structural Features: Bedding, Foliation, or Flow Banding	Spacing	Description for Joints, Faults or Other Fractures
Very thickly (bedded, foliated, or banded)	More than 6 feet	Very widely (fractured or jointed)
Thickly	2 – 6 feet	Widely
Medium	8 – 24 inches	Medium
Thinly	2½ – 8 inches	Closely
Very thinly	¾ – 2½ inches	Very closely
Description for Micro-Structural Features: Lamination, Foliation, or Cleavage	**Spacing**	**Descriptions for Joints, Faults, or Other Fractures**
Intensely (laminated, foliated, or cleaved)	¼ – ¾ inch	Extremely close
Very intensely	Less than ¼ inch	

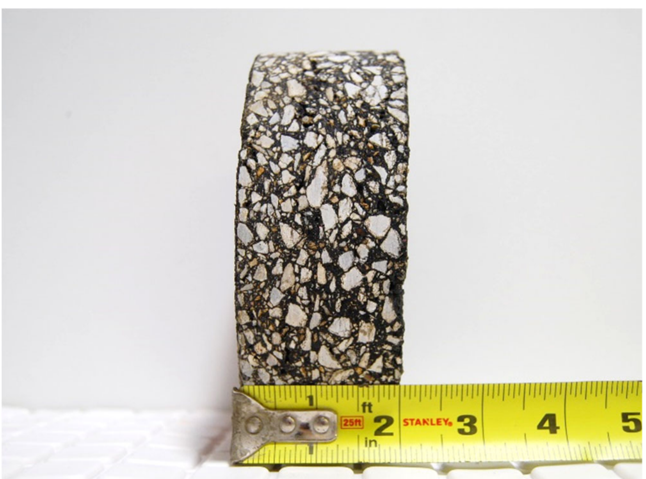
Engineering Classification for in Situ Rock Quality

RQD %	Velocity Index	Rock Mass Quality
90 – 100	0.80 – 1.00	Excellent
75 – 90	0.60 – 0.80	Good
50 – 75	0.40 – 0.60	Fair
25 – 50	0.20 – 0.40	Poor
0 – 25	0 – 0.20	Very Poor

APPENDIX C: CORE PHOTOGRAPHS

Boring B-1

Boring B-2



Boring B-3

Boring B-4

ARIAS
1312 E. Corporate Drive, Suite B1, Arlington, Texas 76006
Phone: (817) 812-3500 • Fax: (817) 812-3502

PAVEMENT CORE PHOTOS

Center Municipal Airport Runway Investigation

Center, TX 75935

Date: September 10, 2024	Job No.: 2024-74
Drawn By: MM	Checked By: BB
Approved By: BB	Scale: N.T.S.

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Boring B-5

Boring C-101

Boring C-102

Boring C-103

ARIAS

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PAVEMENT CORE PHOTOS

Center Municipal Airport Runway Investigation

Center, TX 75935

Date: September 10, 2024	Job No.: 2024-74
Drawn By: MM	Checked By: BB
Approved By: BB	Scale: N.T.S.

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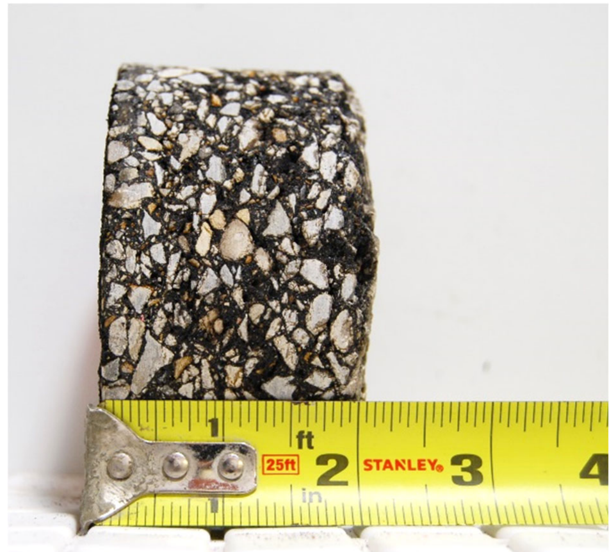
Boring C-104



Boring C-105

1312 E. Corporate Drive, Suite B1, Arlington, Texas 76006
Phone: (817) 812-3500 • Fax: (817) 812-3502

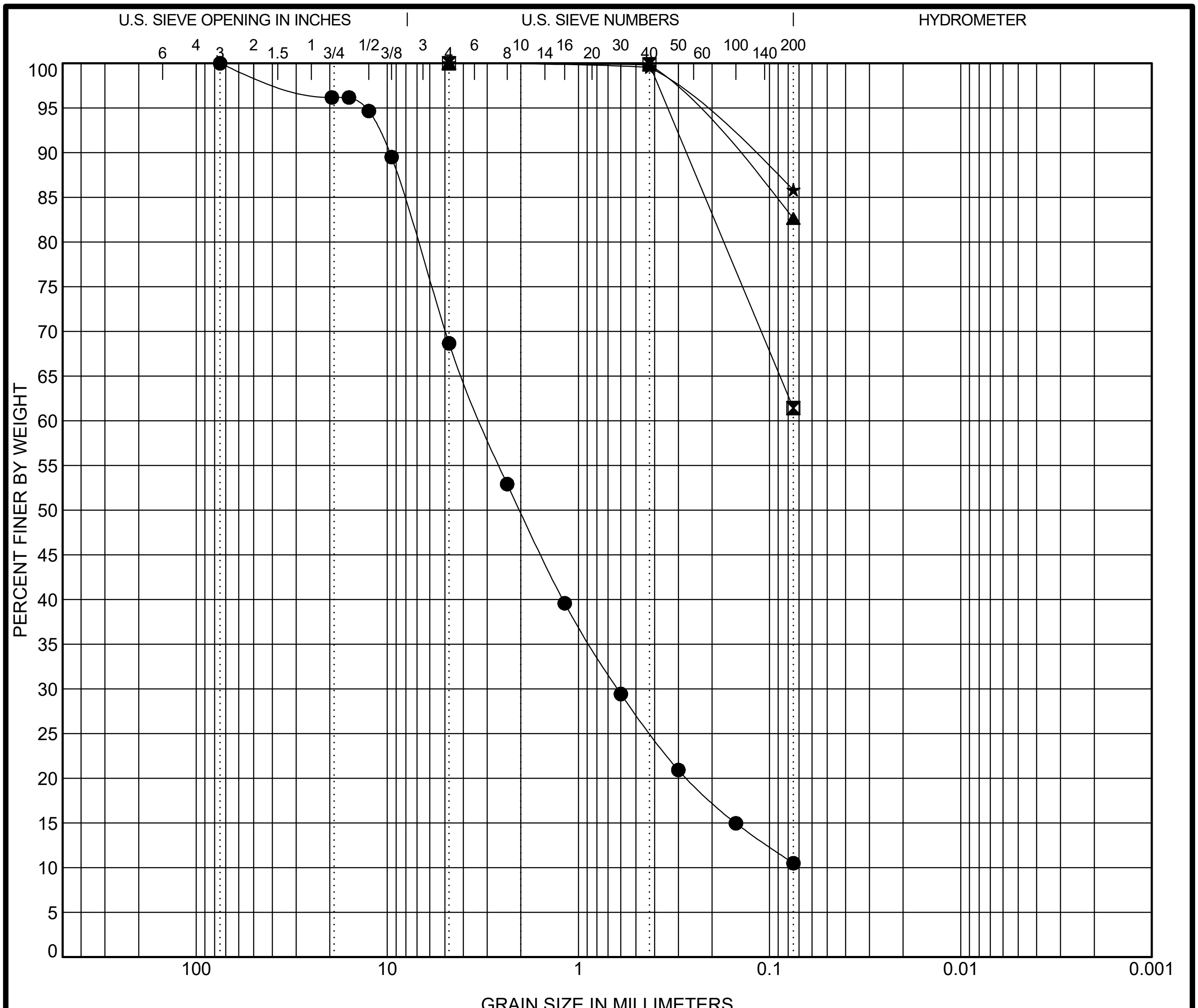
PAVEMENT CORE PHOTOS

Center Municipal Airport Runway Investigation

Center, TX 75935

Date: September 10, 2024	Job No.: 2024-74
Drawn By: MM	Checked By: BB
Approved By: BB	Scale: N.T.S.

APPENDIX D: GRAIN SIZE DISTRIBUTION CURVES



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring	Elev	Depth	Classification	LL	PL	PI	Cc	Cu
●	1		1.8					1.73	46.52
⊠	1		2.0	**SANDY LEAN CLAY (CL)**	28	20	8		
▲	1		4.0	**SILT with SAND (ML)**	NP	NP	NP		
★	2		4.0	**FAT CLAY (CH)**	91	24	67		

	Boring	Depth	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	1	1.8	75	3.233	0.623		31.3	58.2	10.5	
⊠	1	2.0	4.75				0.0	38.6	61.4	
▲	1	4.0	4.75				0.0	17.4	82.6	
★	2	4.0	4.75				0.0	14.2	85.8	

Silt and clay fractions were determined using 0.002 mm as the maximum particle size for clay.

ARIAS

GRAIN SIZE DISTRIBUTION

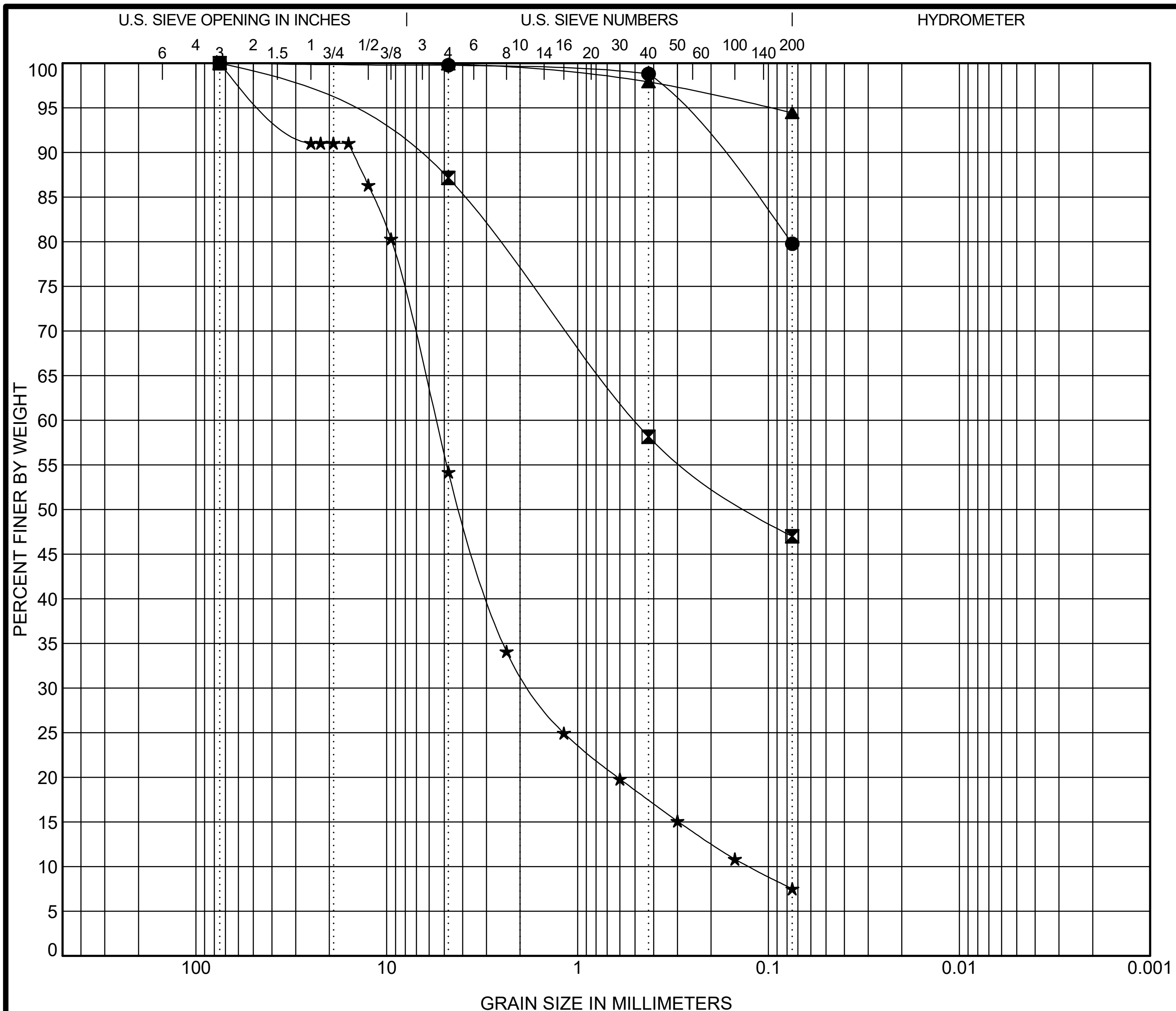
Project: Municipal Airport (F17) Runway Investigation

Location: See Boring Location Plan

Job No.: 2024-74

GINT.GPJ 9/16/24 (GRAIN SIZE ARIAS.US_LAB.GDT,LIBRARY2023.GLB)

Arias & Associates, Inc.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring	Elev	Depth	Classification	LL	PL	PI	Cc	Cu
●	**2**		**6.0**	**LEAN CLAY with SAND (CL)**	**48**	**19**	**29**		
⧗	**3**		**1.5**	**CLAYEY SAND (SC)**	**28**	**11**	**17**		
▲	**3**		**4.0**	**FAT CLAY (CH)**	**64**	**21**	**43**		
★	**4**		**1.5**					**4.29**	**44.05**

	Boring	Depth	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**2**	**6.0**	**75**				**0.2**	**20.0**	**79.8**	
⧗	**3**	**1.5**	**75**	**0.495**			**12.9**	**40.2**	**47.0**	
▲	**3**	**4.0**	**75**				**0.1**	**5.5**	**94.4**	
★	**4**	**1.5**	**75**	**5.541**	**1.73**	**0.126**	**45.8**	**46.7**	**7.5**	

Silt and clay fractions were determined using 0.002 mm as the maximum particle size for clay.

ARIAS

GRAIN SIZE DISTRIBUTION

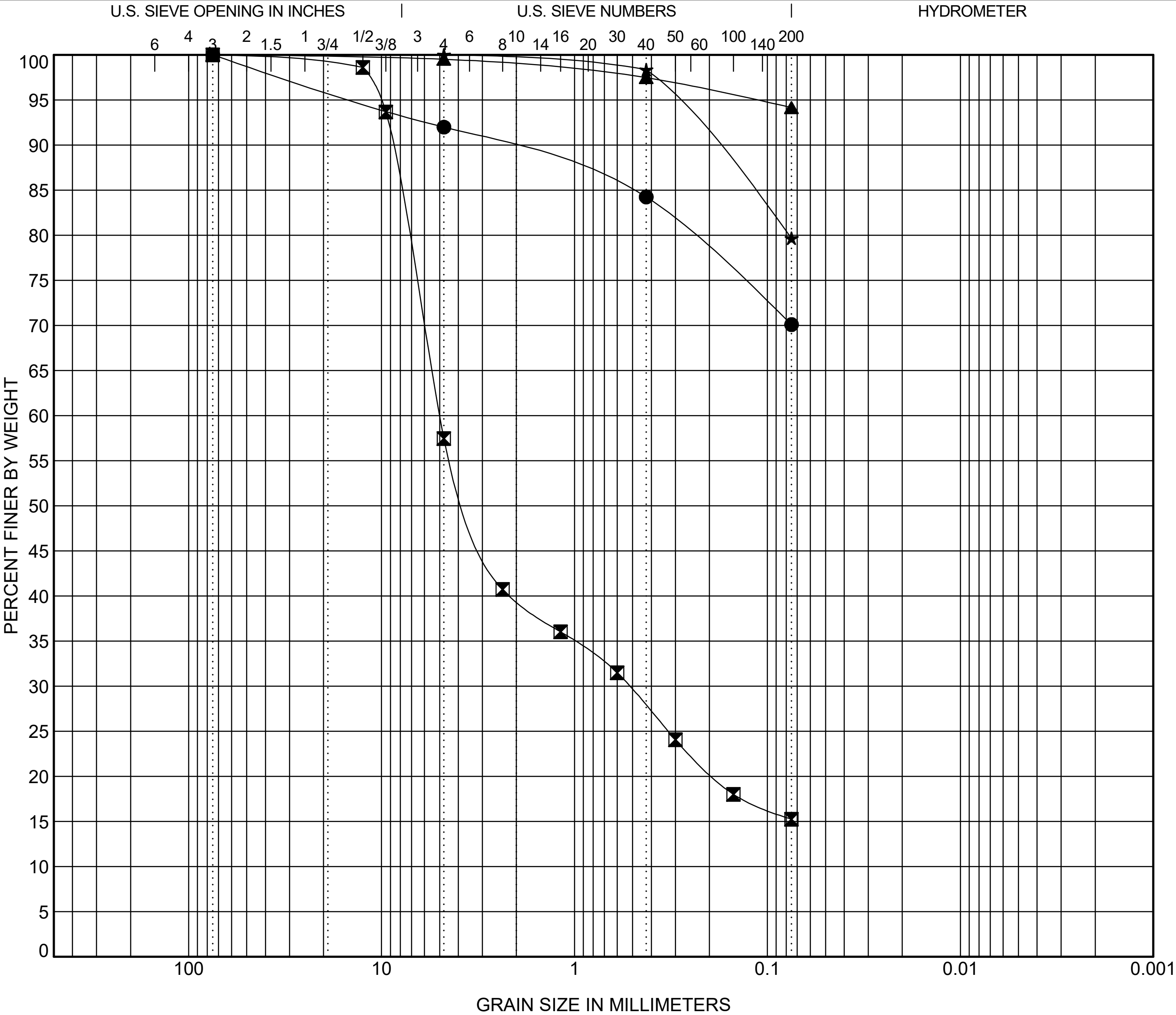
Project: Municipal Airport (F17) Runway Investigation

Location: See Boring Location Plan

Job No.: 2024-74

GINT.GPJ 9/16/24 (GRAIN SIZE ARIAS,US_LAB.GDT,LIBRARY2023.GLB)

Arias & Associates, Inc.



Boring	Elev	Depth	Classification	LL	PL	PI	Cc	Cu
● 4		4.0	**LEAN CLAY with SAND (CL)**	40	16	24		
⧗ 5		1.5						
▲ 5		2.0	**FAT CLAY (CH)**	58	20	38		
★ 5		6.0	**LEAN CLAY with SAND (CL)**	39	17	22		

Boring	Depth	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● 4	4.0	75				8.0	21.9	70.1	
⧗ 5	1.5	75	4.988	0.523		42.6	42.2	15.3	
▲ 5	2.0	75				0.5	5.4	94.2	
★ 5	6.0	4.75				0.0	20.3	79.7	

Silt and clay fractions were determined using 0.002 mm as the maximum particle size for clay.

ARIAS

GRAIN SIZE DISTRIBUTION

Project: Municipal Airport (F17) Runway Investigation

Location: See Boring Location Plan

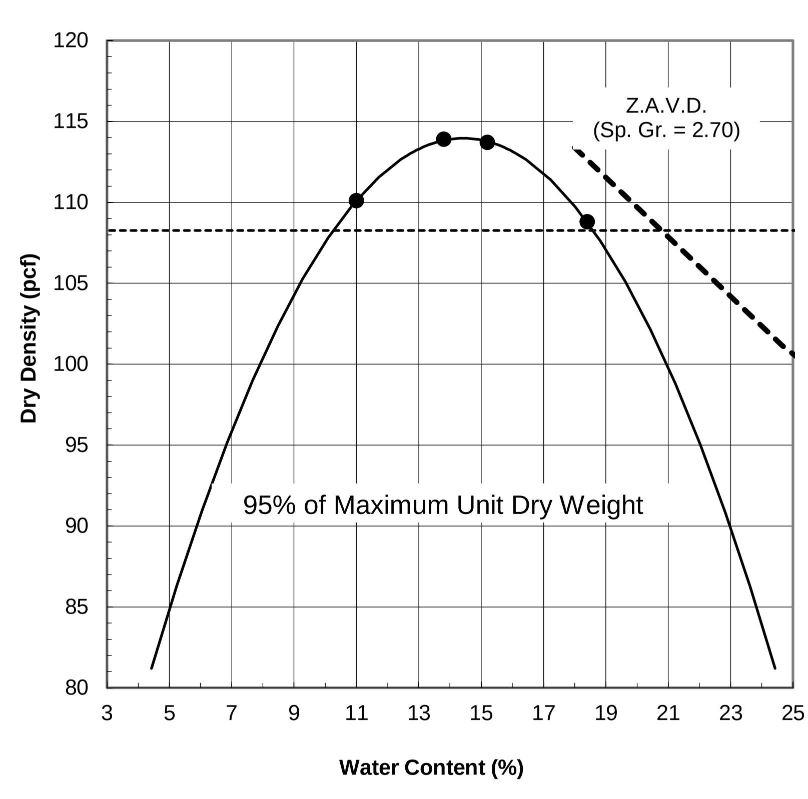
Job No.: 2024-74

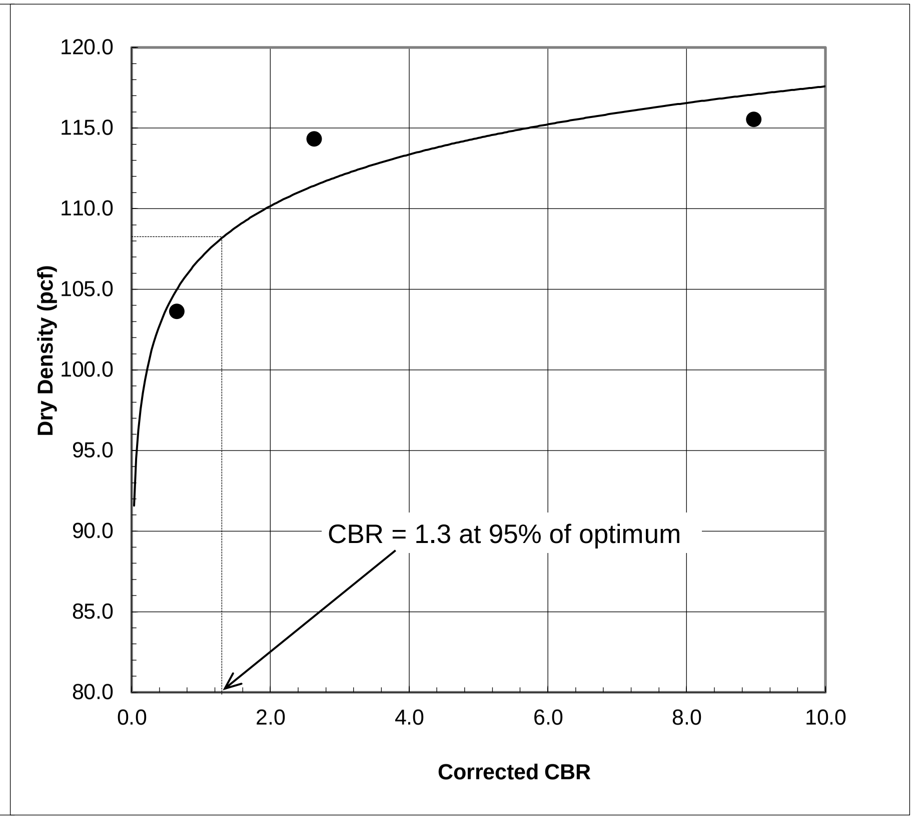
GINT.GPJ 9/16/24 (GRAIN SIZE ARIAS,US_LAB.GDT,LIBRARY2023.GLB)

Arias & Associates, Inc.

APPENDIX E: CBR TEST REULTS

Composite Sample of B-1, B-2





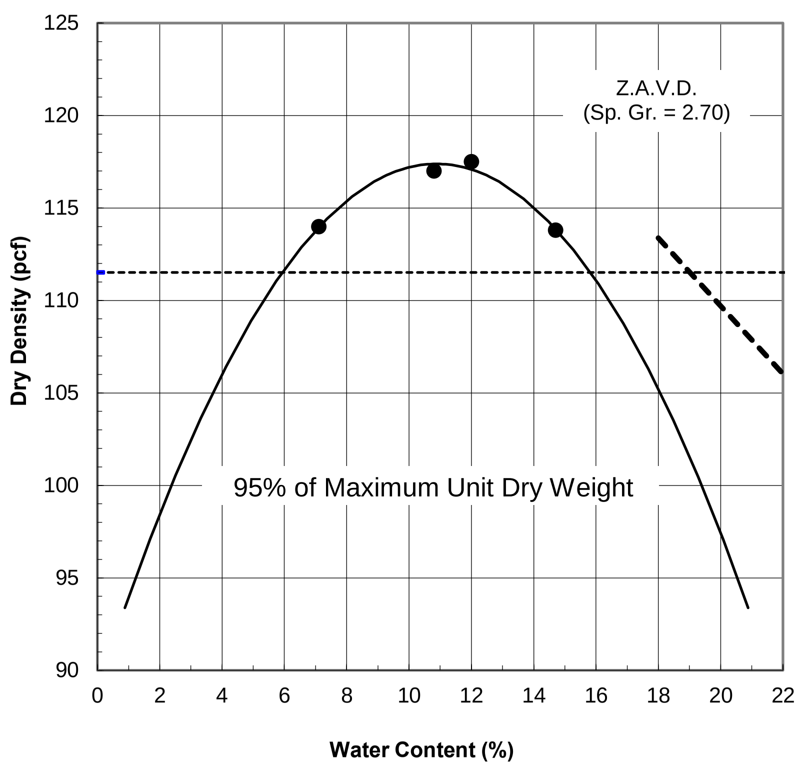
Sample: 24-829
Test Method: D698 C
Material: Fat Clay with Sand (CL), tan and red

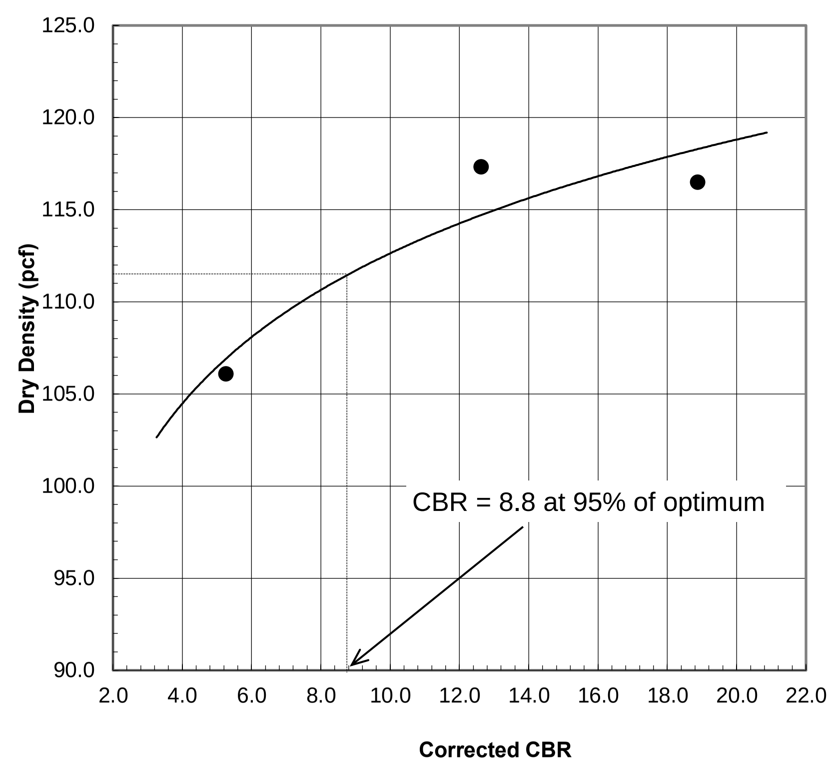
Optimum Water Content:	14.4 %
Maximum Unit Dry Weight:	114.0 pcf
Liquid Limit:	57
Plasticity Index:	31
% Passing #200 Sieve:	71
Sulfate Content:	240 ppm

	% SWELL
56 blows:	0.8
25 blows:	4.0
10 blows:	4.9

MOISTURE-DENSITY AND CBR TEST RESULTS
TxDOT Aviation - Center Municipal Airport (F17) Runway Investigation
SAN ANTONIO, TEXAS

Composite Sample of B-4, B-5





Sample: 24-830
Test Method: D698 C
Material: Lean Clay with Sand (CL), greyish tan

Optimum Water Content:	10.9 %
Maximum Unit Dry Weight:	117.4 pcf
Liquid Limit:	37
Plasticity Index:	22
% Passing #200 Sieve:	74
Sulfate Content:	1420 ppm

	% SWELL
56 blows:	0.7
25 blows:	0.7
10 blows:	0.6

MOISTURE-DENSITY AND CBR TEST RESULTS
TxDOT Aviation - Center Municipal Airport (F17) Runway Investigation
SAN ANTONIO, TEXAS

APPENDIX F: GBA INFORMATION

Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, clients can benefit from a lowered exposure to the subsurface problems that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed below, contact your GBA-member geotechnical engineer. Active involvement in the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Geotechnical-Engineering Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. *Those who rely on a geotechnical-engineering report prepared for a different client can be seriously misled.* No one except authorized client representatives should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one – not even you – should apply this report for any purpose or project except the one originally contemplated.*

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read it *in its entirety*. Do not rely on an executive summary. Do not read selected elements only. *Read this report in full.*

You Need to Inform Your Geotechnical Engineer about Change

Your geotechnical engineer considered unique, project-specific factors when designing the study behind this report and developing the confirmation-dependent recommendations the report conveys. A few typical factors include:

- the client's goals, objectives, budget, schedule, and risk-management preferences;
- the general nature of the structure involved, its size, configuration, and performance criteria;
- the structure's location and orientation on the site; and
- other planned or existing site improvements, such as retaining walls, access roads, parking lots, and underground utilities.

Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light-industrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.*

This Report May Not Be Reliable

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, that it could be unwise to rely on a geotechnical-engineering report whose reliability may have been affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If your geotechnical engineer has not indicated an "apply-by" date on the report, ask what it should be*, and, in general, *if you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying it. A minor amount of additional testing or analysis – if any is required at all – could prevent major problems.

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface through various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing were performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgment to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team from project start to project finish, so the individual can provide informed guidance quickly, whenever needed.

This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, *they are not final*, because the geotechnical engineer who developed them relied heavily on judgment and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* revealed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a full-time member of the design team, to:

- confer with other design-team members,
- help develop specifications,
- review pertinent elements of other design professionals' plans and specifications, and
- be on hand quickly whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction observation.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for informational purposes only*. To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report, but they may rely on the factual data relative to the specific times, locations, and depths/elevations referenced. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely*. Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures*. If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. As a general rule, *do not rely on an environmental report prepared for a different client, site, or project, or that is more than six months old.*

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, none of the engineer's services were designed, conducted, or intended to prevent uncontrolled migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, ***proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration.*** Confront the risk of moisture infiltration by including building-envelope or mold specialists on the design team. ***Geotechnical engineers are not building-envelope or mold specialists.***

GEOPROFESSIONAL BUSINESS ASSOCIATION

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APPENDIX G: PROJECT QUALITY ASSURANCE

A Message to Owners from ASFE/GBA

Construction-materials engineering and testing (CoMET) consultants perform quality-assurance (QA) services to evaluate how well constructors are achieving the specified conditions they're contractually obligated to achieve. Done right, QA can save you time and money while helping you manage project risks by detecting molehills before they grow into mountains you and the design team are forced to climb.

Done right, QA can save you time and money; prevent claims and disputes; and reduce risks. Many owners don't do QA right because they follow bad advice.

It's ironic that, as important as CoMET consultants can be, some owners and design professionals treat them as though they were commodities. Often referred to incorrectly as "testing labs," CoMET consultants create the last line of defense against costly construction errors and the delays, change orders, claims, disputes, and litigation that can result. Why would owners entrust such an important responsibility to the firm offering to fulfill it for the lowest fee as opposed to the one whose qualifications enable it to offer the best service and the most value? The answer: Too many owners follow bad advice; e.g., "CoMET consultants are all the same. They all follow the same standards. They all have accredited laboratories and certified personnel. Go with the low bidder." That's bad advice because there's no such thing as a standard QA scope of service, meaning that – to bid – each interested firm *must* develop its own scope…and it has to be a cheap scope in order to offer the low fee the owner apparently prefers. A cheap scope cannot help but jeopardize service quality, aggravating risk for you and the entire project team. Of course, some firms will offer what seems to be a better scope at a "low-ball," less-than-cost bid in order to win the commission and then earn a profit through multiple change orders.

You have too much at stake to follow bad advice. Consider these facts.

Fact: ***Most CoMET firms are not accredited,*** including some that say they are and some that don't even follow the correct standards, even when they say they do. And the quality of those that are accredited varies significantly; some practice at a high level; others just barely scrape by. As such, while accreditation is extremely important, it is far from being a "be-all and end-all." It signifies only that a firm's facilities or operations met the *minimum criteria* of an accrediting body whose concerns in some cases may have little to do with your project. And the condition of what an accrediting body typically evaluates – management systems, technical staff, facilities, and equipment – can change substantially between on-site accreditation assessments.

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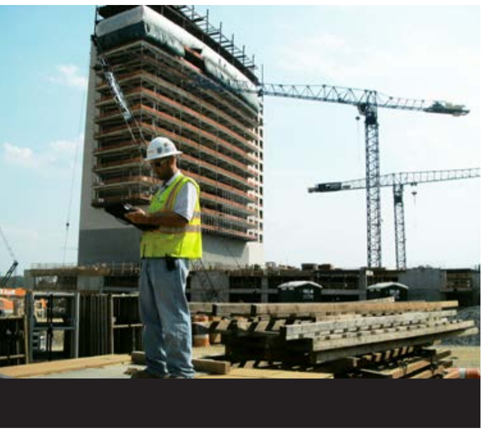
E-mail: info@asfe.org
Internet: www.asfe.org

Most CoMET firms are not accredited and it's dangerous to assume CoMET personnel are certified.



Fact: ***It's dangerous to assume CoMET personnel are certified.*** Many have no credentials; some are certified by organizations of questionable merit, while others have a valid certification, but *not* for the services they're assigned. All too many have little training or none at all.

Some CoMET firms – the "low-cost providers" – *want* you to believe that price is the only difference between QA providers. It's not: Firms that sell low price typically lack:

- facilities appropriate for many of the projects they accept,
- equipment that is well maintained and properly calibrated,
- field and laboratory personnel who are well trained and appreciate the importance of their responsibilities,
- management with the education, experience, and judgment to provide technical oversight, and
- the professional-liability insurance you should require to enjoy peace of mind.

Quality-oriented firms invest in the facilities, equipment, personnel, and insurance needed to achieve quality in quality assurance.

Quality-oriented firms invest in the facilities, equipment, personnel, and insurance needed to achieve quality in quality assurance.

To derive maximum value from your QA investment, have the CoMET firm's project manager serve actively on the project team from beginning to end, a level of service that's relatively inexpensive and can pay huge dividends. During the project's planning and design stages, experienced CoMET professionals can help the design team develop consistent, cost-effective technical specifications and establish appropriate observation, testing, and instrumentation protocols. They can analyze plans and specs much as constructors do, looking for the little errors, omissions, conflicts, and ambiguities that often lead to the misunderstandings and confusion that become the basis for big extras and big claims. They can also provide guidance about operations and materials that need closer review than others, because of their criticality or potential for error or abuse, and even suggest reduced levels of review or testing for areas of a less critical nature, based on local experience. You can also benefit from a CoMET professional's frank assessments of the various constructors that have expressed interest in the project.

To derive maximum value, have the CoMET project manager serve actively on the project team from beginning to end.

CoMET consultants' construction-phase QA services focus on two distinct issues:

- those that relate to geotechnical engineering and
- those that relate to the other elements of construction.

Geotechnical-engineering issues are critically important because they are essential to the "observational method" geotechnical engineers use to help their clients save time and money while maintaining a "healthy respect" for the unknown in the underground.

In essence, the observational method is an overall approach that begins during the earliest element of the design phase and carries through to the construction phase. Geotechnical engineers initiate this approach by applying their knowledge of local geological conditions to develop an economical subsurface-sampling plan. Proper execution of the plan should derive just enough samples from just enough areas to permit an experienced geotechnical engineer to develop an assumed-subsurface profile. Because so much depends on the reliability of each sample, quality-focused geotechnical engineers often insist that their own personnel perform or oversee the sampling process, from obtaining the samples to packaging, storing, and transporting them to a trusted laboratory, using their own equipment and facilities or relying on others' they know they can trust.

Combining the assumed subsurface profile with knowledge of what is being constructed – e.g., its dimensions, weight, anticipated use, and performance objectives – geotechnical engineers develop *provisional* recommendations for the structure's foundations and for the specifications of various "geo" elements, like excavations, site grading, foundation-bearing grades, and roadway and parking-lot preparation and surfacing. When geotechnical engineers know that their personnel will be on site observing subsurface conditions as they are exposed, they usually will recommend the most cost-effective design their assumptions make practical, knowing that – if their assumed-subsurface profile is "off" in any significant way – the variances will be caught (that's what they teach their field personnel to do), permitting them to "tweak" their recommendations in the field. *It is essential to realize that geotechnical engineers cannot finalize their recommendations until they or their field representatives are on site to observe what's excavated to verify that the subsurface conditions the engineers predicted are those that actually exist.*

Geotechnical engineers cannot finalize their recommendations until they are on site to verify that the subsurface conditions they predicted are those that actually exist. Entrusting geotechnical field observation to someone other than the geotechnical engineer of record creates a significant risk.

Insofar as **other elements of construction** are concerned, many geotechnical-engineering firms have obliged their clients by expanding their field-services mix, so they're able to perform overall construction QA, encompassing – in addition to geotechnical issues – reinforced concrete, structural steel, structural masonry, fireproofing, and so on. Unfortunately, that's caused some confusion. Believing that all CoMET consultants are alike, some owners take bids for the overall CoMET package, including the geotechnical field observation, thus curtailing services of the geotechnical engineer of record (GER). ***Entrusting geotechnical field observation to someone other than the GER creates a significant risk.***

GERs have developed a variety of protocols to optimize the quality of their field-observation procedures. Quality-focused GERs meet with their field representatives before the representatives leave for a project site, to brief them on what to look for and where, when, and how to look. (***No one can duplicate this briefing***, because no one else knows as much about a project's geotechnical issues.) And once they arrive at a project site, the field representatives know to maintain timely, effective communication with the GER, because that's what the GER has trained them to do. By contrast, it's extremely rare for a different

firm's field personnel to contact the GER, even when they're concerned or confused about what they observe, because they regard the GER's firm as "the competition." Convoluted project-communications protocols can make this communications breakdown even worse.

A different firm is often willing to perform on-site geotechnical review for less money than the GER, frequently because it treats geotechnical field services as a "loss leader" in order to obtain the far larger, overall CoMET commission. Given the significant risk that supplanting the GER creates, accepting the offer is almost always penny-wise and pound-foolish. Still, because some owners accept bad advice, it's commonly done, helping to explain why ***"geo" issues are the number-one source of construction-industry claims and disputes.***

Divorcing the GER from geotechnical field operations is almost always penny-wise and pound-foolish, helping to explain why "geo" issues are the number-one source of construction-industry claims and disputes.

To derive the biggest bang for the QA buck, identify three or even four quality-focused CoMET consultants. (If you don't know any, use the "Find a Geoprofessional" service available free at www.asfe.org.) Ask about the firms' ongoing and recent projects and the clients and client representatives involved; *insist upon receiving verification of all claimed accreditations, certifications, licenses, and insurance coverages.*

Insist upon receiving verification of all claimed accreditations, certifications, licenses, and insurance coverages.

Once you identify the two or three most qualified firms, meet with their key personnel, preferably at their own facility, so you can inspect their laboratory, speak with management and technical staff, and form an opinion about the firm's capabilities and attitude.

Insist that each firm's designated project manager and lead field representative participate in the meeting. You will benefit when those individuals are seasoned QA professionals familiar with construction's rough-and-tumble. Ask about others the firm will assign, too. There's no substitute for experienced, certified personnel who are familiar with the codes and standards involved and know how to:

- read and interpret plans and specifications;
- perform the necessary observation, inspection, and testing;
- document their observations and findings;
- interact with constructors' personnel; and
- respond to the unexpected.

Important: Many of the services CoMET QA field representatives perform – like observing operations and outcomes – require the good judgment afforded by extensive training and experience. Who will be on hand when the unexpected occurs: a 15-year "veteran" or a rookie?

Many of the services CoMET QA field representatives perform require good judgment.

Also consider the tools CoMET personnel use. Some firms are fanatical about proper maintenance and calibration; others, less so. Ask to see the firm's calibration records. If the firm doesn't have any, or if they are not current, be cautious: *You cannot trust test results derived using equipment that may be out of calibration.* Also ask if the firm's laboratory participates in

proficiency testing, relying on a program like the one sponsored by the American Association of State Highway and Transportation Officials (AASHTO). And be sure to ask a firm's representatives about their reporting practices, including report distribution and timeliness, how they handle notifications of nonconformance, and how they resolve complaints.

Once you identify your preferred firm, meet with its representatives again. Provide the approved plans and specifications and other pertinent materials, like a construction schedule, and discuss what's needed to finalize a scope of service that reflects what will be happening on site and when it will occur. Recognize that most CoMET services are performed periodically or randomly, not continuously. Also recognize that a CoMET consultant's field representatives cannot be in all places at all times, an important issue when multiple activities are ongoing simultaneously. Ask for guidance about appropriate staffing levels and discuss the trade-offs that may be available.

Creating a detailed scope of CoMET QA service can help avoid surprises. Still, scope flexibility is needed to deal promptly with the unanticipated, like the additional services required to check the rework performed because of an error caught in QA.

Scope flexibility is needed to deal promptly with the unanticipated.

For financing purposes, some owners require the constructor to pay for CoMET services. ***Consider an alternative approach*** so you don't convert the constructor into the CoMET consultant's client. If it's essential for you to fund QA via the constructor, have the CoMET fee included as an allowance in the bid documents. This arrangement ensures that you remain the CoMET consultant's client, and it prevents the CoMET fee from becoming part of the constructor's bid-price competition. (Note that the International Building Code (IBC) *requires the owner to pay* for Special Inspection (SI) services commonly performed by the CoMET consultant as a service separate from QA, to help ensure the independence of the SI process. Because failure to comply could result in denial of an occupancy or use permit, having a contractual agreement that conforms to local code requirements is essential.)

If it's essential for you to fund QA via the constructor, have the CoMET fee included as an allowance in the bid documents. Note, too, that the International Building Code (IBC) requires you to pay for Special Inspection (SI) services.

CoMET consultants can usually quote their fees as unit fees, unit fees with estimated total (invoiced on a unit-fee basis), or lump-sum (invoiced on a percent-completion basis referenced to a schedule of values). No matter which method is used, estimated quantities need to be realistic. Some CoMET firms lower their total-fee estimates by using quantities they know are too low and then request change orders long before construction and the need for QA are complete.

Once you and the CoMET consultant settle on the scope of service and fee, enter into a written contract. Established CoMET firms have their own contracts; most owners sign them. Some owners prefer to use different contracts, but that can be a mistake when the contract was prepared for construction services. *Professional services are different.* Wholly avoidable problems occur when a contract includes provisions that don't apply to the services involved and fails to include those that do.

Some owners create wholly avoidable problems by using a contract prepared for construction services.

This final note: CoMET consultants perform QA for owners, not constructors. While constructors are commonly given review copies of QA reports *as a courtesy*, you need to make it clear that constructors do *not* have a legal right to rely on those reports; i.e., if constructors want to forgo their own observation and testing and rely on results derived from a scope created to meet *only* the needs of the owner, they *must do so at their own risk.* In all too many cases where owners have failed to make that clear, constructors have alleged that they *did* have a legal right to rely on QA reports and, as a result, the CoMET consultant – not they – are responsible for their failure to deliver what they contractually promised to provide. The outcome can be delays and disputes that entangle you and all other principal project participants. Avoid that. Rely on CoMET professionals with the resources and attitude needed to manage this and other risks as an element of a quality-focused service. Involve them early. Keep them engaged. And listen to what they say. Good CoMET consultants can provide great value.

For more information, speak with representatives of a firm that's part of ASFE/ The Geoprofessional Business Association (GBA) or contact GBA staff. In either case, your inquiries will be warmly welcomed.

ASFE THE GEOPROFESSIONAL BUSINESS ASSOCIATION
8811 Colesville Road
Suite G106
Silver Spring, Maryland 20910
Voice: 301.565.2733
Fax: 301.589.2017
E-mail: info@asfe.org
Internet: www.asfe.org

EXHIBIT C – FAARFIELD CALCULATIONS

Federal Aviation Administration FAARFIELD 2.1 Structure Report

FAARFIELD 2.1 (Build 10/09/2023)

Job Name: F17 Center Muni RW 17-35

Structure: AC RW 17-35

Analysis Type: New Flexible

Last Run: Life Analysis 2024-10-04 10:05:56

Calculated Life = 15,025.7 Years

Total thickness to the top of the subgrade = 24.0in.

Pavement Structure Information by Layer

No.	Type	Thickness (in.)	Modulus (psi)	CBR	Poisson's Ratio	Strength R (psi)
1	P-401/P-403 HMA Surface	17.0	200,000	0	0.35	0
2	User Defined	7.0	20,000	0	0.35	0
3	Subgrade	0	3,000	2	0.35	0

Airplane Information

No.	Name	Gross Wt. (lbs)	Annual Departures	% Annual Growth
1	Dassault Falcon 50/50EX	38,800	1,000	2
2	S-12.5	12,500	10,000	2
3	D-15	15,000	5,000	2
4	Truck Axle Single	18,740	1,500	2
5	BeechJet-400/400A	16,300	1,000	2

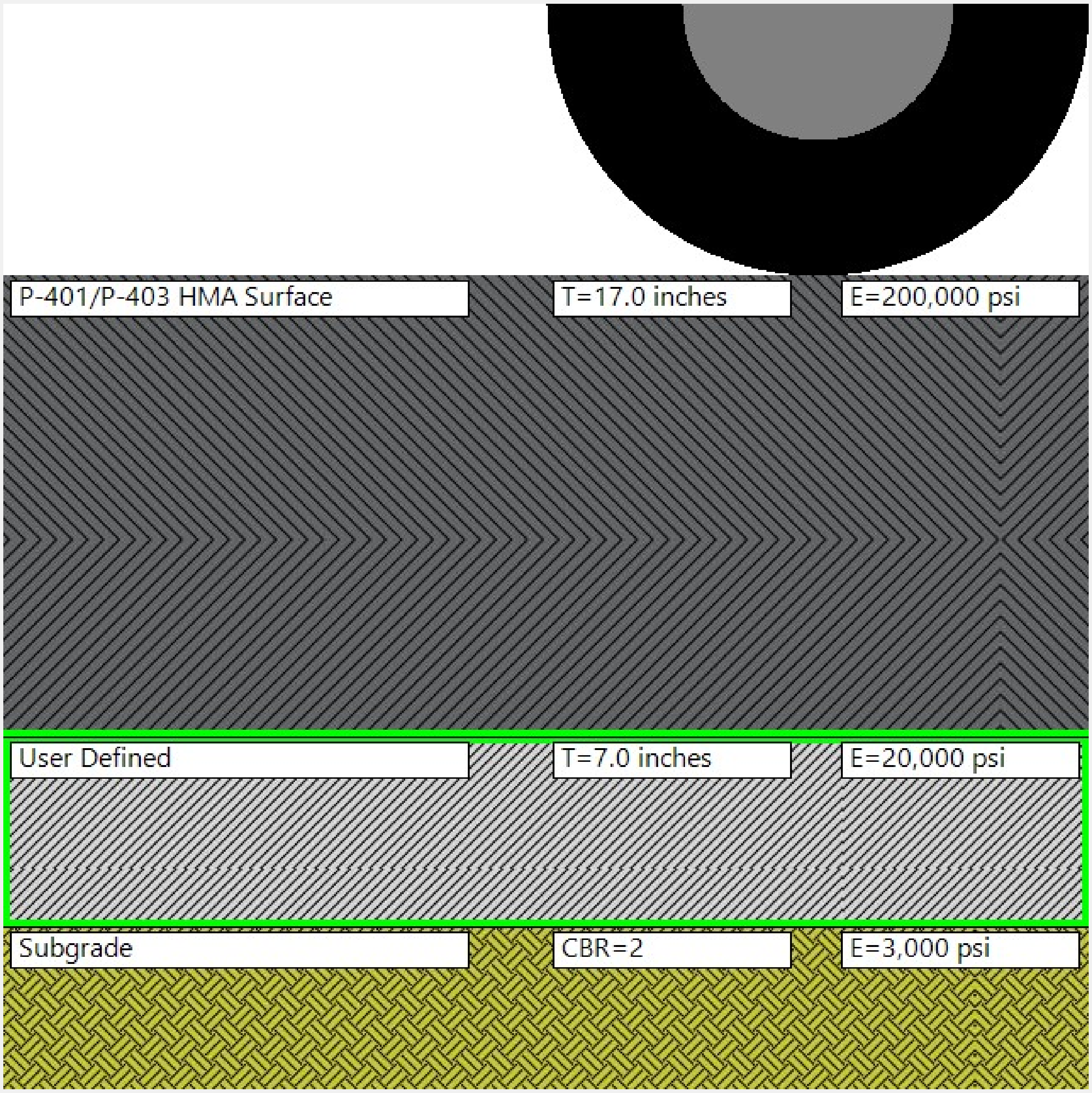
Additional Airplane Information

Subgrade CDF

No.	Name	CDF Contribution	CDF Max for Airplane	P/C Ratio
1	Dassault Falcon 50/50EX	0.00	0.00	1.89
2	S-12.5	0.00	0.00	2.41
3	D-15	0.00	0.00	1.98
4	Truck Axle Single	0.00	0.00	2.44
5	BeechJet-400/400A	0.00	0.00	2.49

NOTE:

User is responsible for checking frost protection requirements.



Appendix D

Airport Layout Plan

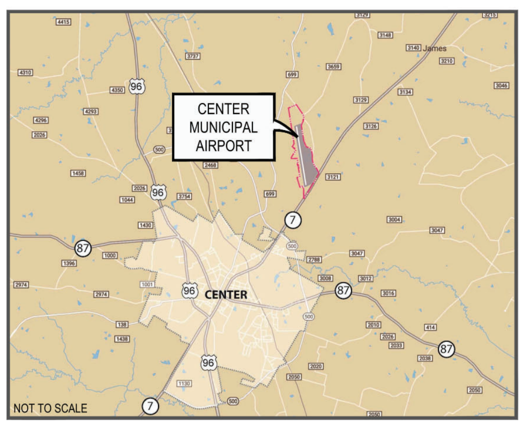
AIRPORT LAYOUT PLAN

for the

CENTER MUNICIPAL AIRPORT

Center, Texas

Prepared for
the City of Center, Texas



LOCATION MAP

VICINITY MAP

DRAWING INDEX

1. TITLE SHEET
2. AIRPORT DATA SHEET
3. AIRPORT LAYOUT PLAN DRAWING
4. AIRPORT AIRSPACE DRAWING
5. AIRPORT AIRSPACE PROFILE RUNWAY 17-35
6. INNER PORTION OF THE APPROACH SURFACE DRAWING RUNWAY 17
7. INNER PORTION OF THE APPROACH SURFACE DRAWING RUNWAY 35
8. RUNWAY 17-35 DEPARTURE SURFACE DRAWING
9. RUNWAY 17-35 DEPARTURE SURFACE OBSTRUCTION & SIGNIFICANT OBJECT TABLES
10. TERMINAL AREA DRAWING
11. LAND USE DRAWING
12. EXHIBIT 'A' AIRPORT PROPERTY INVENTORY MAP

COUNTY MAP
NOT TO SCALE

DRAFT

NO.	REVISIONS	DATE	BY	APP'D.

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CENTER MUNICIPAL AIRPORT

TITLE SHEET

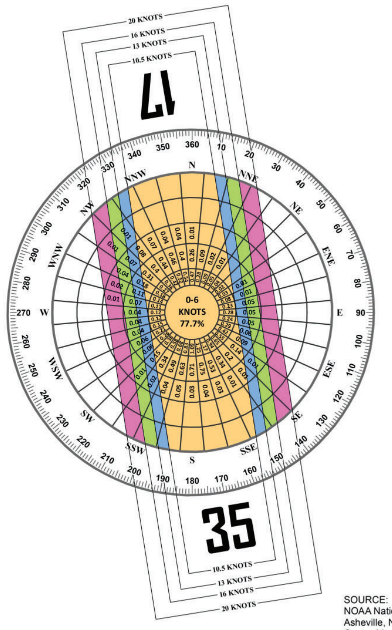
CENTER, TEXAS

PLANNED BY: C. Burks
DETAILED BY: D. Przybycien
APPROVED BY: M. Dmyterko

May 2025 SHEET 1 OF 12

Coffman Associates
Airport Consultants
www.coffmanassociates.com

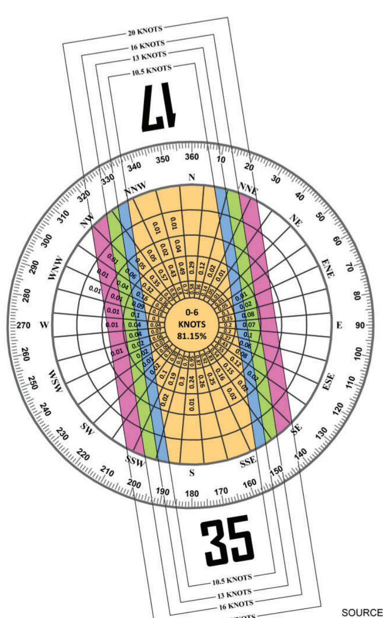
ALL WEATHER WIND COVERAGE				
Runways	10.5 Knots	13 Knots	16 Knots	20 Knots
Runway 17-35	98.87%	99.54%	99.92%	99.99%



SOURCE:
NOAA National Climatic Center
Asheville, North Carolina
Center Municipal Airport
Center, Texas
Wind data taken from Nacogdoches
A L Mangham Jr. Regional Airport

OBSERVATIONS:
156,379 All Weather Observations
Jan. 1, 2014 - Dec, 31 2023

IFR WIND COVERAGE				
Runways	10.5 Knots	13 Knots	16 Knots	20 Knots
Runway 17-35	98.97%	99.51%	99.90%	99.98%



SOURCE:
NOAA National Climatic Center
Asheville, North Carolina
Center Municipal Airport
Center, Texas
Wind data taken from Nacogdoches
A L Mangham Jr. Regional Airport

OBSERVATIONS:
22,775 IFR Observations
Jan. 1, 2014 - Dec, 31 2023

AIRPORT DATA

City: Center		County: Shelby	Owner: City of Center
Airport Name & ID: Center Municipal Airport (F17)		EXISTING	ULTIMATE
Airport Reference Code (ARC)		B-II	C-III
Mean Maximum Temperature of Hottest Month		94.5° August	Same
Airport Elevation (NAVD 88)		318.73'	319.00'
Airport Navigational Aids		LNAV GPS (17,35), NDB (17), PAPI-2 (17,35)	LPV GPS (17,35), PAPI-4 (17,35)
Airport Reference Point (ARP) Coordinates	Latitude	31°49'53.743'	31°50'00.516"
	Longitude	94°09'23.128"	94°09'24.453"
Miscellaneous Facilities		AWOS-3, Rotating Beacon, Lighted Wind Cone/Segmented Circle, MIRL	AWOS-3, Rotating Beacon, Lighted Wind Cone/Segmented Circle, MIRL, MITL
Design Critical Aircraft		King Air 350	Bombardier Global 5000
Wingspan of Design Aircraft (Feet)		57.9'	94.0'
Approach Speed of Design Aircraft (Knots)		107	128
Undercarriage Width of Design Aircraft (Feet)		19.78'	18.40'
Magnetic Declination (Degrees)		0°59' Changing by 0°6' Per Year	
Declination Date		12-Dec-24	
Declination Source		NOAA	
NPIAS Code		GA Local	
State System Plan Role		BC	

Taxiway Data Table

Existing/Ultimate Taxiway/Taxilane Designation	Taxiway Design Group	Width	Taxiway/Taxilane Safety Area Dimension	Taxiway Object Free Area	Taxilane Object Free Area	Taxiway/Taxilane Lighting	Taxiway & Taxilane Separation[1]	Taxiway Edge Safety Margin (TESM)
A/A	2A/2B	35'	118'	171'	N/A	None	85.5'/79'	7.5'
A1-A5	2B	35'	118'	171'	N/A	None	85.5'/79'	7.5'
B/A4	2A	35'	79'/118'	124'/171'	N/A	None	85.5'/79'	7.5'
C/To Be Closed	2A	35'	79'	124'	N/A	None	85.5'/79'	7.5'
D	2A	40'	118'	N/A	158'	None	85.5'/79'	7.5'

RUNWAY DECLARED DISTANCE	EXISTING		ULTIMATE	
	17	35	17	35
Takeoff Run Available (TORA)	5501'	5501'	Same	Same
Takeoff Distance Available (TODA)	5501'	5501'	Same	Same
Accelerate-Stop Distance Available (ASDA)	5501'	5501'	Same	Same
Landing Distance Available (LDA)	5501'	5501'	Same	Same

RUNWAY DATA TABLE

		EXISTING		ULTIMATE	
Runway Identification		17	35	17	35
Runway Design Code (RDC)		B-II-5000		C-III-4000	
Approach Reference Code (APRC)		B/III/4000, D/II/4000		D/IV/4000, D/V/4000	
Departure Reference Code (DPRC)		B/III, D/II		D/IV, D/V	
Runway Surface Material		Asphalt		Same	
Runway Pavement Strength By Wheel Loading (in thousands of lbs.)		30 (S)		100 (D)	
Runway Pavement Strength by PCN		NA		NA	
Runway Surface Treatment		NONE		Same	
Runway Effective Gradient		0.50%		0.44%	
Runway Percent Wind Coverage	10.5 knots	98.7		Same	
	13 knots	99.54		Same	
	16 knots	99.92		Same	
	20 knots	99.99		Same	
		5501' x 75'		5501' x 100'	
Runway End Coordinates	Latitude	31°50'20.488"	31°49'26.895"	31°50'27.365"	31°49'33.671"
	Longitude	94°09'28.378"	94°09'17.879"	94°09'29.704"	94°09'19.204"
Runway End Elevation		318.73'	291.02'	319.00'	294.78'
Runway Displaced Threshold Coordinates	Latitude	NA	NA	Same	Same
	Longitude	NA	NA	Same	Same
Runway Displaced Threshold Distance		NA	NA	Same	Same
Runway Displaced Threshold Elevation		NA	NA	Same	Same
Runway Safety Area Dimensions (width x length beyond end) - Design Std.		150'x300'	150'x300'	500'x1000'	500'x1000'
Runway Safety Area Dimensions (width x length beyond end) - Actual		150'x300'	150'x300'	500'x1000'	500'x1000'
Runway Lighting Type		MIRL		Same	
Runway Protection Zone Dimensions		1000'x500'x700'	1000'x500'x700'	1700'x1000'x1510'	1700'x500'x1010'
Runway Marking Type		NonPrecision	NonPrecision	Same	Same
14 CFR Part 77 Approach Slope		34:1	34:1	Same	Same
14 CFR Part 77 Approach Type		NonPrecision	NonPrecision	Same	Same
Approach Visibility Minimums		> = 1 Mile	> = 1 Mile	3/4 Mile	> = 1 Mile
Type of Aeronautical Survey Required for Approach		VG	VG	Same	Same
Departure Surface (Yes or N/A)		Yes	Yes	Same	Same
Runway Object Free Area Dimensions (width x length beyond end)		500'x300'	500'x300'	800'x1000'	800'x1000'
Runway Obstacle Free Zone Dimension (width x length beyond end)		400'x200'	400'x200'	Same	Same
13B Approach Surfaces[1]		4	4	5,6	5,6
Runway Visual and Instrument Navaids		MIRL, PAPI-2	MIRL, PAPI-2	MIRL, PAPI-4, REILs	MIRL, PAPI-4, REILs
Touchdown Zone Elevation (TDZE)		318.73'	308.04'	319.00'	309.52'
Horizontal Datum		NAD83			
Vertical Datum		NAVD88			

[1]Tables 3-2, 3-3, & 3-4 in AC 150/5300-13B, Change 1

Airport Navaid Ownership	
Navaid	Owner
AWOS-3	City of Center
NDB	City of Center
Rotating Beacon	City of Center
Lighted Windcone/Segmented Circle	City of Center
MIRL	City of Center
MITL	City of Center

MODIFICATIONS TO STANDARDS APPROVAL TABLE			
APPROVAL DATE	AIRSPACE CASE NUMBER	STANDARD MODIFIED	DESCRIPTION
NONE			

EXISTING AIRPORT FACILITES			
STATION	DESIGNATION	LATITUDE	LONGITUDE
PAC	FAA F17 A	31°49'28.92247"	94°09'15.10233"
SAC	FAA F17 B	31°49'43.36957"	94°09'17.78248"
SAC	FAA F17 C	31°49'57.54568"	94°09'20.95130"

DRAFT

NO.	REVISIONS	DATE	BY	APP'D.

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CENTER MUNICIPAL AIRPORT

AIRPORT DATA SHEET

CENTER, TEXAS

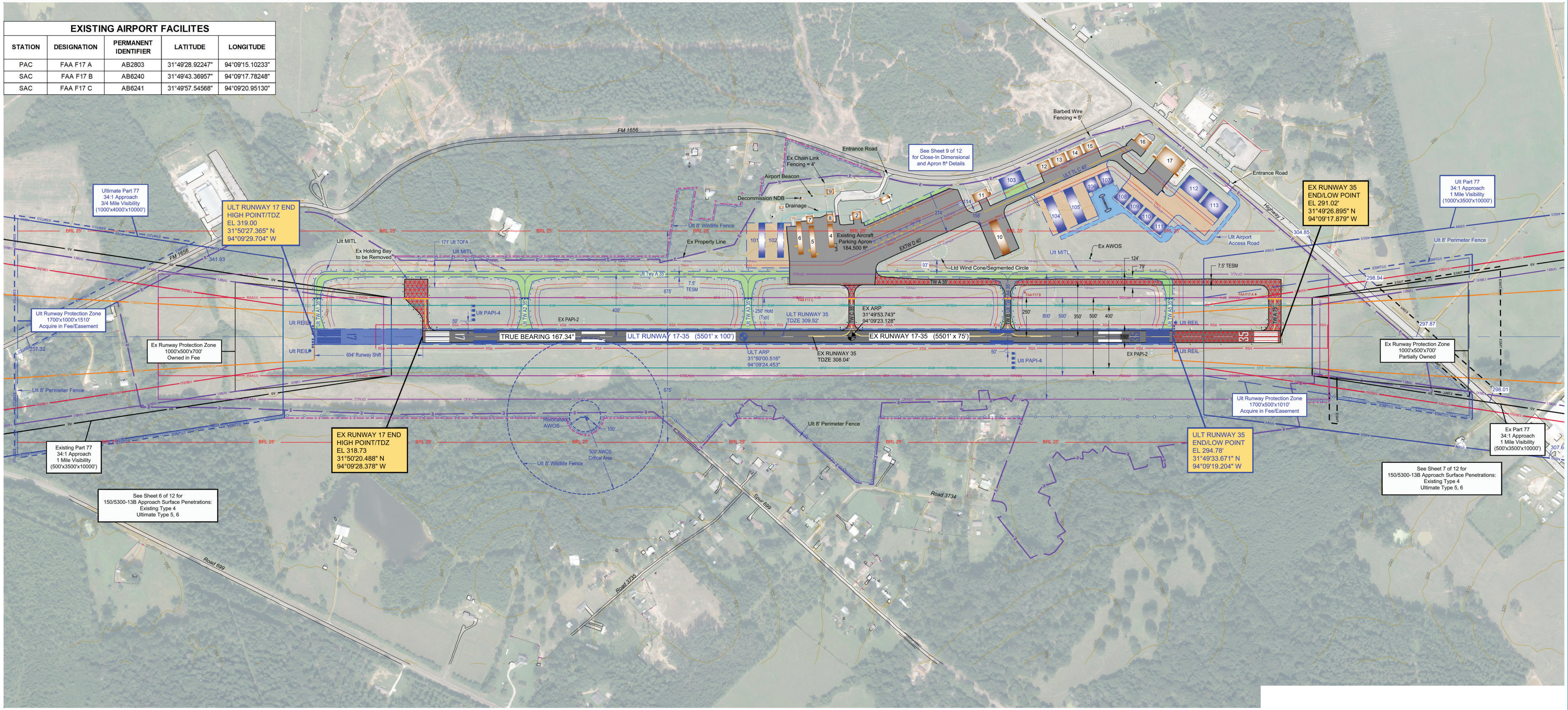
PLANNED BY: C. Burks
DETAILED BY: D. Przybycien
APPROVED BY: M. Dmyterko

May 2025

Coffman Associates
Airport Consultants
www.coffmanassociates.com

EXISTING AIRPORT FACILITES

STATION	DESIGNATION	PERMANENT IDENTIFIER	LATITUDE	LONGITUDE
PAC	FAA F17 A	AB2803	31°49'28.92247"	94°09'15.10233"
SAC	FAA F17 B	AB6240	31°49'43.36957"	94°09'17.78248"
SAC	FAA F17 C	AB6241	31°49'57.54568"	94°09'20.95130"



LEGEND

EXISTING	ULTIMATE	DESCRIPTION
		AIRPORT PROPERTY LINE
		AVIGATION EASEMENT
		AIRPORT REFERENCE POINT
		AIRPORT BEACON
BRL 25'		BUILDING RESTRICTION LINE (25')
		STRUCTURES ON AIRPORT
		STRUCTURE OFF AIRPORT
N/A		ABANDON/REMOVE STRUCTURE
N/A		ABANDON/REMOVE PAVEMENT
		CRITICAL AREA
		RUNWAY TAXIWAY PAVEMENT
		APRON PAVEMENT
		FENCE LINE
		HOLD MARKING
		RUNWAY TAXIWAY APRON MARKING
		ROADS AND PARKING PAVEMENT
		SURVEY MONUMENT WITH IDENTIFIER
OFA	OFA(U)	OBJECT FREE AREA
RSA	RSA(U)	RUNWAY SAFETY AREA
OFZ	OFZ(U)	OBSTACLE FREE ZONE
RPZ	RPZ(U)	RUNWAY PROTECTION ZONE
RVZ	RVZ(U)	RUNWAY VISIBILITY ZONE
TOFA	TOFA (U)	TAXIWAY OBJECT FREE AREA
TSA	TSA (U)	TAXIWAY SAFETY AREA
		RUNWAY END IDENTIFIER LIGHTS (REIL)
		RUNWAY THRESHOLD LIGHTS
		PAPI
		TIE-DOWNS
		TOPOGRAPHIC CONTOURS

EXISTING AIRPORT FACILITES

#	Facility Name	Top Elevation ft. msl
1	Terminal Building	341.3
2	Executive Box Hangar	343.7
3	Self-Service Fuel Pumps	330.0
4	FBO/T-Hangar	338.7
5	T-Hangar (7-Unit)	337.5
6	T-Hangar (7-Unit)	338.2
7	Executive Box Hangar	346.2
8	Executive Box Hangar	344.1
9	Fuel Farm	349.9
10	T-Hangar (10-Unit)	330.8
11	Executive Box Hangar	334.4
12	Executive Box Hangar	339.2
13	Executive Box Hangar	344.9
14	Executive Box Hangar	342.7
15	Executive Box Hangar	342.2
16	Executive Box Hangar	340.9
17	Conventional Hangar	351.6

ULTIMATE AIRPORT FACILITIES

#	Facility Name	Top Elevation ft. msl*
101	T-Hangars	337.0
102	T-Hangars	337.0
103	Conventional Hangar	346.0
104	T-Hangars	329.0
105	T-Hangars	329.0
106	Executive Hangars	337.0
107	Executive Hangars	337.0
108	Executive Hangars	336.0
109	Executive Hangars	335.0
110	Executive Hangars	334.0
111	Executive Hangars	334.0
112	Conventional Hangar	349.0
113	Conventional Hangar	349.0
114	Fuel Farm	336.0

*Top elevation estimated based off common structure height

GENERAL NOTES:

1. UNLESS NOTED OTHERWISE ALL EXISTING AIRFIELD COORDINATES, ELEVATIONS, AND BEARINGS FROM SURVEY DATED 08/01/2024 BY MARTINEZ GEOSPATIAL.
2. HORIZONTAL DATUM: NORTH AMERICAN DATUM 1983 - NAD83; VERTICAL DATUM: NORTH AMERICAN DATUM 1988 - NAVD88.
3. NO AIR TRAFFIC CONTROL TOWER (ATCT) LINE OF SIGHT/SHADOW STUDY PER FAA ORDER 6480.4 WAS CONDUCTED FOR THIS ALP.
4. TAXILANE D TLOFA IS SET TO 134' BASED ON WINGSPAN OF A GLOBAL 5000.
5. SEE TERMINAL AREA DRAWING SHEET 9 FOR AIRSIDE AND LANDSIDE DIMENSIONAL DETAILS.
6. SEE SHEETS 4 AND 5 FOR PART 77 APPROACH PENETRATIONS.
7. SEE SHEETS 6 AND 7, INNER PORTION OF THE APPROACH SURFACE DRAWINGS FOR PART 77 AND OBSTACLE CLEARANCE SURFACE PENETRATIONS.

Texas Department Of Transportation Aviation Division	Airport Sponsor
ALP approved according to FAA AC 150/5300-13B, Change 1 plus the requirements of a favorable environmental finding and FAA NRA study prior to the start of any land acquisition or construction on airport property.	Current and future development depicted on this ALP is approved and supported by Airport Sponsor. Sponsor acknowledges approval of ALP by TXDOT does not constitute a commitment to funding.
Dan Harmon, Director, Aviation Division — Date	Signature — Date
	Title, Airport Sponsor's Representative

MAGNETIC NORTH
NORTH

Magnetic Declination
00° 59' East
Annual Rate of Change
00° 06' West
(Source: NOAA, NCEI, December 2024)

0 300 600
SCALE IN FEET

DRAFT

NO.	REVISIONS	DATE	BY	APP'D.

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CENTER MUNICIPAL AIRPORT

AIRPORT LAYOUT DRAWING

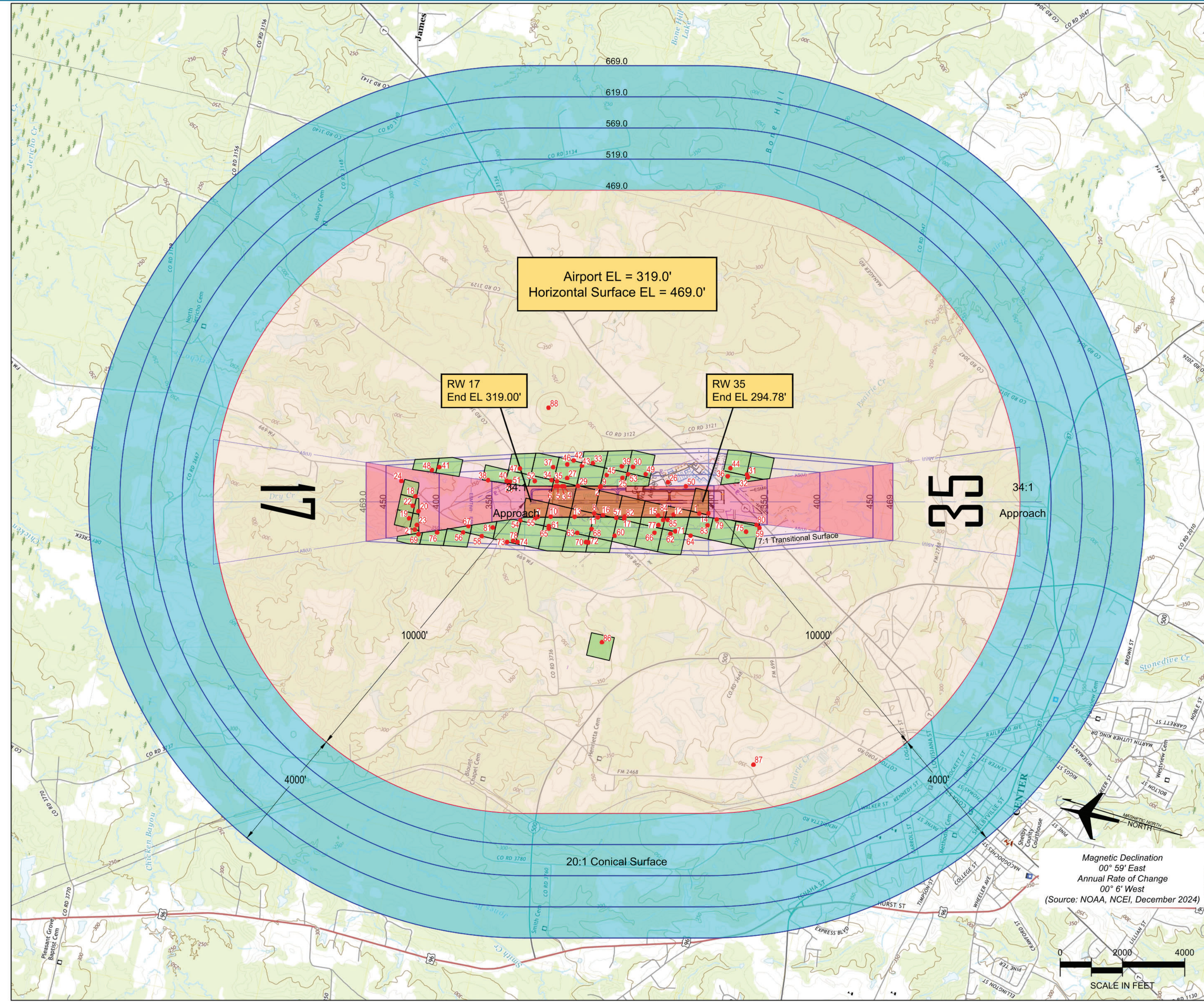
CENTER, TEXAS

PLANNED BY: C. Burks
DETAILED BY: D. Przybycien
APPROVED BY: M. Dmyterko

May 2025 SHEET 3 OF 12

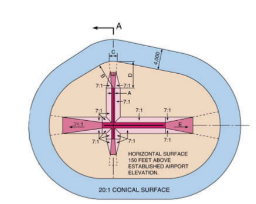
Coffman Associates
Airport Consultants
www.coffmanassociates.com

Obstruction Table										
ID	Feature	Source	Accuracy	FAA Study ID	Ground Elevation (ft. msl.)	AGL (ft.)	Top Elevation (ft. msl.)	Surface Obstructed	Penetration Value (ft.)	Remediation
1	Tree	Martinez Survey (8/1/24)	H20/V3	None	284.25	41.03	325.28	Primary Surface	29.85	Remove Tree
2	Tree	Martinez Survey (8/1/24)	H20/V3	None	325.97	48.41	374.38	Primary Surface	62.26	Remove Tree
3	Tree	Martinez Survey (8/1/24)	H20/V3	None	332.49	54.82	387.31	Primary Surface	69.98	Remove Tree
4	Tree	Martinez Survey (8/1/24)	H20/V3	None	334.93	59.14	394.07	Primary Surface	77.02	Remove Tree
5	Tree	Martinez Survey (8/1/24)	H20/V3	None	335.80	59.79	395.59	Primary Surface	77.58	Remove Tree
6	Tree	Martinez Survey (8/1/24)	H20/V3	None	336.80	60.96	397.76	Primary Surface	79.52	Remove Tree
7	Tree	Martinez Survey (8/1/24)	H20/V3	None	321.46	62.83	384.29	Primary Surface	65.62	Remove Tree
8	Tree	Martinez Survey (8/1/24)	H20/V3	None	301.48	68.70	370.18	Primary Surface	57.66	Remove Tree
9	Tree	Martinez Survey (8/1/24)	H20/V3	None	326.79	69.44	396.23	Primary Surface	84.19	Remove Tree
10	Tree	Martinez Survey (8/1/24)	H20/V3	None	318.93	72.98	391.91	Primary Surface	73.25	Remove Tree
11	Tree	Martinez Survey (8/1/24)	H20/V3	None	297.24	80.36	377.60	Primary Surface	65.31	Remove Tree
12	Tree	Martinez Survey (8/1/24)	H20/V3	None	287.87	84.07	371.94	Primary Surface	72.69	Remove Tree
13	Tree	Martinez Survey (8/1/24)	H20/V3	None	304.87	90.47	395.34	Primary Surface	79.88	Remove Tree
14	Tree	Martinez Survey (8/1/24)	H20/V3	None	282.07	95.51	377.58	Primary Surface	83.92	Remove Tree
15	Tree	Martinez Survey (8/1/24)	H20/V3	None	289.82	100.71	390.53	Primary Surface	88.65	Remove Tree
16	Tree	Martinez Survey (8/1/24)	H20/V3	None	300.05	109.95	410.00	Primary Surface	98.08	Remove Tree
17	Tree	Martinez Survey (8/1/24)	H20/V3	None	295.88	116.95	412.83	Primary Surface	103.27	Remove Tree
18	Tree	Martinez Survey (8/1/24)	H20/V3	None	344.34	84.50	428.84	Rwy 17 Approach	6.50	Remove Tree
19	Tree	Martinez Survey (8/1/24)	H20/V3	None	355.74	84.55	440.29	Rwy 17 Approach	11.88	Remove Tree
20	Tree	Martinez Survey (8/1/24)	H20/V3	None	355.51	88.54	444.05	Rwy 17 Approach	24.48	Remove Tree
21	Tree	Martinez Survey (8/1/24)	H20/V3	None	347.52	89.28	436.80	Rwy 17 Approach	13.84	Remove Tree
22	Tree	Martinez Survey (8/1/24)	H20/V3	None	348.84	91.14	439.98	Rwy 17 Approach	15.23	Remove Tree
23	Tree	Martinez Survey (8/1/24)	H20/V3	None	352.32	91.64	443.96	Rwy 17 Approach	22.94	Remove Tree
24	Tree	Martinez Survey (8/1/24)	H20/V3	None	332.44	103.32	435.76	Rwy 17 Approach	0.26	Remove Tree
25	Antenna	Martinez Survey (8/1/24)	H20/V3	None	327.63	35.54	363.17	Transitional	18.56	To Remain
26	Hangar	Martinez Survey (8/1/24)	H20/V3	None	313.05	17.58	330.63	Transitional	12.09	To Remain
27	Building	Martinez Survey (8/1/24)	H20/V3	None	343.72	29.26	372.98	Transitional	21.99	Add Obstruction Lighting
28	Road	Martinez Survey (8/1/24)	H20/V3	None	327.86	15.00	342.86	Transitional	7.13	Add Obstruction Lighting
29	Tree	Martinez Survey (8/1/24)	H20/V3	None	335.03	60.63	395.66	Transitional	82.30	Remove Tree
30	Tree	Martinez Survey (8/1/24)	H20/V3	None	334.60	73.95	408.55	Transitional	15.07	Remove Tree
31	Tree	Martinez Survey (8/1/24)	H20/V3	None	290.41	78.25	368.66	Transitional	6.07	Remove Tree
32	Tree	Martinez Survey (8/1/24)	H20/V3	None	289.10	78.64	367.74	Transitional	16.64	Remove Tree
33	Tree	Martinez Survey (8/1/24)	H20/V3	None	344.19	78.82	423.01	Transitional	6.62	Remove Tree
34	Tree	Martinez Survey (8/1/24)	H20/V3	None	345.55	80.82	426.37	Transitional	82.92	Remove Tree
35	Tree	Martinez Survey (8/1/24)	H20/V3	None	343.65	81.31	424.96	Transitional	88.13	Remove Tree
36	Tree	Martinez Survey (8/1/24)	H20/V3	None	295.08	82.33	377.41	Transitional	28.77	Remove Tree
37	Tree	Martinez Survey (8/1/24)	H20/V3	None	351.40	86.01	437.41	Transitional	34.85	Remove Tree
38	Tree	Martinez Survey (8/1/24)	H20/V3	None	344.20	89.64	433.84	Transitional	77.81	Remove Tree
39	Tree	Martinez Survey (8/1/24)	H20/V3	None	336.68	90.58	427.26	Transitional	29.35	Remove Tree
40	Tree	Martinez Survey (8/1/24)	H20/V3	None	330.20	92.89	423.09	Transitional	75.17	Remove Tree
41	Tree	Martinez Survey (8/1/24)	H20/V3	None	339.99	93.45	433.44	Transitional	4.97	Remove Tree
42	Tree	Martinez Survey (8/1/24)	H20/V3	None	334.30	96.49	430.79	Transitional	0.06	Remove Tree
43	Tree	Martinez Survey (8/1/24)	H20/V3	None	330.53	100.23	430.76	Transitional	25.09	Remove Tree
44	Tree	Martinez Survey (8/1/24)	H20/V3	None	299.79	100.36	400.15	Transitional	14.00	Remove Tree
45	Tree	Martinez Survey (8/1/24)	H20/V3	None	325.68	100.62	426.30	Transitional	66.79	Remove Tree
46	Tree	Martinez Survey (8/1/24)	H20/V3	None	338.23	102.58	440.81	Transitional	27.42	Remove Tree
47	Tree	Martinez Survey (8/1/24)	H20/V3	None	331.89	107.14	439.03	Transitional	37.71	Remove Tree
48	Tree	Martinez Survey (8/1/24)	H20/V3	None	317.50	112.25	429.75	Transitional	12.71	Remove Tree
49	Building	Martinez Survey (8/1/24)	H20/V3	None	325.82	47.74	373.56	Transitional	14.97	Add Obstruction Lighting
50	Utility Pole	Martinez Survey (8/1/24)	H20/V3	None	305.35	30.09	335.44	Transitional	37.43	Lower/Relocate
51	Utility Pole	Martinez Survey (8/1/24)	H20/V3	None	328.29	32.11	360.40	Transitional	16.41	Lower/Relocate
52	Utility Pole	Martinez Survey (8/1/24)	H20/V3	None	328.28	35.07	363.35	Transitional	22.08	Lower/Relocate
53	NDB	Martinez Survey (8/1/24)	H20/V3	None	329.08	49.61	378.69	Transitional	18.16	To Remain
54	Tree	Martinez Survey (8/1/24)	H20/V3	None	328.56	31.75	360.31	Transitional	25.60	Remove Tree
55	Tree	Martinez Survey (8/1/24)	H20/V3	None	324.88	56.19	381.07	Transitional	60.08	Remove Tree
56	Tree	Martinez Survey (8/1/24)	H20/V3	None	354.52	65.27	419.79	Transitional	15.68	Remove Tree
57	Tree	Martinez Survey (8/1/24)	H20/V3	None	296.85	65.82	362.67	Transitional	53.00	Remove Tree
58	Tree	Martinez Survey (8/1/24)	H20/V3	None	348.54	69.57	418.11	Transitional	1.77	Remove Tree
59	Tree	Martinez Survey (8/1/24)	H20/V3	None	288.72	76.44	365.16	Transitional	2.69	Remove Tree
60	Tree	Martinez Survey (8/1/24)	H20/V3	None	315.49	79.75	395.24	Transitional	3.55	Remove Tree
61	Tree	Martinez Survey (8/1/24)	H20/V3	None	325.43	86.19	411.62	Transitional	55.70	Remove Tree
62	Tree	Martinez Survey (8/1/24)	H20/V3	None	290.28	88.40	378.68	Transitional	3.55	Remove Tree
63	Tree	Martinez Survey (8/1/24)	H20/V3	None	328.97	88.80	417.77	Transitional	34.75	Remove Tree
64	Tree	Martinez Survey (8/1/24)	H20/V3	None	292.32	89.15	381.47	Transitional	0.50	Remove Tree
65	Tree	Martinez Survey (8/1/24)	H20/V3	None	324.54	90.72	415.26	Transitional	47.73	Remove Tree
66	Tree	Martinez Survey (8/1/24)	H20/V3	None	296.41	90.91	387.32	Transitional	14.88	Remove Tree
67	Tree	Martinez Survey (8/1/24)	H20/V3	None	347.99	92.62	440.61	Transitional	67.54	Remove Tree
68	Tree	Martinez Survey (8/1/24)	H20/V3	None	312.60	93.65	406.25	Transitional	42.99	Remove Tree
69	Tree	Martinez Survey (8/1/24)	H20/V3	None	341.53	94.99	436.52	Transitional	12.78	Remove Tree
70	Tree	Martinez Survey (8/1/24)	H20/V3	None	332.45	95.35	427.80	Transitional	3.30	Remove Tree
71	Tree	Martinez Survey (8/1/24)	H20/V3	None	287.89	96.32	384.21	Transitional	21.11	Remove Tree
72	Tree	Martinez Survey (8/1/24)	H20/V3	None	332.64	97.02	429.66	Transitional	3.63	Remove Tree
73	Tree	Martinez Survey (8/1/24)	H20/V3	None	343.67	97.17	440.84	Transitional	4.19	Remove Tree
74	Tree	Martinez Survey (8/1/24)	H20/V3	None	341.89	98.87	440.76	Transitional	6.70	Remove Tree
75	Tree	Martinez Survey (8/1/24)	H20/V3	None	280.90	100.50	381.40	Transitional	6.52	Remove Tree
76	Tree	Martinez Survey (8/1/24)	H20/V3	None	352.25	101.41	453.66	Transitional	43.08	Remove Tree
77	Tree	Martinez Survey (8/1/24)	H20/V3	None	289.56	101.59	391.15	Transitional	54.69	Remove Tree
78	Tree	Martinez Survey (8/1/24)	H20/V3	None	342.46	104.80	447.26	Transitional	17.70	Remove Tree
79	Tree	Martinez Survey (8/1/24)	H20/V3	None	281.79	104.92	386.71	Transitional	78.73	Remove Tree
80	Tree	Martinez Survey (8/1/24)	H20/V3	None	279.69	105.13	384.82	Transitional	38.17	Remove Tree
81	Tree	Martinez Survey (8/1/24)	H20/V3	None	336.34	106.82	443.16	Transitional	68.80	Remove Tree
82	Tree	Martinez Survey (8/1/24)	H20/V3	None	295.63	107.28	402.91	Transitional	91.37	Remove Tree
83	Tree	Martinez Survey (8/1/24)	H20/V3	None	283.98	122.79	406.77	Transitional	75.60	Remove Tree
84	Utility Pole	Martinez Survey (8/1/24)	H20/V3	None	288.92	27.55	316.47	Transitional	3.48	Lower/Relocate
85	Utility Pole	Martinez Survey (8/1/24)	H20/V3	None	288.16	33.62	321.78	Transitional	10.06	Lower/Relocate
86	Tree	Martinez Survey (8/1/24)	H20/V3	None	380.97	94.42	475.39	Horizontal	6.39	Remove Tree
87	Water Tower	Martinez Survey (8/1/24)	H20/V3	None	369.01	149.01	518.02	Horizontal	49.02	Add Obstruction Lighting
88	Tree	Martinez Survey (8/1/24)	H20/V3	None	368.13	104.15	472.28	Horizontal	3.28	Remove Tree



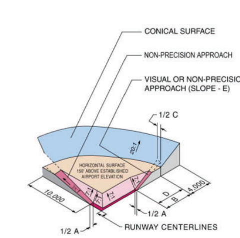
GENERAL NOTES:

1. THE PART 77 AIRSPACE SURFACES SHOWN ARE BASED ON FUTURE CONDITIONS PER FAA SOP NO. 2, A.5. AIRPORT AIRSPACE DRAWING, ITEM B.
2. HORIZONTAL DATUM: NORTH AMERICAN DATUM 1983 - NAD83;
VERTICAL DATUM: NORTH AMERICAN DATUM 1988 - NAVD88
3. OSTRUCTIONS IDENTIFIED BY COFFMAN ASSOCIATES FROM PLANIMETRIC DATA SURVEY DATED 08/01/2024 BY MARTINEZ GEOSPATIAL.
6. A SELECTION OF THE MOST PENETRATING NATURAL AND MANMADE OBJECTS ARE IDENTIFIED WITHIN THE OBSTRUCTION GROUPING AREAS.
7. SEE THE INNER PORTION OF THE APPROACH SURFACE DRAWINGS FOR CLOSE-IN APPROACH DETAILS.
8. ALL ELEVATIONS IN MSL FEET.



DIM	ITEM	DIMENSIONAL STANDARDS (FEET)					
		VISUAL RUNWAY		NON-PRECISION INSTRUMENT RUNWAY			PRECISION INSTRUMENT RUNWAY
		A	B	A	B C	B D	
A	WIDTH OF PRIMARY SURFACE AND APPROACH SURFACE WIDTH AT INNER END	250	500	500	500	1,000	1,000
B	RADIUS OF HORIZONTAL SURFACE	5,000	5,000	5,000	10,000	10,000	10,000
		VISUAL APPROACH		NON-PRECISION INSTRUMENT APPROACH			PRECISION INSTRUMENT APPROACH
		A	B	A	B C	B D	
C	APPROACH SURFACE WIDTH AT END	1,250	1,500	2,000	3,500	4,000	16,000
D	APPROACH SURFACE LENGTH	5,000	5,000	5,000	10,000	10,000	*
E	APPROACH SLOPE	20:1	20:1	20:1	34:1	34:1	*

A - UTILITY RUNWAYS
B - RUNWAYS LARGER THAN UTILITY
C - VISIBILITY MINIMUMS GREATER THAN 3/4 MILE
D - VISIBILITY MINIMUMS AS LOW AS 3/4 MILE
* - PRECISION INSTRUMENT APPROACH SLOPE IS 50:1 FOR INNER 10,000 FEET AND 40:1 FOR AN ADDITIONAL 40,000 FEET



ISOMETRIC VIEW OF SECTION A-A

SOURCE: 14 CFR Part 77, Section 77.25, Civil Airport Imaginary Surfaces.

LEGEND

● OBSTRUCTION IDENTIFIER

OBSTRUCTION AREA GROUPING

DRAFT

NO.	REVISIONS	DATE	BY	APP'D.

"THE PREPARATION OF THESE DOCUMENTS WAS FINANCED IN PART THROUGH A GRANT FROM THE FEDERAL AVIATION ADMINISTRATION AS PROVIDED UNDER SECTION 505 OF THE AIRPORT AND AIRWAY IMPROVEMENT ACT OF 1982, AS AMENDED. THE CONTENTS DO NOT NECESSARILY REFLECT THE OFFICIAL VIEWS OR POLICY OF THE FAA. ACCEPTANCE OF THESE DOCUMENTS BY THE FAA DOES NOT IN ANY WAY CONSTITUTE A COMMITMENT ON THE PART OF THE UNITED STATES TO PARTICIPATE IN ANY DEVELOPMENT DEPICTED HEREIN NOR DOES IT INDICATE THAT THE PROPOSED DEVELOPMENT IS ENVIRONMENTALLY ACCEPTABLE IN ACCORDANCE WITH APPROPRIATE PUBLIC LAWS."

CENTER MUNICIPAL AIRPORT

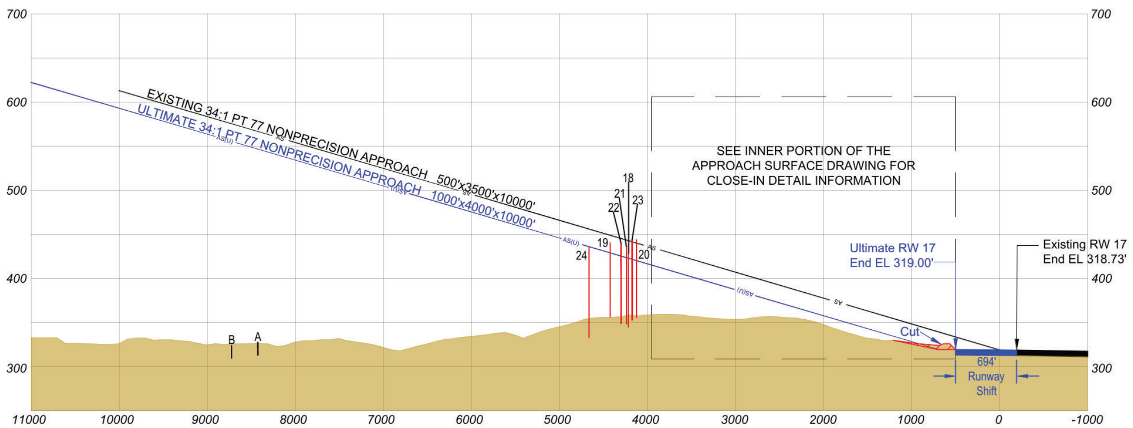
AIRPORT AIRSPACE DRAWING

CENTER, TEXAS

PLANNED BY: C. Burks
DETAILED BY: D. Przybycien
APPROVED BY: M. Dmyterko

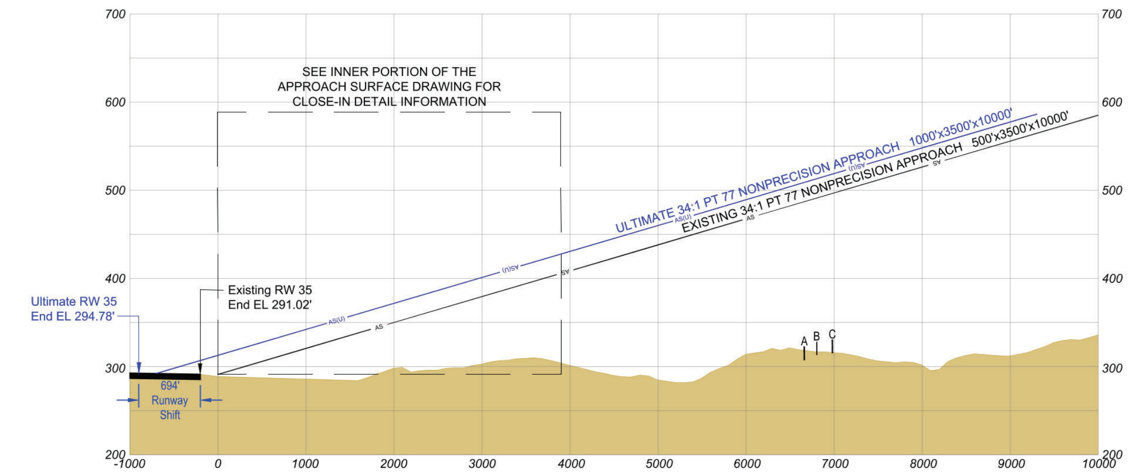
May 2025 SHEET 4 OF 12

Coffman Associates
Airport Consultants
www.coffmanassociates.com



0 1000 2000
HORIZONTAL SCALE IN FEET

0 100 200
VERTICAL SCALE IN FEET

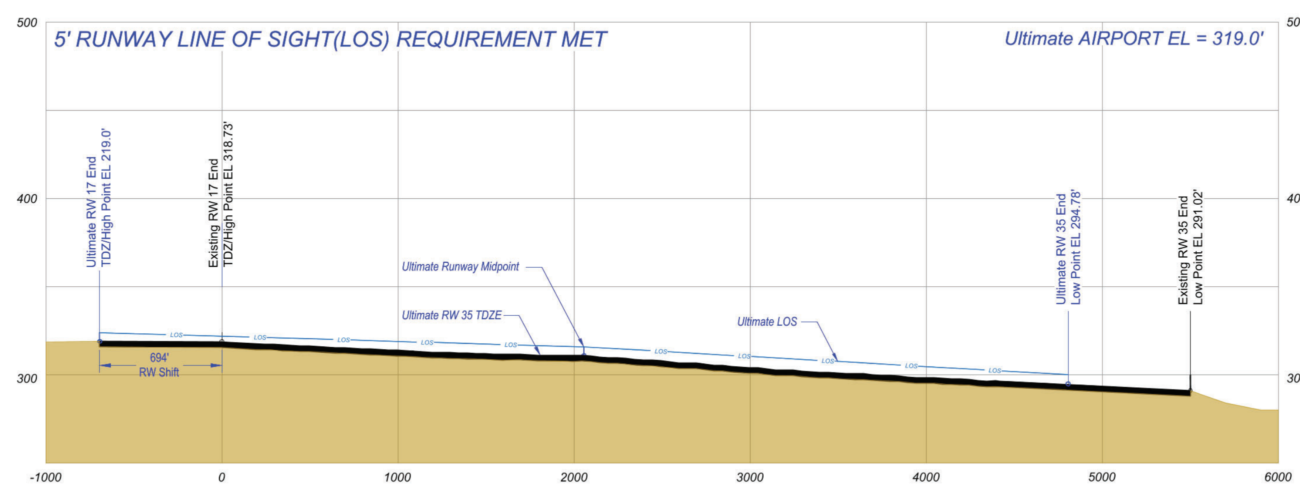


Runway 17 Outer-Approach Obstructions										
ID	Feature	Source	Accuracy	FAA Study ID	Ground Elevation (ft. msl.)	AGL (ft.)	Top Elevation (ft. msl.)	Surface Obstructed	Penetration Value (ft.)	Remediation
18	Tree	Martinez Survey (8/1/24)	H20/V3	None	344.34	84.5	428.84	Ult. 17 Part 77 Approach	6.50	Remove Tree
19	Tree	Martinez Survey (8/1/24)	H20/V3	None	355.74	84.55	440.29	Ult. 17 Part 77 Approach	11.88	Remove Tree
20	Tree	Martinez Survey (8/1/24)	H20/V3	None	355.51	88.54	444.05	Ex. 17 Part 77 Approach	4.34	Remove Tree
								Ult. 17 Part 77 Approach	24.48	
21	Tree	Martinez Survey (8/1/24)	H20/V3	None	347.52	89.28	436.8	Ult. 17 Part 77 Approach	13.84	Remove Tree
22	Tree	Martinez Survey (8/1/24)	H20/V3	None	348.84	91.14	439.98	Ult. 17 Part 77 Approach	15.23	Remove Tree
23	Tree	Martinez Survey (8/1/24)	H20/V3	None	352.32	91.64	443.96	Ex. 17 Part 77 Approach	2.79	Remove Tree
								Ult. 17 Part 77 Approach	22.94	
24	Tree	Martinez Survey (8/1/24)	H20/V3	None	332.44	103.32	435.76	Ult. 17 Part 77 Approach	0.26	Remove Tree

Runway 35 Outer-Approach Obstructions										
ID	Feature	Source	Accuracy	FAA Study ID	Ground Elevation (ft. msl.)	AGL (ft.)	Top Elevation (ft. msl.)	Surface Obstructed	Penetration Value (ft.)	Remediation
No Obstructions										

Runway 35 Outer-Approach Significant Objects							
ID	Feature	Source	Ground Elevation (ft. msl.)	AGL (ft.)	Top Elevation (ft. msl.)	Surface	Clearance Value (ft)
A	Fm 2788	USGS DEM	307.54	15.00	322.54	Ex. 35 Part 77 Approach	164.50
B	Fm 2788	USGS DEM	298.05	15.00	313.05	Ex. 35 Part 77 Approach	178.14
C	Fm 2788	USGS DEM	300.41	15.00	315.41	Ex. 35 Part 77 Approach	180.95

Runway 17 Outer-Approach Significant Objects							
ID	Feature	Source	Ground Elevation (ft. msl.)	AGL (ft.)	Top Elevation (ft. msl.)	Surface	Clearance Value (ft)
A	Fm 699	USGS DEM	312.64	15.00	327.64	Ex. 17 Part 77 Approach	238.59
B	Fm 699	USGS DEM	309.12	15.00	324.12	Ult. 17 Part 77 Approach	230.70



RUNWAY 17-35 PROFILE

0 500 1000
HORIZONTAL SCALE IN FEET

0 50 100
VERTICAL SCALE IN FEET

DRAFT

NO.	REVISIONS	DATE	BY	APP'D.

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CENTER MUNICIPAL AIRPORT

AIRPORT AIRSPACE
APPROACH PROFILE RUNWAYS 17-35

CENTER, TEXAS

PLANNED BY: C. Burks
DETAILED BY: D. Przybycien
APPROVED BY: M. Dmyterko

May 2025 SHEET 5 OF 12

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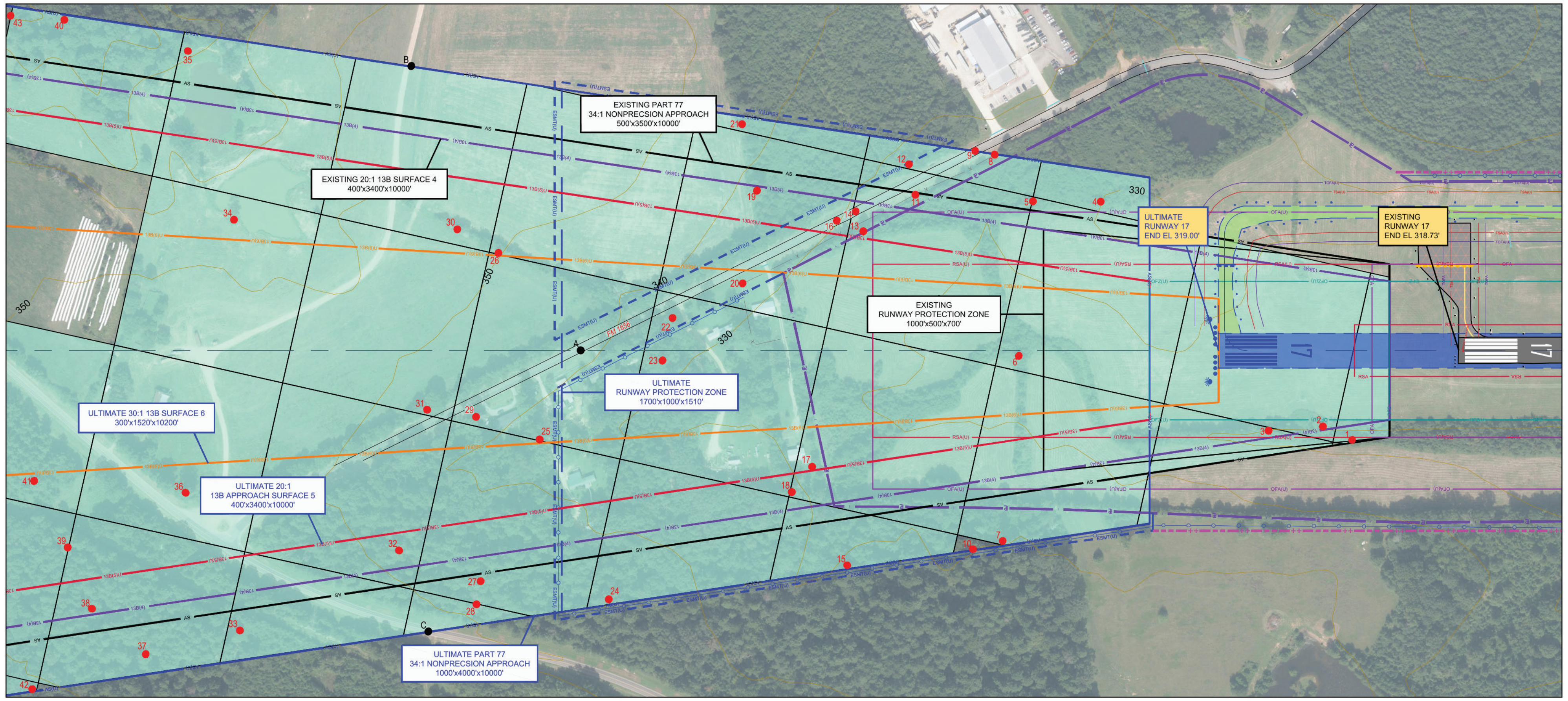

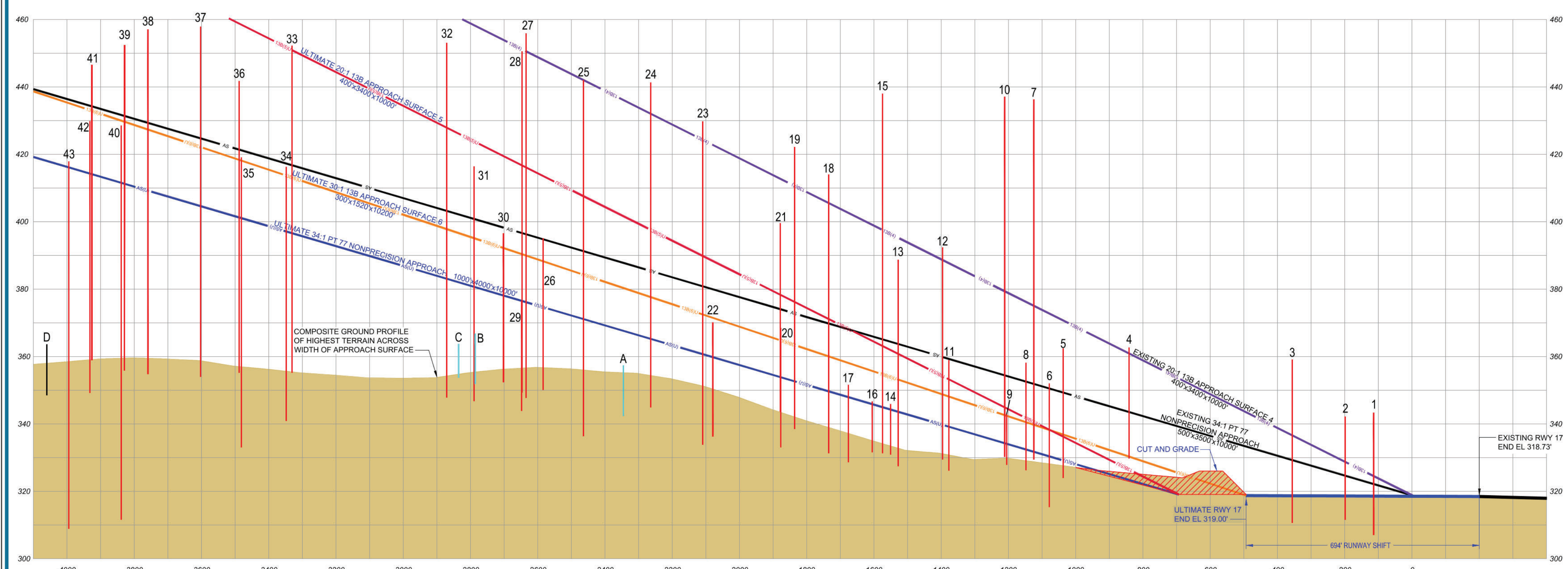

Runway 17 Inner-Approach Obstructions										
ID	Feature	Source	Accuracy	FAA Study ID	Ground Elevation (ft. msl.)	AGL (ft.)	Top Elevation (ft. msl.)	Surface Obstructed	Penetration Value (ft.)	Remediation
1	Tree	Martinez Survey (8/1/24)	H20/V3	None	307.01	36.25	343.26	Ex. 17 Part 77 Approach	21.35	Remove Tree
2	Tree	Martinez Survey (8/1/24)	H20/V3	None	311.56	30.55	342.11	Ex. 17 13B #4	13.77	Remove Tree
								Ex. 17 Part 77 Approach	17.73	
3	Tree	Martinez Survey (8/1/24)	H20/V3	None	310.55	48.47	359.02	Ex. 17 13B #4	22.79	Remove Tree
								Ex. 17 Part 77 Approach	29.99	
4	Tree	Martinez Survey (8/1/24)	H20/V3	None	329.73	32.85	362.58	Ult. 17 Part 77 Approach	39.41	Remove Tree
5	Tree	Martinez Survey (8/1/24)	H20/V3	None	323.89	38.48	362.37	Ult. 17 Part 77 Approach	33.45	Remove Tree
6	Tree	Martinez Survey (8/1/24)	H20/V3	None	315.31	36.61	351.92	Ex. 17 Part 77 Approach	1.65	Remove Tree
7	Tree	Martinez Survey (8/1/24)	H20/V3	None	329.37	106.90	436.27	Ult. 17 Part 77 Approach	104.78	Remove Tree
8	Utility Pole	Martinez Survey (8/1/24)	H20/V3	None	326.24	31.86	358.10	Ult. 17 Part 77 Approach	25.92	Lower/Relocate
9	Road	Martinez Survey (8/1/24)	H20/V3	None	327.84	15.00	342.84	Ult. 17 Part 77 Approach	8.99	To Remain
10	Tree	Martinez Survey (8/1/24)	H20/V3	None	330.14	106.91	437.05	Ult. 17 Part 77 Approach	103.01	Remove Tree
11	Utility Pole	Martinez Survey (8/1/24)	H20/V3	None	326.11	32.73	358.84	Ult. 17 Part 77 Approach	19.91	Lower/Relocate
12	Tree	Martinez Survey (8/1/24)	H20/V3	None	329.37	62.91	392.28	Ult. 17 Part 77 Approach	52.81	Remove Tree
13	Tree	Martinez Survey (8/1/24)	H20/V3	None	327.40	61.26	388.66	Ex. 17 Part 77 Approach	25.15	Remove Tree
								Ult. 17 Part 77 Approach	45.30	
14	Road	Martinez Survey (8/1/24)	H20/V3	None	330.82	15.00	345.82	Ult. 17 Part 77 Approach	1.81	To Remain
15	Tree	Martinez Survey (8/1/24)	H20/V3	None	331.29	106.64	437.93	Ult. 17 Part 77 Approach	93.21	Remove Tree
16	Road	Martinez Survey (8/1/24)	H20/V3	None	331.57	15.00	346.57	Ult. 17 Part 77 Approach	0.95	To Remain
17	Utility Pole	Martinez Survey (8/1/24)	H20/V3	None	328.59	22.93	351.52	Ult. 17 Part 77 Approach	3.80	Lower/Relocate
18	Tree	Martinez Survey (8/1/24)	H20/V3	None	331.30	82.58	413.88	Ex. 17 13B #4	8.72	Remove Tree
								Ex. 17 Part 77 Approach	44.31	
19	Tree	Martinez Survey (8/1/24)	H20/V3	None	338.52	83.56	422.08	Ex. 17 13B #4	11.86	Remove Tree
								Ex. 17 Part 77 Approach	49.53	
19	Tree	Martinez Survey (8/1/24)	H20/V3	None	338.52	83.56	422.08	Ult. 17 Part 77 Approach	69.67	Remove Tree
20	Utility Pole	Martinez Survey (8/1/24)	H20/V3	None	333.00	35.35	368.35	Ult. 17 Part 77 Approach	14.73	Lower/Relocate
21	Tree	Martinez Survey (8/1/24)	H20/V3	None	343.54	55.94	399.48	Ult. 17 Part 77 Approach	45.81	Remove Tree
22	Utility Pole	Martinez Survey (8/1/24)	H20/V3	None	336.24	33.76	370.00	Ult. 17 Part 77 Approach	10.43	Lower/Relocate
23	Tree	Martinez Survey (8/1/24)	H20/V3	None	333.78	95.94	429.72	Ex. 17 13B #4	5.83	Remove Tree
								Ex. 17 Part 77 Approach	49.13	
								Ult. 17 13B #4	40.26	
23	Tree	Martinez Survey (8/1/24)	H20/V3	None	333.78	95.94	429.72	Ult. 17 Part 77 Approach	69.27	Remove Tree
24	Tree	Martinez Survey (8/1/24)	H20/V3	None	344.82	96.37	441.19	Ult. 17 Part 77 Approach	76.18	Remove Tree
25	Tree	Martinez Survey (8/1/24)	H20/V3	None	336.33	105.58	441.91	Ex. 17 13B #4	0.28	Remove Tree
								Ex. 17 Part 77 Approach	50.89	
26	Tree	Martinez Survey (8/1/24)	H20/V3	None	349.99	44.96	394.95	Ex. 17 Part 77 Approach	0.39	Remove Tree
								Ult. 17 Part 77 Approach	20.55	
27	Tree	Martinez Survey (8/1/24)	H20/V3	None	347.63	108.22	455.85	Ult. 17 Part 77 Approach	79.94	Remove Tree
28	Tree	Martinez Survey (8/1/24)	H20/V3	None	349.21	101.29	450.50	Ult. 17 Part 77 Approach	74.24	Remove Tree
29	Utility Pole	Martinez Survey (8/1/24)	H20/V3	None	343.83	32.67	376.50	Ult. 17 Part 77 Approach	0.20	
30	Tree	Martinez Survey (8/1/24)	H20/V3	None	352.29	44.21	396.50	Ult. 17 Part 77 Approach	18.61	Remove Tree
31	Tree	Martinez Survey (8/1/24)	H20/V3	None	346.68	69.58	416.26	Ex. 17 Part 77 Approach	15.65	Remove Tree
								Ult. 17 Part 77 Approach	35.79	
32	Tree	Martinez Survey (8/1/24)	H20/V3	None	347.79	105.14	452.93	Ex. 17 Part 77 Approach	49.94	Remove Tree
								Ult. 17 Part 77 Approach	70.08	
33	Tree	Martinez Survey (8/1/24)	H20/V3	None	355.13	97.01	452.14	Ult. 17 Part 77 Approach	55.76	Remove Tree
34	Tree	Martinez Survey (8/1/24)	H20/V3	None	340.80	75.37	416.17	Ult. 17 Part 77 Approach	19.28	Remove Tree
35	Tree	Martinez Survey (8/1/24)	H20/V3	None	332.94	86.07	419.01	Ult. 17 Part 77 Approach	18.19	Remove Tree
36	Tree	Martinez Survey (8/1/24)	H20/V3	None	355.14	86.46	441.60	Ex. 17 Part 77 Approach	20.46	Remove Tree
								Ult. 17 Part 77 Approach	40.60	
37	Tree	Martinez Survey (8/1/24)	H20/V3	None	353.93	103.88	457.81	Ult. 17 Part 77 Approach	53.42	Remove Tree
38	Tree	Martinez Survey (8/1/24)	H20/V3	None	354.76	102.20	456.96	Ex. 17 Part 77 Approach	27.83	Remove Tree
39	Tree	Martinez Survey (8/1/24)	H20/V3	None	355.76	96.56	452.32	Ex. 17 Part 77 Approach	21.15	Remove Tree
								Ult. 17 Part 77 Approach	41.29	
40	Tree	Martinez Survey (8/1/24)	H20/V3	None	311.50	116.92	428.42	Ult. 17 Part 77 Approach	17.10	Remove Tree
41	Tree	Martinez Survey (8/1/24)	H20/V3	None	358.77	87.66	446.43	Ex. 17 Part 77 Approach	12.40	Remove Tree
								Ult. 17 Part 77 Approach	32.54	
42	Tree	Martinez Survey (8/1/24)	H20/V3	None	349.16	80.58	429.74	Ult. 17 Part 77 Approach	15.69	Remove Tree
43	Tree	Martinez Survey (8/1/24)	H20/V3	None	308.76	109.05	417.81	Ult. 17 Part 77 Approach	1.91	Remove Tree

Magnetic Declination
00° 59' East
Annual Rate of Change
00° 06' West
(Source: NOAA, NCEI, December 2024)

LEGEND

- OBSTRUCTION GROUPING
- OBSTRUCTION IDENTIFIER
- SIGNIFICANT OBJECT
- EXISTING EASEMENT BOUNDARY
- ULTIMATE EASEMENT BOUNDARY
- EXISTING PROPERTY BOUNDARY
- ULTIMATE PROPERTY BOUNDARY

0 200 400
HORIZONTAL SCALE IN FEET

0 20 40
VERTICAL SCALE IN FEET

DRAFT

GENERAL NOTES:

1. HORIZONTAL DATUM: NORTH AMERICAN DATUM 1983 - NAD83;
   VERTICAL DATUM: NORTH AMERICAN DATUM 1988 - NAVD88.
2. SAMPLED POINTS REPRESENT THE HIGHEST POINTS WITHIN OBSTRUCTION GROUPINGS.
3. OSTRUCTIONS IDENTIFIED BY COFFMAN ASSOCIATES FROM SURVEY PROVIDED BY MARTINEZ GEOSPATIAL, DATED 08/01/2024.
4. ALL ELEVATIONS IN MSL FEET.

Runway 17 Inner-Approach Significant Objects							
ID	Feature	Source	Ground Elevation (ft. msl.)	AGL (ft.)	Top Elevation (ft. msl.)	Surface	Clearance Value (ft)
A	FM 1656	USGS DEM	342.32	15.00	357.32	Ult. 17 Part 77 Approach	10.08
						Ex. 17 Part 77 Approach	30.22
B	Private Rd.	USGS DEM	343.68	10.00	353.68	Ult. 17 Part 77 Approach	18.13
C	Fm 699	USGS DEM	336.75	15.00	351.75	Ult. 17 Part 77 Approach	13.60
D	Fm 699	USGS DEM	333.49	15.00	348.49	Ult. 17 Part 77 Approach	54.33
						Ex. 17 Part 77 Approach	74.47

NO.	REVISIONS	DATE	BY	APP'D.

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CENTER MUNICIPAL AIRPORT

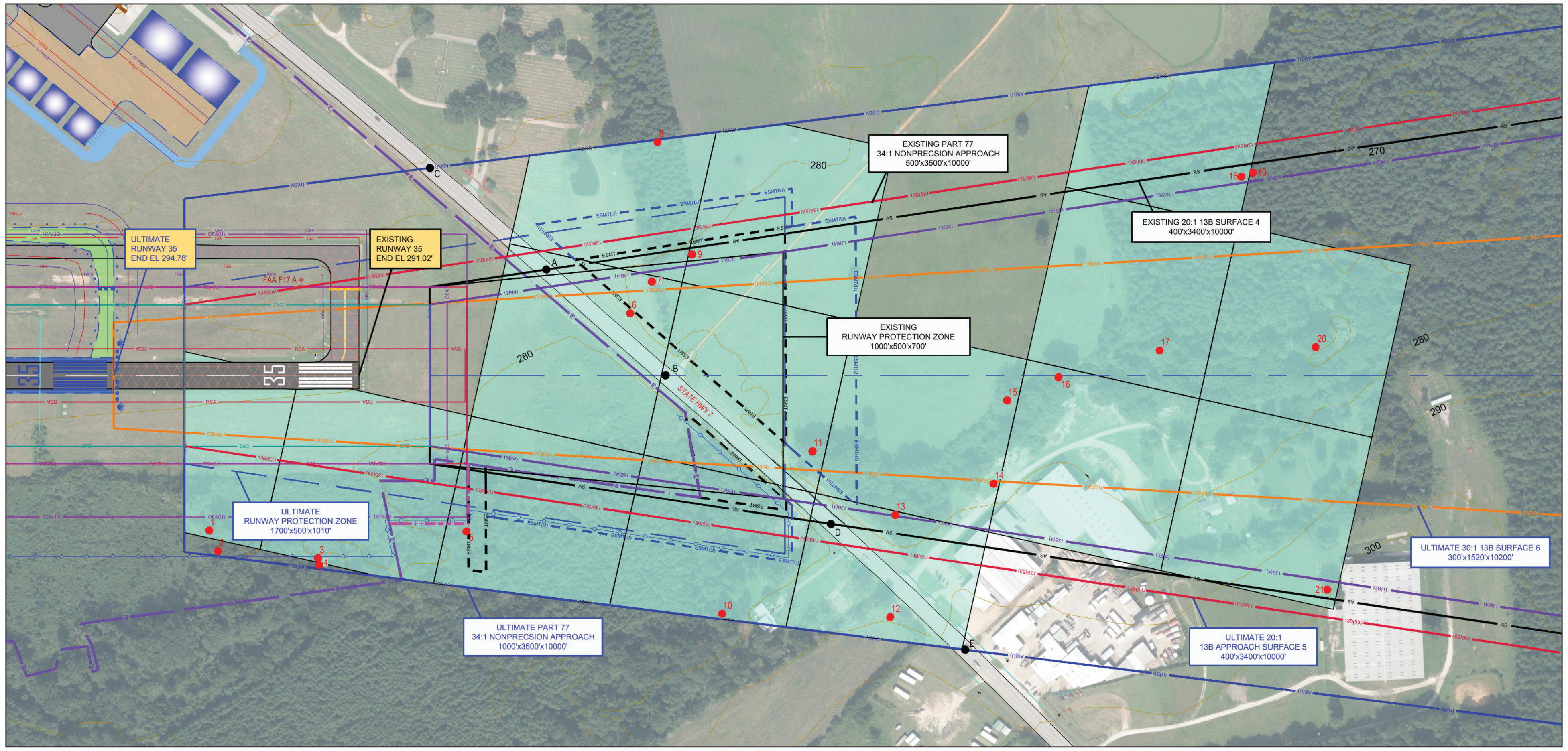
INNER PORTION OF THE APPROACH SURFACE DRAWING RUNWAY 17

CENTER, TEXAS

PLANNED BY: C. Burks
DETAILED BY: D. Przybycien
APPROVED BY: M. Dmyterko

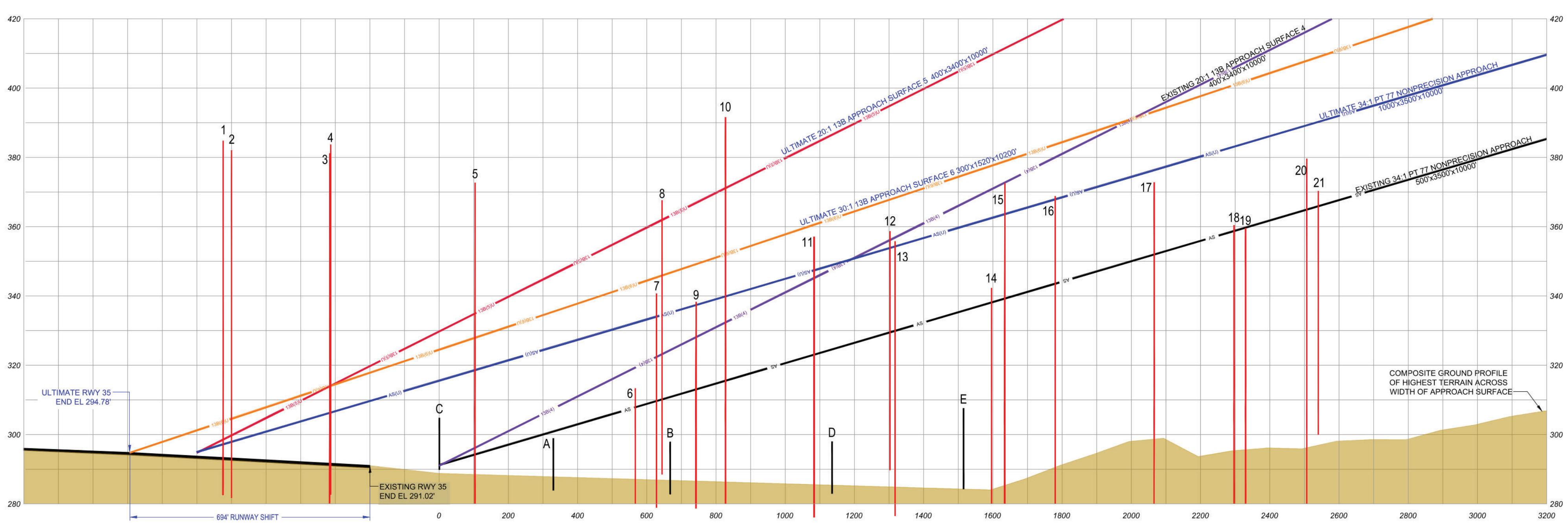
May 2025 SHEET 6 OF 12

Coffman Associates
Airport Consultants
www.coffmanassociates.com



Runway 35 Inner-Approach Obstructions										
ID	Feature	Source	Accuracy	FAA Study ID	Ground Elevation (ft. msl.)	AGL (ft.)	Top Elevation (ft. msl.)	Surface Obstructed	Penetration Value (ft.)	Remediation
1	Tree	Martinez Survey (8/1/24)	H20/V3	None	282.56	102.26	384.82	Ult. 35 Part 77 Approach	87.94	Remove Tree
2	Tree	Martinez Survey (8/1/24)	H20/V3	None	281.70	100.38	382.08	Ult. 35 Part 77 Approach	84.47	Remove Tree
3	Tree	Martinez Survey (8/1/24)	H20/V3	None	280.21	100.99	381.20	Ult. 35 Part 77 Approach	75.25	Remove Tree
4	Tree	Martinez Survey (8/1/24)	H20/V3	None	282.69	101.04	383.73	Ult. 35 Part 77 Approach	77.70	Remove Tree
5	Tree	Martinez Survey (8/1/24)	H20/V3	None	279.43	93.28	372.71	Ult. 35 Part 77 Approach	54.42	Remove Tree
6	Utility Pole	Martinez Survey (8/1/24)	H20/V3	None	280.13	33.25	313.38	Ex. 35 Part 77 Approach	5.66	Lower/Relocate
7	Tree	Martinez Survey (8/1/24)	H20/V3	None	279.01	61.69	340.70	Ult. 35 13B #4	18.24	Remove Tree
								Ex. 35 Part 77 Approach	31.19	
								Ult. 35 Part 77 Approach	6.98	
8	Tree	Martinez Survey (8/1/24)	H20/V3	None	288.53	79.14	367.67	Ult. 35 Part 77 Approach	33.48	Remove Tree
9	Tree	Martinez Survey (8/1/24)	H20/V3	None	278.75	59.56	338.31	Ex. 35 Part 77 Approach	25.44	Remove Tree
9	Tree	Martinez Survey (8/1/24)	H20/V3	None	278.75	59.56	338.31	Ult. 35 Part 77 Approach	1.23	Remove Tree
10	Tree	Martinez Survey (8/1/24)	H20/V3	None	279.34	112.27	391.61	Ult. 35 Part 77 Approach	52.03	Remove Tree
11	Tree	Martinez Survey (8/1/24)	H20/V3	None	276.12	80.96	357.08	Ult. 35 13B #4	11.86	Remove Tree
								Ex. 35 Part 77 Approach	34.18	
								Ult. 35 Part 77 Approach	9.97	
12	Utility Pole	Martinez Survey (8/1/24)	H20/V3	None	289.79	68.97	358.76	Ult. 35 Part 77 Approach	5.19	Lower/Relocate
13	Tree	Martinez Survey (8/1/24)	H20/V3	None	276.53	79.29	355.82	Ex. 35 Part 77 Approach	26.04	Remove Tree
								Ult. 35 Part 77 Approach	1.83	
14	Utility Pole	Martinez Survey (8/1/24)	H20/V3	None	276.98	65.40	342.38	Ex. 35 Part 77 Approach	4.41	Lower/Relocate
15	Tree	Martinez Survey (8/1/24)	H20/V3	None	276.23	96.41	372.64	Ex. 35 Part 77 Approach	33.54	Remove Tree
								Ult. 35 Part 77 Approach	9.33	
16	Tree	Martinez Survey (8/1/24)	H20/V3	None	272.31	96.49	368.80	Ex. 35 Part 77 Approach	25.42	Remove Tree
								Ult. 35 Part 77 Approach	1.21	
17	Tree	Martinez Survey (8/1/24)	H20/V3	None	275.10	97.70	372.80	Ex. 35 Part 77 Approach	21.00	Remove Tree
18	Tree	Martinez Survey (8/1/24)	H20/V3	None	272.42	88.07	360.49	Ex. 35 Part 77 Approach	1.90	Remove Tree
19	Tree	Martinez Survey (8/1/24)	H20/V3	None	272.26	87.38	359.64	Ex. 35 Part 77 Approach	0.07	Remove Tree
20	Tree	Martinez Survey (8/1/24)	H20/V3	None	273.61	106.10	379.71	Ex. 35 Part 77 Approach	14.93	Remove Tree
21	Tree	Martinez Survey (8/1/24)	H20/V3	None	300.07	70.30	370.37	Ex. 35 Part 77 Approach	4.62	Remove Tree

Runway 35 Inner-Approach Significant Objects							
ID	Feature	Source	Ground Elevation (ft. msl.)	AGL (ft.)	Top Elevation (ft. msl.)	Surface	Clearance Value (ft)
A	State Hwy 7	USGS DEM	289.85	15.00	304.85	Ult. 35 Part 77 Approach	10.41
B	State Hwy 7	USGS DEM	283.94	15.00	298.94	Ex. 35 Part 77 Approach	1.79
C	State Hwy 7	USGS DEM	282.87	15.00	297.87	Ex. 35 Part 77 Approach	12.80
						Ult. 35 Part 77 Approach	37.01
D	State Hwy 7	USGS DEM	283.01	15.00	298.01	Ex. 35 Part 77 Approach	26.41
E	State Hwy 7	USGS DEM	292.65	15.00	307.65	Ult. 35 Part 77 Approach	52.15



LEGEND

- OBSTRUCTION GROUPING
- OBSTRUCTION IDENTIFIER
- SIGNIFICANT OBJECT
- EXISTING EASEMENT BOUNDARY
- ULTIMATE EASEMENT BOUNDARY
- EXISTING PROPERTY BOUNDARY
- ULTIMATE PROPERTY BOUNDARY

MAGNETIC NORTH

Magnetic Declination
00° 59' East
Annual Rate of Change
00° 06' West
(Source: NOAA, NCEI, December 2024)

0 200 400
HORIZONTAL SCALE IN FEET

0 20 40
VERTICAL SCALE IN FEET

DRAFT

GENERAL NOTES:

1. HORIZONTAL DATUM: NORTH AMERICAN DATUM 1983 - NAD83;
   VERTICAL DATUM: NORTH AMERICAN DATUM 1988 - NAVD88.
2. SAMPLED POINTS REPRESENT THE HIGHEST POINTS WITHIN OBSTRUCTION GROUPINGS.
3. OSTRUCTIONS IDENTIFIED BY COFFMAN ASSOCIATES FROM SURVEY PROVIDED BY MARTINEZ GEOSPATIAL, DATED 08/01/2024.
4. ALL ELEVATIONS IN MSL FEET.

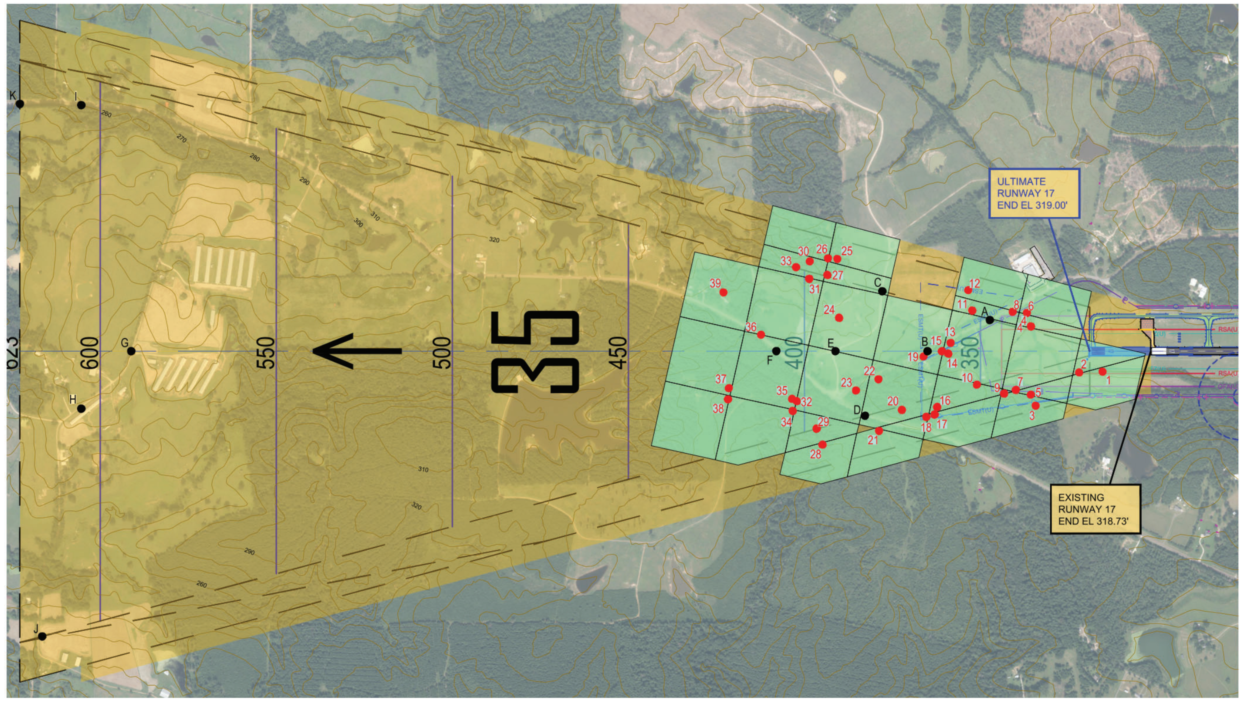
NO.	REVISIONS	DATE	BY	APP'D.

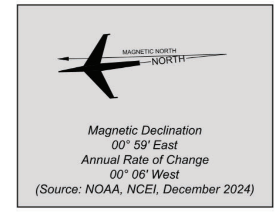
"THE PREPARATION OF THESE DOCUMENTS WAS FINANCED IN PART THROUGH A GRANT FROM THE FEDERAL AVIATION ADMINISTRATION AS PROVIDED UNDER SECTION 505 OF THE AIRPORT AND AIRWAY IMPROVEMENT ACT OF 1982, AS AMENDED. THE CONTENTS DO NOT NECESSARILY REFLECT THE OFFICIAL VIEWS OR POLICY OF THE FAA. ACCEPTANCE OF THESE DOCUMENTS BY THE FAA DOES NOT IN ANY WAY CONSTITUTE A COMMITMENT ON THE PART OF THE UNITED STATES TO PARTICIPATE IN ANY DEVELOPMENT DEPICTED HEREIN NOR DOES IT INDICATE THAT THE PROPOSED DEVELOPMENT IS ENVIRONMENTALLY ACCEPTABLE IN ACCORDANCE WITH APPROPRIATE PUBLIC LAWS."

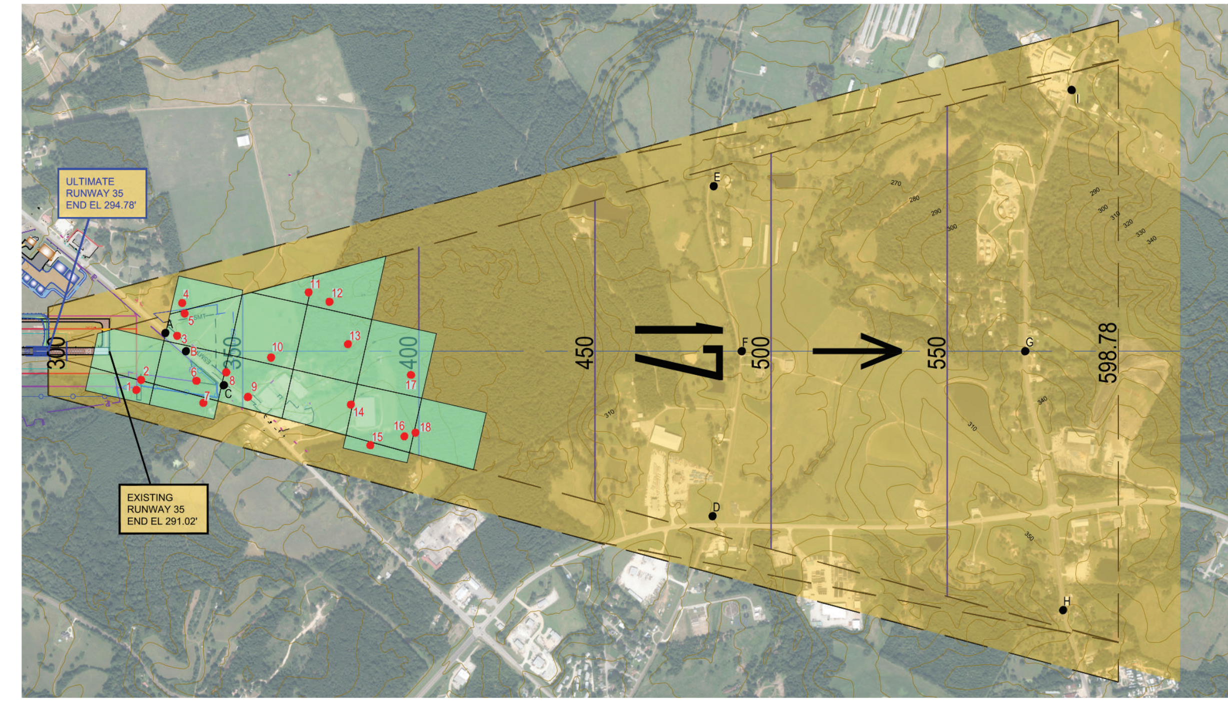
CENTER MUNICIPAL AIRPORT
INNER PORTION OF THE APPROACH SURFACE DRAWING
RUNWAY 35
CENTER, TEXAS

PLANNED BY: C. Burks
DETAILED BY: D. Przybycien
APPROVED BY: M. Dmyterko

May 2025







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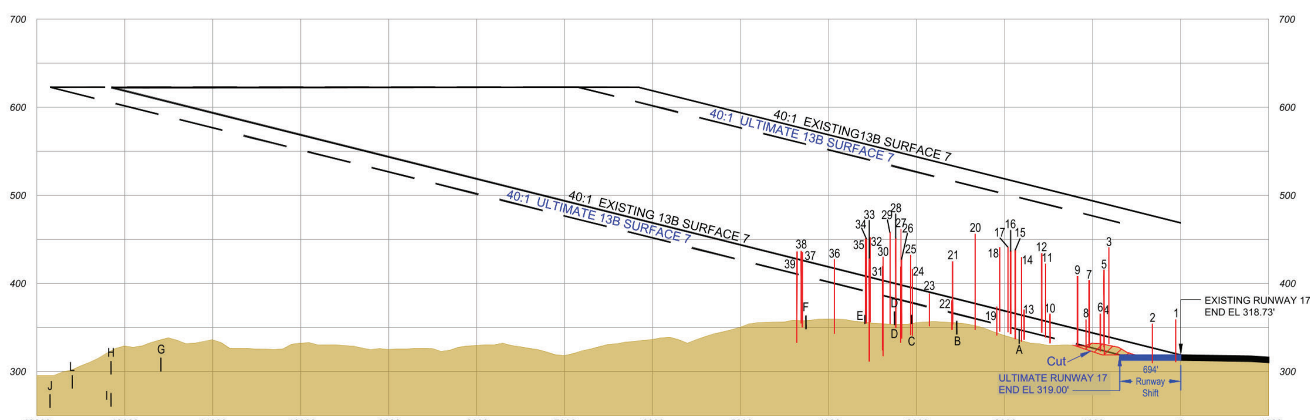
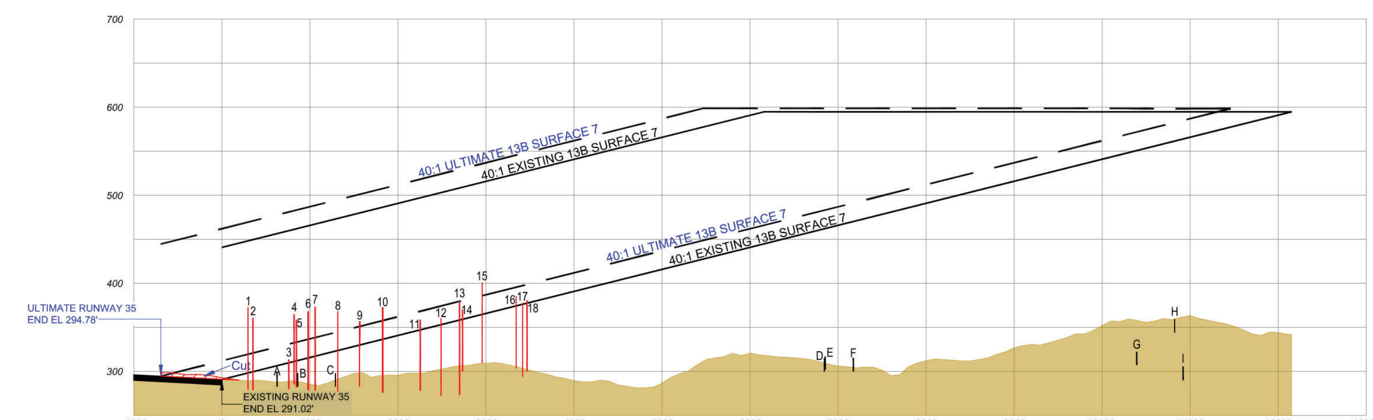
HORIZONTAL SCALE IN FEET

0 100 200

VERTICAL SCALE IN FEET





LEGEND

———	EXISTING OBSTACLE CLEARANCE SURFACE (OCS)
— — —	ULTIMATE OBSTACLE CLEARANCE SURFACE (OCS)
	EXISTING PROPERTY BOUNDARY
	ULTIMATE PROPERTY BOUNDARY
ESMT	EXISTING EASEMENT BOUNDARY
ESMT(U)	ULTIMATE EASEMENT BOUNDARY
● (red)	OBSTRUCTION IDENTIFIER
● (black)	SIGNIFICANT OBJECT IDENTIFIER
	OBSTRUCTION GROUPING
	CUT

GENERAL NOTES:

1. HORIZONTAL DATUM: NORTH AMERICAN DATUM 1983 - NAD83; VERTICAL DATUM: NORTH AMERICAN DATUM 1988 - NAVD88
2. PENETRATIONS IDENTIFIED WITHIN OBSTRUCTION GROUPINGS REFLECT THE TALLEST NATURAL, MANMADE AND/OR TERRAIN FEATURES WITHIN A REPRESENTATIVE SELECTION OF OBSTRUCTIONS.
3. PLANIMETRIC DATA FROM MARTINEZ GEOSPATIAL SURVEY DATED 08/01/2024.
4. SEE SHEET 9 FOR CORRESPONDING OBSTRUCTION AND SIGNIFICANT OBJECT TABLES.
5. SUPPLEMENTAL ELEVATION DATA BEYOND THE LIMITS OF THE SURVEY, FROM THE USGS $\frac{1}{3}$ Arc Second DEM Published 08/19/2022.
6. 50' CONTOURS SHOWN ACROSS DEPARTURE SLOPE CORRESPOND TO ULTIMATE CONDITION.
5. REFER TO FAA AC 150/5300-13B CHANGE 1, PAGES 3-15 THROUGH 3-20.
6. ALL ELEVATIONS IN MSL FEET.

DRAFT

NO.	REVISIONS	DATE	BY	APP'D.

"THE PREPARATION OF THESE DOCUMENTS WAS FINANCED IN PART THROUGH A GRANT FROM THE FEDERAL AVIATION ADMINISTRATION AS PROVIDED UNDER SECTION 505 OF THE AIRPORT AND AIRWAY IMPROVEMENT ACT OF 1982, AS AMENDED. THE CONTENTS DO NOT NECESSARILY REFLECT THE OFFICIAL VIEWS OR POLICY OF THE FAA. ACCEPTANCE OF THESE DOCUMENTS BY THE FAA DOES NOT IN ANY WAY CONSTITUTE A COMMITMENT ON THE PART OF THE UNITED STATES TO PARTICIPATE IN ANY DEVELOPMENT DEPICTED HEREIN NOR DOES IT INDICATE THAT THE PROPOSED DEVELOPMENT IS ENVIRONMENTALLY ACCEPTABLE IN ACCORDANCE WITH APPROPRIATE PUBLIC LAWS."

CENTER MUNICIPAL AIRPORT

RUNWAY 17-35
DEPARTURE SURFACE DRAWING

CENTER, TEXAS

PLANNED BY: C. Burks
DETAILED BY: D. Przybycien
APPROVED BY: M. Dmyterko

May 2025 SHEET 8 OF 12

Runway 17 End Departure Obstructions

ID	Feature	Source	Accuracy	FAA Study ID	Ground Elevation (ft. msl.)	AGL (ft.)	Top Elevation	Surface Obstructed	Penetration Value (ft.)	Remediation
1	Tree	Martinez Survey (8/1/24)	H20/V3	None	310.548	48.47	359.018	Ex. 17 End Departure	11.14	Remove Tree
2	Tree	Martinez Survey (8/1/24)	H20/V3	None	309.526	44.52	354.046	Ex. 17 End Departure	14.94	Remove Tree
3	Tree	Martinez Survey (8/1/24)	H20/V3	None	331.162	109.69	440.852	Ex. 17 End Departure	14.22	Remove Tree
4	Tree	Martinez Survey (8/1/24)	H20/V3	None	318.612	54.86	373.472	Ult. 17 End Departure	20.41	Remove Tree
								Ex. 17 End Departure	20.66	
5	Tree	Martinez Survey (8/1/24)	H20/V3	None	328.313	87.26	415.573	Ex. 17 End Departure	33.32	Remove Tree
6	Tree	Martinez Survey (8/1/24)	H20/V3	None	322.901	42.48	365.381	Ult. 17 End Departure	4.42	Remove Tree
7	Tree	Martinez Survey (8/1/24)	H20/V3	None	327.553	75.64	403.193	Ult. 17 End Departure	7.86	Remove Tree
								Ex. 17 End Departure	46.11	
8	Utility Pole	Martinez Survey (8/1/24)	H20/V3	None	326.114	32.73	358.844	Ex. 17 End Departure	0.82	Lower/Relocate
9	Tree	Martinez Survey (8/1/24)	H20/V3	None	328.021	80.12	408.141	Ult. 17 End Departure	7.82	Remove Tree
								Ex. 17 End Departure	47.73	
10	Utility Pole	Martinez Survey (8/1/24)	H20/V3	None	332.205	33.04	365.245	Ult. 17 End Departure	14.13	Lower/Relocate
11	Tree	Martinez Survey (8/1/24)	H20/V3	None	338.518	83.56	422.078	Ult. 17 End Departure	51.91	Remove Tree
								Ex. 17 End Departure	52.6	
12	Tree	Martinez Survey (8/1/24)	H20/V3	None	344.203	89.64	433.843	Ult. 17 End Departure	31.19	Remove Tree
13	Utility Pole	Martinez Survey (8/1/24)	H20/V3	None	336.242	33.76	370.002	Ult. 17 End Departure	11.51	Lower/Relocate
14	Tree	Martinez Survey (8/1/24)	H20/V3	None	333.776	95.94	429.716	Ult. 17 End Departure	70.49	Remove Tree
								Ex. 17 End Departure	53.41	
15	Tree	Martinez Survey (8/1/24)	H20/V3	None	336.422	101.92	438.342	Ult. 17 End Departure	77.35	Remove Tree
								Ex. 17 End Departure	60.27	
16	Tree	Martinez Survey (8/1/24)	H20/V3	None	342.564	93.92	436.484	Ult. 17 End Departure	33.75	Remove Tree
								Ex. 17 End Departure	57.07	
17	Tree	Martinez Survey (8/1/24)	H20/V3	None	344.823	96.37	441.193	Ult. 17 End Departure	12.43	Remove Tree
								Ex. 17 End Departure	53.37	
18	Tree	Martinez Survey (8/1/24)	H20/V3	None	345.456	95.26	440.716	Ult. 17 End Departure	9.04	Remove Tree
								Ex. 17 End Departure	50	
19	Utility Pole	Martinez Survey (8/1/24)	H20/V3	None	341.071	32.21	373.281	Ult. 17 End Departure	7.02	Lower/Relocate
20	Tree	Martinez Survey (8/1/24)	H20/V3	None	347.631	108.22	455.851	Ult. 17 End Departure	68.36	Remove Tree
								Ex. 17 End Departure	66.39	
21	Tree	Martinez Survey (8/1/24)	H20/V3	None	353.73	71.07	424.8	Ex. 17 End Departure	16.27	Remove Tree
22	Utility Pole	Martinez Survey (8/1/24)	H20/V3	None	347.172	33.45	380.622	Ult. 17 End Departure	1.63	Lower/Relocate
23	Utility Pole	Martinez Survey (8/1/24)	H20/V3	None	351.346	37.09	388.436	Ult. 17 End Departure	3	Lower/Relocate
24	Tree	Martinez Survey (8/1/24)	H20/V3	None	340.799	75.37	416.169	Ult. 17 End Departure	25.96	Remove Tree
								Ex. 17 End Departure	8.88	
25	Tree	Martinez Survey (8/1/24)	H20/V3	None	341.288	91	432.288	Ult. 17 End Departure	6.53	Remove Tree
26	Tree	Martinez Survey (8/1/24)	H20/V3	None	337.517	89.63	427.147	Ult. 17 End Departure	5.35	Remove Tree
27	Tree	Martinez Survey (8/1/24)	H20/V3	None	332.942	86.07	419.012	Ult. 17 End Departure	20.47	Remove Tree
								Ex. 17 End Departure	8.39	
28	Tree	Martinez Survey (8/1/24)	H20/V3	None	349.726	101.87	451.596	Ex. 17 End Departure	31.3	Remove Tree
29	Tree	Martinez Survey (8/1/24)	H20/V3	None	353.929	103.88	457.809	Ult. 17 End Departure	61.23	Remove Tree
								Ex. 17 End Departure	44.15	
30	Tree	Martinez Survey (8/1/24)	H20/V3	None	317.501	112.25	429.751	Ex. 17 End Departure	14.13	Remove Tree
31	Tree	Martinez Survey (8/1/24)	H20/V3	None	324.072	95	419.072	Ult. 17 End Departure	20.42	Remove Tree
								Ex. 17 End Departure	3.34	
32	Tree	Martinez Survey (8/1/24)	H20/V3	None	355.763	96.56	452.323	Ult. 17 End Departure	50.1	Remove Tree
								Ex. 17 End Departure	33.02	
33	Tree	Martinez Survey (8/1/24)	H20/V3	None	311.496	116.92	428.416	Ult. 17 End Departure	22.8	Remove Tree
34	Tree	Martinez Survey (8/1/24)	H20/V3	None	354.807	95.93	450.737	Ult. 17 End Departure	47.38	Remove Tree
								Ex. 17 End Departure	30.3	
35	Tree	Martinez Survey (8/1/24)	H20/V3	None	357.455	93.51	450.965	Ult. 17 End Departure	47.38	Remove Tree
								Ex. 17 End Departure	30.3	
36	Tree	Martinez Survey (8/1/24)	H20/V3	None	342.897	84.28	427.177	Ult. 17 End Departure	14.81	Remove Tree
37	Tree	Martinez Survey (8/1/24)	H20/V3	None	350.255	85.1	435.355	Ult. 17 End Departure	13.86	Remove Tree
38	Tree	Martinez Survey (8/1/24)	H20/V3	None	354.535	81.99	436.525	Ult. 17 End Departure	14.73	Remove Tree
39	Tree	Martinez Survey (8/1/24)	H20/V3	None	332.444	103.32	435.764	Ult. 17 End Departure	12.73	Remove Tree

Runway 35 End Departure Obstructions

ID	Feature	Source	Accuracy	FAA Study ID	Ground Elevation (ft. msl.)	AGL (ft.)	Top Elevation	Surface Obstructed	Penetration Value (ft.)	Remediation
1	Tree	Martinez Survey (8/1/24)	H20/V3	None	279.43	93.28	372.71	Ult. 35 End Departure	11.68	Point ZM
2	Tree	Martinez Survey (8/1/24)	H20/V3	None	278.68	82.09	360.77	Ult. 35 End Departure	39.62	Point ZM
3	Utility Pole	Martinez Survey (8/1/24)	H20/V3	None	280.13	33.25	313.38	Ex. 35 End Departure	3.17	Point ZM
4	Tree	Martinez Survey (8/1/24)	H20/V3	None	285.53	79.68	365.21	Ult. 35 End Departure	2.31	Point ZM
5	Tree	Martinez Survey (8/1/24)	H20/V3	None	282.11	76.43	358.54	Ult. 35 End Departure	25.06	Point ZM
6	Tree	Martinez Survey (8/1/24)	H20/V3	None	278.65	89.71	368.36	Ult. 35 End Departure	31.51	Point ZM
								Ex. 35 End Departure	41.89	
7	Tree	Martinez Survey (8/1/24)	H20/V3	None	278.44	95.34	373.78	Ult. 35 End Departure	13.15	Point ZM
8	Tree	Martinez Survey (8/1/24)	H20/V3	None	277.73	90.71	368.44	Ult. 35 End Departure	23.17	Point ZM
								Ex. 35 End Departure	44.32	
9	Utility Pole	Martinez Survey (8/1/24)	H20/V3	None	283.17	73.86	357.03	Ult. 35 End Departure	5.57	Point ZM
								Ex. 35 End Departure	6.85	
10	Tree	Martinez Survey (8/1/24)	H20/V3	None	276.23	96.41	372.64	Ult. 35 End Departure	14.60	Point ZM
								Ex. 35 End Departure	35.75	
11	Tree	Martinez Survey (8/1/24)	H20/V3	None	278.47	80.24	358.71	Ex. 35 End Departure	2.61	Point ZM
12	Tree	Martinez Survey (8/1/24)	H20/V3	None	272.42	88.07	360.49	Ex. 35 End Departure	7.04	Point ZM
13	Tree	Martinez Survey (8/1/24)	H20/V3	None	273.61	106.10	379.71	Ex. 35 End Departure	21.00	Point ZM
14	Tree	Martinez Survey (8/1/24)	H20/V3	None	300.07	70.30	370.37	Ex. 35 End Departure	10.83	Point ZM
15	Tree	Martinez Survey (8/1/24)	H20/V3	None	309.37	91.75	401.12	Ult. 35 End Departure	1.74	Point ZM
16	Tree	Martinez Survey (8/1/24)	H20/V3	None	303.73	81.64	385.37	Ex. 35 End Departure	0.33	Point ZM
17	Tree	Martinez Survey (8/1/24)	H20/V3	None	294.09	83.42	377.51	Ex. 35 End Departure	0.91	Point ZM
18	Tree	Martinez Survey (8/1/24)	H20/V3	None	299.93	80.77	380.70	Ex. 35 End Departure	2.81	Point ZM

Runway 35 End Departure Significant Objects

ID	Feature	Source	Ground Elevation (ft. msl.)	AGL (ft.)	Top Elevation (ft. msl.)	Surface	Clearance Value (ft)
A	Hwy 7	USGS DEM	283.16	15.00	298.16	Ex. 35 End Departure	8.72
B	Hwy 7	USGS DEM	282.87	15.00	297.87	Ex. 35 End Departure	14.85
C	Hwy 7	USGS DEM	282.96	15.00	297.96	Ex. 35 End Departure	25.50
D	Fm 2788	USGS DEM	299.91	15.00	314.91	Ex. 35 End Departure	147.34
E	Fm 2788	USGS DEM	302.15	15.00	317.15	Ex. 35 End Departure	145.38
F	Fm 2788	USGS DEM	300.41	15.00	315.41	Ex. 35 End Departure	155.15
G	Hwy 87	USGS DEM	322.45	15.00	337.45	Ex. 35 End Departure	213.54
H	Shelbyville	USGS DEM	359.50	15.00	374.50	Ex. 35 End Departure	187.27
I	Hwy 87	USGS DEM	290.36	15.00	305.36	Ex. 35 End Departure	258.79

Runway 17 End Departure Significant Objects

ID	Feature	Source	Ground Elevation (ft. msl.)	AGL (ft.)	Top Elevation (ft. msl.)	Surface	Clearance Value (ft)
A	Fm 1656	USGS DEM	331.63	15.00	346.63	Ult. 17 End Departure	0.78
B	Fm 1656	USGS DEM	342.32	15.00	357.32	Ult. 17 End Departure	7.82
C	Private Rd.	USGS DEM	354.08	10.00	364.08	Ult. 17 End Departure	13.90
D	Fm 1656	USGS DEM	352.98	15.00	367.98	Ult. 17 End Departure	14.84
E	Private Rd.	USGS DEM	353.96	10.00	363.96	Ult. 17 End Departure	27.29
F	Fm 699	USGS DEM	348.49	15.00	363.49	Ult. 17 End Departure	44.51
G	Hwy 3667	USGS DEM	300.36	15.00	315.36	Ult. 17 End Departure	292.95
						Ex. 17 End Departure	275.88
H	Hwy 3667	USGS DEM	296.59	15.00	311.59	Ex. 17 End Departure	310.94
I	Fm 699	USGS DEM	260.18	15.00	275.18	Ex. 17 End Departure	347.35
J	Hwy 3667	USGS DEM	280.57	15.00	295.57	Ult. 17 End Departure	320.89
K	Fm 699	USGS DEM	258.86	15.00	273.86	Ult. 17 End Departure	348.94

GENERAL NOTES:

1. HORIZONTAL DATUM: NORTH AMERICAN DATUM 1983 - NAD83;
   VERTICAL DATUM: NORTH AMERICAN DATUM 1988 - NAVD88
2. PLANIMETRIC DATA FROM MARTINEZ GEOSPATIAL SURVEY DATED 08/01/2024.
5. REFER TO FAA AC 150/5300-13B CHANGE 1, PAGES 3-15 THROUGH 3-20.
6. ALL ELEVATIONS IN MSL FEET.

DRAFT

NO.	REVISIONS	DATE	BY	APP'D.

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CENTER MUNICIPAL AIRPORT

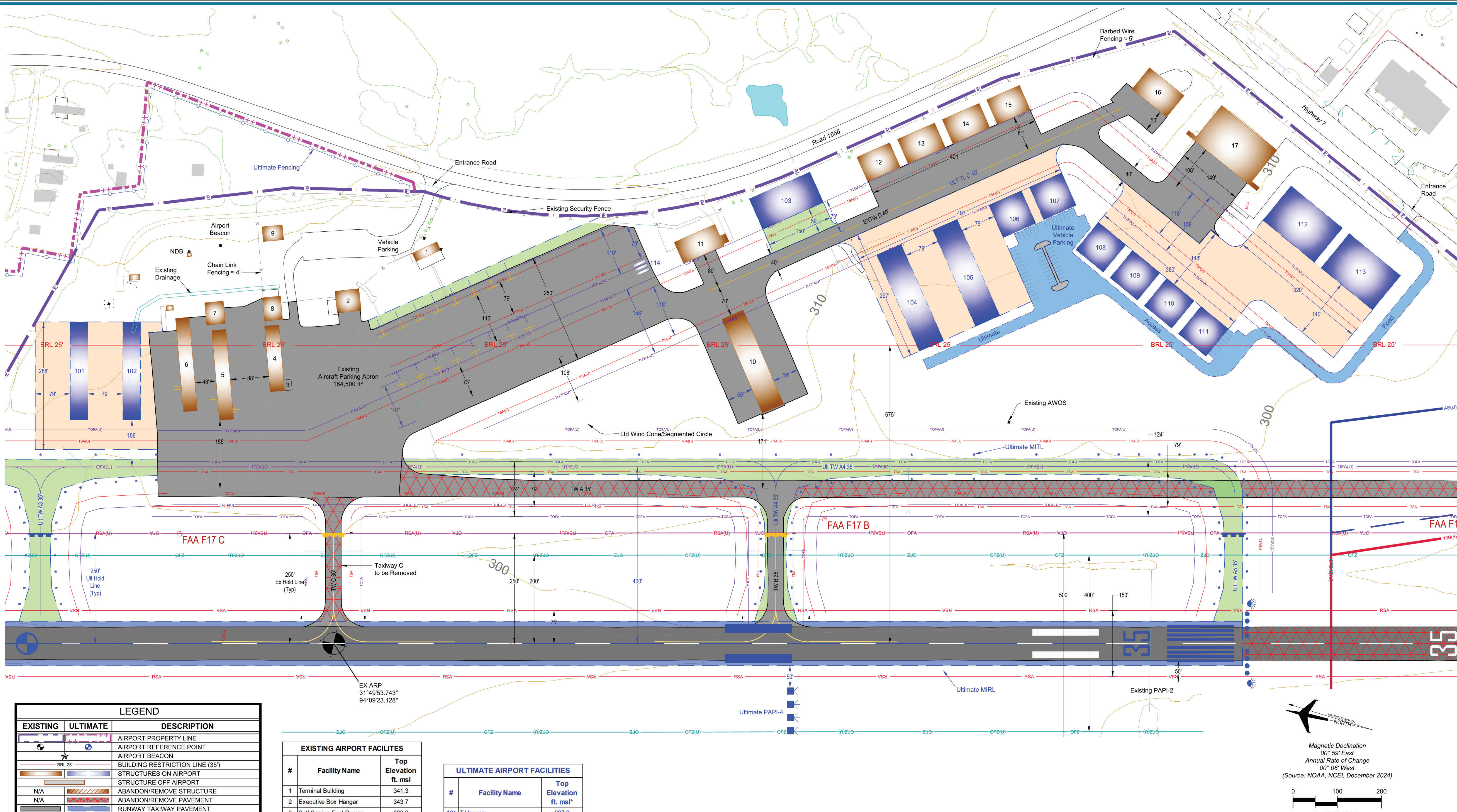
RUNWAY 17-35 DEPARTURE SURFACE
OBSTRUCTION & SIGNIFICANT OBJECT TABLES

CENTER, TEXAS

PLANNED BY: C. Burks
DETAILED BY: D. Przybycien
APPROVED BY: M. Dmyterko

May 2025 SHEET 9 OF 12

Coffman Associates
Airport Consultants
www.coffmanassociates.com



LEGEND		
EXISTING	ULTIMATE	DESCRIPTION
		AIRPORT PROPERTY LINE
		AIRPORT REFERENCE POINT
		AIRPORT BEACON
BRL 25'		BUILDING RESTRICTION LINE (35')
		STRUCTURES ON AIRPORT
		STRUCTURE OFF AIRPORT
N/A		ABANDON/REMOVE STRUCTURE
N/A		ABANDON/REMOVE PAVEMENT
		RUNWAY TAXIWAY PAVEMENT
		APRON PAVEMENT
		FENCE LINE
		HOLD MARKING
		RUNWAY TAXIWAY APRON MARKING
		ROADS AND PARKING PAVEMENT
		SURVEY MONUMENT WITH IDENTIFIER
OFA	OFA(U)	OBJECT FREE AREA
RSA	RSA(U)	RUNWAY SAFETY AREA
OFZ	OFZ(U)	OBSTACLE FREE ZONE
N/A		RUNWAY PROTECTION ZONE
TOFA	TOFA (U)	TAXIWAY OBJECT FREE AREA
TSA	TSA (U)	TAXIWAY SAFETY AREA
N/A		RUNWAY END IDENTIFIER LIGHTS (REIL)
N/A		RUNWAY THRESHOLD LIGHTS
		PAPI
		TIE-DOWNS
		TREELINE
300		TOPOGRAPHIC CONTOURS

EXISTING AIRPORT FACILITES

#	Facility Name	Top Elevation ft. msl
1	Terminal Building	341.3
2	Executive Box Hangar	343.7
3	Self-Service Fuel Pumps	330.0
4	FBO/T-Hangar	338.7
5	T-Hangar (7-Unit)	337.5
6	T-Hangar (7-Unit)	338.2
7	Executive Box Hangar	346.2
8	Executive Box Hangar	344.1
9	Fuel Farm	349.9
10	T-Hangar (10-Unit)	330.8
11	Executive Box Hangar	334.4
12	Executive Box Hangar	339.2
13	Executive Box Hangar	344.9
14	Executive Box Hangar	342.7
15	Executive Box Hangar	342.2
16	Executive Box Hangar	340.9
17	Conventional Hangar	351.6

ULTIMATE AIRPORT FACILITIES

#	Facility Name	Top Elevation ft. msl*
101	T-Hangars	337.0
102	T-Hangars	337.0
103	Conventional Hangar	346.0
104	T-Hangars	329.0
105	T-Hangars	329.0
106	Executive Hangars	337.0
107	Executive Hangars	337.0
108	Executive Hangars	336.0
109	Executive Hangars	335.0
110	Executive Hangars	334.0
111	Executive Hangars	334.0
112	Conventional Hangar	349.0
113	Conventional Hangar	349.0
114	Fuel Farm	336.0

*Top elevation estimated based off common structure height

GENERAL NOTES:

1. UNLESS NOTED OTHERWISE ALL EXISTING AIRFIELD COORDINATES, ELEVATIONS, AND BEARINGS FROM SURVEY DATED 08/01/2024 BY MARTINEZ GEOSPATIAL.
2. HORIZONTAL DATUM: NORTH AMERICAN DATUM 1983 - NAD83; VERTICAL DATUM: NORTH AMERICAN DATUM 1988 - NAVD88.
3. NO AIR TRAFFIC CONTROL TOWER (ATCT) LINE OF SIGHT/SHADOW STUDY PER FAA ORDER 6480.4 WAS CONDUCTED FOR THIS ALP.
4. TAXILANE D TLOFA IS SET TO 134' BASED ON WINGSPAN OF A GLOBAL 5000.

DRAFT

NO.	REVISIONS	DATE	BY	APP'D.

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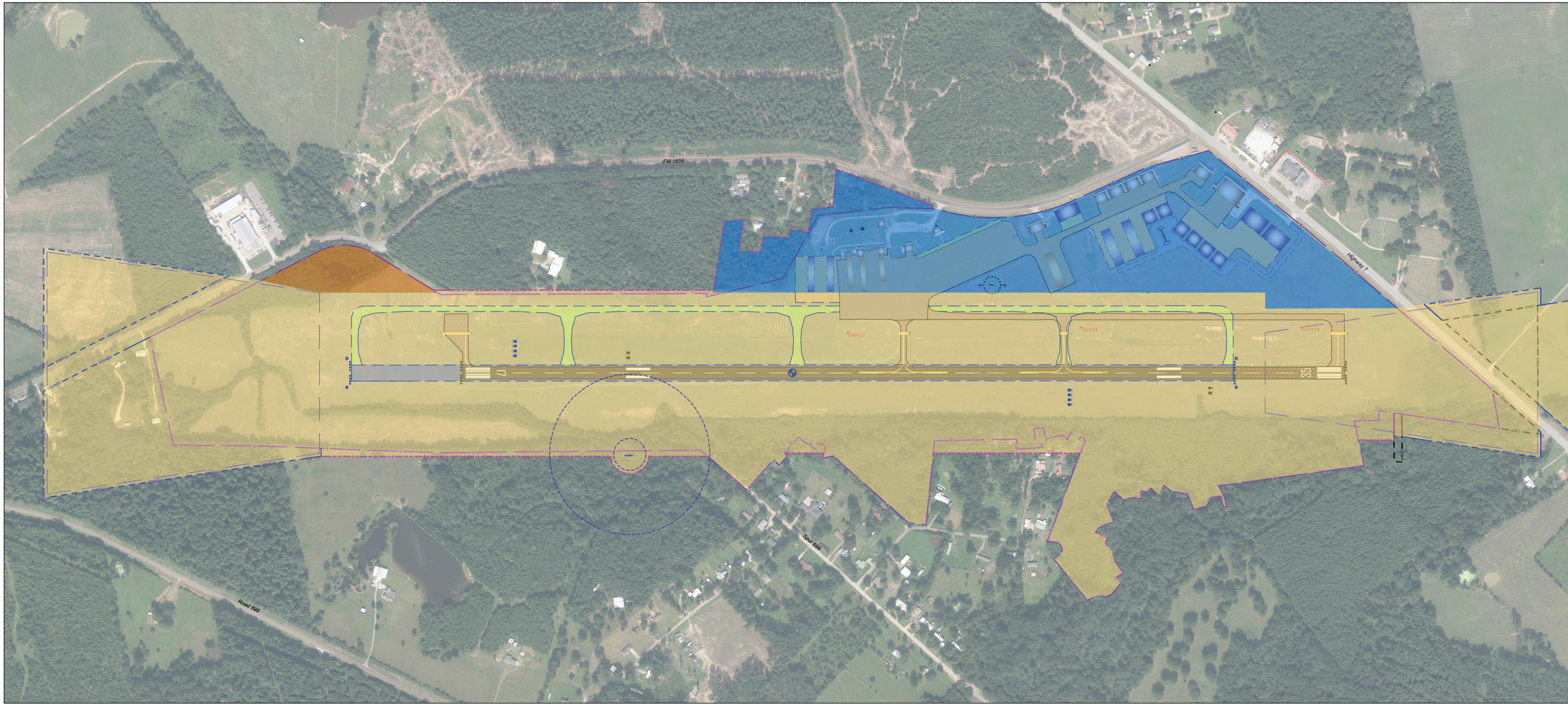
CENTER MUNICIPAL AIRPORT

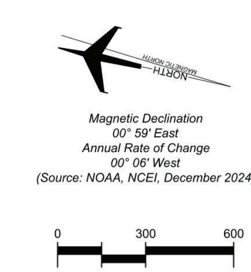
TERMINAL AREA DRAWING

CENTER, TEXAS

PLANNED BY: C. Burks
DETAILED BY: D. Przybycien
APPROVED BY: M. Dmyterko

May 2025





LEGEND

Aeronautical Use	Ultimate Property Boundary
Airport Use	Existing Property Boundary
Mixed Use	Existing Easement Boundary
	Ultimate Easement Boundary

DRAFT

NO.	REVISIONS	DATE	BY	APP'D.

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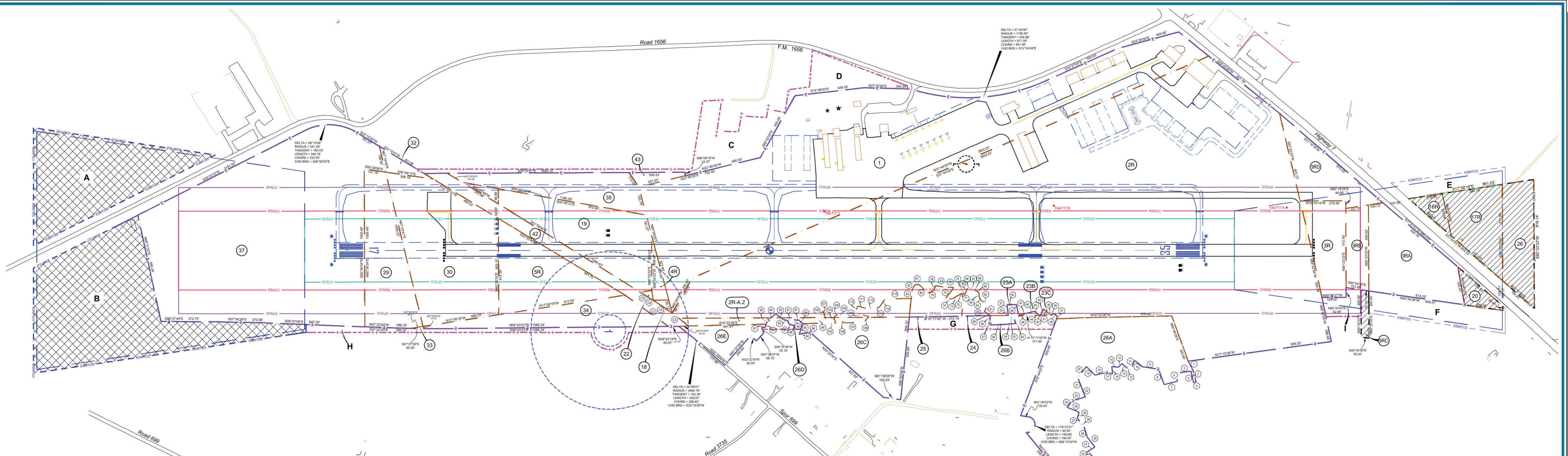
CENTER MUNICIPAL AIRPORT

LAND USE DRAWING

CENTER, TEXAS

PLANNED BY: C. Burks
DETAILED BY: D. Przybycien
APPROVED BY: M. Dmyterko

May 2025



Property Section	Bearing	Length
1	S53°01'02"W	66.31'
2	S65°56'43"W	72.04'
3	N37°05'56"W	17.94'
4	N69°26'15"E	74.17'
5	N16°11'19"W	77.04'
6	N84°56'44"W	55.68'
7	N23°34'59"W	83.55'
8	N60°22'54"E	103.53'
9	N00°13'45"W	103.47'
10	N29°45'22"E	62.78'
11	N75°40'26"W	65.83'
12	N19°55'40"E	27.82'
13	N33°02'18"E	40.28'
14	N52°52'59"W	33.07'
15	N03°03'58"W	40.92'
16	S75°34'15"W	47.06'
17	N03°41'15"E	41.90'
18	N22°46'33"W	72.14'
19	N34°54'55"E	77.85'
20	N62°45'23"W	88.65'
21	S60°20'22"W	95.38'
22	S57°40'55"W	34.54'
23	N26°46'53"W	91.64'
24	N63°28'26"W	47.61'
25	S12°24'29"W	81.43'
26	N81°38'29"W	38.80'
27	S46°53'09"W	38.63'
28	S35°41'50"W	29.73'
29	S63°42'45"W	74.12'
30	S43°12'04"W	77.43'
31	N38°57'44"W	54.09'
32	S36°10'37"W	45.60'
33	N61°13'22"W	87.28'
34	N39°12'41"W	40.39'
35	N02°48'37"E	51.23'
36	N32°31'53"W	78.11'
37	S83°52'00"E	12.19'
38	N33°04'48"E	27.11'
39	N34°34'28"W	22.97'
40	N28°25'02"E	14.34'
41	N27°44'14"E	47.13'
42	N76°22'45"W	31.77'
43	N75°41'57"W	16.42'
44	N31°44'34"E	22.72'
45	N31°03'46"E	23.97'
46	N24°00'05"W	66.84'
47	N23°19'17"W	37.34'
48	N68°36'54"E	9.04'
49	N67°56'00"E	60.97'
50	N11°40'54"W	59.45'
51	S74°35'33"W	58.48'
52	S75°16'21"W	12.10'
53	S17°55'32"W	44.95'
54	S65°42'10"W	28.70'
55	N13°48'04"W	73.55'
56	N11°37'17"W	92.05'
57	N85°26'47"E	34.42'
58	N85°26'47"E	25.67'

Property Section	Bearing	Length
59	N26°25'24"E	15.87'
60	N25°44'36"E	30.19'
61	S74°48'15"E	52.42'
62	N16°29'25"E	49.62'
63	N55°08'54"E	14.42'
64	N70°59'55"E	36.23'
65	N39°20'03"E	15.81'
66	N03°07'53"W	39.03'
67	N43°14'55"E	16.32'
68	N09°59'04"W	13.80'
69	N79°51'03"W	37.58'
70	N09°11'14"W	18.02'
71	N05°32'26"W	1.22'
72	N87°31'46"E	5.27'
73	S38°40'48"E	75.41'
74	N10°07'15"W	42.97'
75	S62°14'03"E	92.15'
76	N08°06'13"W	59.13'
77	S00°17'56"E	60.20'
78	N81°54'45"W	32.43'
79	N31°39'27"W	43.01'
80	N36°10'59"E	78.54'
81	N17°20'59"W	27.98'
82	N74°44'48"W	39.00'
83	S86°13'46"W	57.54'
84	S23°35'02"E	66.37'
85	N82°02'12"W	71.45'
86	S32°53'16"W	30.91'
87	S05°35'21"E	35.83'
88	N51°09'52"E	27.49'
89	S42°44'00"E	20.23'
90	S12°16'23"W	28.12'
91	S62°07'23"W	21.14'
92	S04°46'49"W	30.57'
93	S28°39'48"W	58.72'
94	S49°58'32"E	65.91'
95	S72°08'13"E	26.25'
96	N87°21'52"W	19.37'
97	N15°51'25"W	23.69'
98	S10°22'36"E	105.83'
99	N71°31'05"E	41.63'
100	S58°27'55"E	48.29'
101	S61°37'42"W	81.12'
102	S10°22'36"E	53.97'
103	N63°10'47"E	38.60'
104	S46°24'19"E	44.08'
105	S63°32'05"W	55.19'
106	S27°18'19"W	16.22'
107	S10°22'36"E	125.16'
108	S58°05'00"E	49.34'
109	N06°00'54"E	89.48'
110	S80°06'08"E	45.41'
111	S06°53'27"W	67.46'
112	S23°34'38"E	49.80'
113	S00°29'55"E	23.79'
114	S65°02'36"E	66.81'
115	S09°26'27"E	165.48'

Property Section	Bearing	Radius	Length
C1	S24°32'18"W	2824.79'	253.70'
C2	N27°47'51"E	2904.79'	139.04'
C3	N24°59'21"E	2904.79'	145.70'
C4	N23°27'12"E	2904.79'	10.00'
C5	N22°39'37"E	2904.79'	70.43'

Property Table

Tract ID	Acreage	Purpose of Acquisition	Notes
A	≈9.90	RPZ Protection	Acquire Easement
B	≈18.20	RPZ Protection	Acquire Easement
C	≈4.34	Future Airport Development	To be Acquired in Fee
D	≈2.18	Future Airport Development	To be Acquired in Fee
E	≈1.75	RPZ Protection	Acquire Easement
F	≈2.84	RPZ Protection	Acquire Easement
G	≈1.78	Primary Surface Protection	To be Acquired in Fee
H	≈1.77	Primary Surface, Critical Area Protection	To be Acquired in Fee
I	≈0.76	OFA Protection	To be Acquired in Fee

Property Table

Tract ID	Grantor	Interest	Acreage	Instrument	Book/Page	Easement	FAA Grant #	Date	Purpose Of Acquisition	APN	Released	Notes
1	Center Development Foundation	Fee	44.7000	No Data	569/569	N/A	N/A	5/23/1980	Airport Property	No Data	N/A	
*2R	Tem Morrison, et. al.	Fee	92.5*	Warranty Deed	667/301	N/A	N/A	7/9/1986	Airport Property	No Data	N/A	
3R	Ella Frances Payne, et. vir.	Fee	3.0100	No Data	636/677	N/A	N/A	6/1/1984	Airport Property	No Data	N/A	
4R	Sam Lane, et. ux.	Fee	0.5060	No Data	642/367	N/A	N/A	9/25/1984	Airport Property	No Data	N/A	
5R	Sam Lane, et. ux.	Fee	5.6300	No Data	642/367	N/A	N/A	9/25/1984	Airport Property	No Data	N/A	
9RA	Ella Frances Payne, et. vir.	Fee	5.7280	No Data	748/77	N/A	Federal 93-04-041	1/22/1993	Airport Property	No Data	N/A	Originally a Clear Zone Easement numbered Tract 9. (Book/Pg. 636/678, 6/1/1984)
9RB	Ella Frances Payne, et. vir.	Fee	1.8000	No Data	636/677	N/A	N/A	6/1/1984	Airport Property	No Data	N/A	
9RC	Ella Frances Payne, et. vir.	Drainage Eaement	0.3440	No Data	636/682	Drainage	N/A	6/1/1984	Airport Drainage	No Data	N/A	
9RD	Ella Frances Payne, et. vir.	Fee	3.4471	No Data	748/77	N/A	Federal 93-04-041	1/22/1993	Airport Property	No Data	N/A	
16R	Oaklawn Memorial Park	Clear Zone Easement	0.6830	No Data	655/458	Clear Zone	N/A	7/30/1985	RPZ Protection	No Data	N/A	Limits Height to 30' AGL
17R	Jerold Waters, Trustee for Pearce Property 754-LMT	Clear Zone Easement	3.4960	No Data	642/607	Clear Zone	N/A	9/28/1984	RPZ Protection	No Data	N/A	20:1 Slope
18	Sam Lane, et. ux.	Fee	0.0910	No Data	642/367	N/A	N/A	9/25/1984	Airport Property	No Data	N/A	
19	Sam Lane, et. ux.	Fee	7.3610	No Data	642/367	N/A	N/A	9/25/1984	Airport Property	No Data	N/A	
20	Melvin Jones	Clear Zone Easement	0.7490	No Data	641/893	Clear Zone	N/A	9/17/1984	RPZ Protection	No Data	N/A	20:1 Slope
22	Sam Lane, et. ux.	Fee	0.0480	No Data	642/367	N/A	N/A	9/25/1984	Airport Property	No Data	N/A	
23A	Albert Reynolds, et. ux.	Fee	0.0855	No Data	748/83	N/A	Federal 93-04-041	1/21/1993	Airport Property	No Data	N/A	
23B	Albert Reynolds, et. ux.	Fee	0.0151	No Data	748/83	N/A	Federal 93-04-041	1/21/1993	Airport Property	No Data	N/A	
23C	Albert Reynolds, et. ux.	Fee	0.0167	No Data	748/83	N/A	Federal 93-04-041	1/21/1993	Airport Property	No Data	N/A	
24	Michaell L. Reynolds, et. ux.	Fee	0.4751	No Data	746/785	N/A	Federal 93-04-041	12/24/1992	Airport Property	No Data	N/A	
25	James R. Fisher, et. ux.	Fee	1.1718	No Data	748/88	N/A	Federal 93-04-041	1/15/1993	Airport Property	No Data	N/A	
26	No Data	Easement	3.2820	No Data	No Data	No Data	No Data	No Data	RPZ Protection	No Data	N/A	No Deed Info Available
26A	Susan Elizabeth Pigg Searight, et. al.	Fee	11.3090	No Data	713/821	N/A	N/A	11/2/1990	Airport Property	No Data	N/A	
26B	Susan Elizabeth Pigg Searight, et. al.	Fee	0.1170	No Data	713/821	N/A	N/A	11/2/1990	Airport Property	No Data	N/A	
26C	Susan Elizabeth Pigg Searight, et. al.	Fee	5.4340	No Data	713/821	N/A	N/A	11/2/1990	Airport Property	No Data	N/A	
26D	Susan Elizabeth Pigg Searight, et. al.	Fee	0.0050	No Data	713/821	N/A	N/A	11/2/1990	Airport Property	No Data	N/A	
26E	Susan Elizabeth Pigg Searight, et. al.	Fee	1.6110	No Data	713/821	N/A	N/A	11/2/1990	Airport Property	No Data	N/A	1.280 Net Acreage
29	Sam Lane, et. ux.	Fee	5.7650	No Data	685/42	N/A	N/A	2/29/1988	Airport Property	No Data	N/A	
30	Wardlow Lane II, et. ux.	Fee	11.264	No Data	684/896	N/A	N/A	2/26/1988	Airport Property	No Data	N/A	
32	Wardlow Lane II, et. ux.	Fee	0.2270	No Data	684/896	N/A	N/A	2/26/1988	Airport Property	No Data	N/A	
33	Sam Lane, et. ux.	Fee	0.0148	No Data	685/42	N/A	N/A	2/29/1988	Airport Property	No Data	N/A	
34	Wardlow Lane II, et. ux.	Fee	3.9038	No Data	684/896	N/A	N/A	2/26/1988	Airport Property	No Data	N/A	
35	Wardlow Lane II, et. ux.	Fee	4.0100	No Data	793/215	N/A	Federal 94-42-051	9/5/1995	Airport Property	No Data	N/A	
36	Wardlow Lane II, et. ux.	Fee	0.5500	No Data	728/450	N/A	Federal 94-42-051	2923/95	Airport Property	No Data	N/A	
37	Sam Lane, et. ux.	Fee	33.2900	No Data	792/101	N/A	Federal 94-42-051	8/31/1995	Airport Property	No Data	N/A	
42	Shelby County	Fee	3.3800	No Data	865/354	N/A	Federal 94-42-051	9/13/1999	Airport Property	No Data	N/A	Former F.M. 699 ROW
43	William Frances Baggett, et. ux.	Fee	0.4500	No Data	780/493	N/A	Federal 94-42-051	12/21/1994	Airport Property	No Data	N/A	

*Tract 2R - Warranty Deed calls for 92.5 acres, more or less, save, less, and except tracts 1, 2, 3, 4, and 5. Only tracts 1, 4, and 5 have minor areas within the boundaries of Tract 2R, resulting in a net area in tract 2R of 92.089 acres

PROPERTY LEGEND

- Ultimate Property Line
- Existing Property Line
- Parcel Boundary
- Existing Airport Easement
- Ultimate Airport Easement

MAGNETIC NORTH
NORTH

Magnetic Declination
00° 59' East
Annual Rate of Change
00° 06' West
(Source: NOAA, NCEI, December 2024)

0 300 600
SCALE IN FEET

DRAFT

NO.	REVISIONS	DATE	BY	APP'D.

"THE PREPARATION OF THESE DOCUMENTS WAS FINANCED IN PART THROUGH A GRANT FROM THE FEDERAL AVIATION ADMINISTRATION AS PROVIDED UNDER SECTION 505 OF THE AIRPORT AND AIRWAY IMPROVEMENT ACT OF 1982, AS AMENDED. THE CONTENTS DO NOT NECESSARILY REFLECT THE OFFICIAL VIEWS OR POLICY OF THE FAA. ACCEPTANCE OF THESE DOCUMENTS BY THE FAA DOES NOT IN ANY WAY CONSTITUTE A COMMITMENT ON THE PART OF THE UNITED STATES TO PARTICIPATE IN ANY DEVELOPMENT DEPICTED HEREIN NOR DOES IT INDICATE THAT THE PROPOSED DEVELOPMENT IS ENVIRONMENTALLY ACCEPTABLE IN ACCORDANCE WITH APPROPRIATE PUBLIC LAWS."

CENTER MUNICIPAL AIRPORT

EXHIBIT 'A'
AIRPORT PROPERTY INVENTORY MAP

CENTER, TEXAS

PLANNED BY: C. Burks
DETAILED BY: D. Przybycien
APPROVED BY: M. Dmyterko

May 2025 SHEET 12 OF 12

Coffman Associates
Airport Consultants
www.coffmanassociates.com

Appendix E

Draft Height and Hazard Zoning Ordinance

Appendix E
Draft Height and Hazard Zoning Ordinance

This appendix includes a height and hazard zoning ordinance based on the guidance included in Appendix D of the Texas Department of Transportation-Aviation Division's (TxDOT) Airport Compatibility Guidelines.[1]

It is important to note that adoption of a height and hazard zoning ordinance requires several steps which must be completed in a specific sequence. Prior to proceeding with the process, the text of the draft ordinance should be reviewed by legal counsel. The steps are presented below and are preceded by the following note in the Texas Department of Transportation-Aviation Division's (TxDOT) Airport Compatibility Guidelines:

> "IMPORTANT: Do not deviate from the numerical order of procedural steps and assure no step is taken before the preceding step is finished."

Checklist of Procedural and Legal Actions required for the Adoption of an Airport Zoning Ordinance:

1. City Ordinance creates a Joint Airport Zoning Board (JAZB) and appoints city's representatives to that board.
2. County Order creates a JAZB and appoints county's representative to that board.
3. Oaths of office administered to members of the JAZB.
4. Election of fifth member of the JAZB who shall serve as chairperson of that board.
5. Oath of office administered to chairperson of the JAZB.
6. JAZB sets date of public hearing.
7. Notice of public hearing published in local newspaper(s).
8. Proof of publication collected for each newspaper.
9. *Note: The above steps 7 and 8 should be repeated for each political subdivision affected by the zoning.*
10. Notice of public hearing posted in city hall and/or county courthouse for each jurisdiction participating in the zoning.
11. Conduct public hearing.
12. Adopt zoning ordinance.
13. Attorney's certification.
14. Adopted ordinance filed with County Clerk for each county participating in the zoning.
15. Copy of procedural forms and adopted ordinance provided to each political subdivision participating in the zoning process.

[1] https://ftp.txdot.gov/pub/txdot-info/avn/avninfo/Airport_Compatibility_Guidelines.pdf

AIRPORT HAZARD ZONING ORDINANCE

CENTER MUNICIPAL AIRPORT COMPATIBLE LAND USE ZONING REGULATIONS

Regulating and restricting the height of structures and objects of natural growth and otherwise regulating the use of property in the vicinity of the Center Municipal Airport, Center, Texas, by creating the appropriate zones and establishing the boundaries thereof; providing for restrictions of such zones and the enforcement of such restrictions; defining certain terms used herein; referring to the Center Municipal Airport Hazard Zoning Map dated ________, which is incorporated in and made a part of these regulations; providing for a board of adjustment; and imposing penalties.

Whereas, these regulations are adopted pursuant to the authority conferred by the Airport Zoning Act, Texas Local Government Code, §§241.001 et seq.

Whereas the Legislature of the State of Texas finds that:

- an airport hazard endangers the lives and property of users of the airport and of occupants of land in the vicinity of the airport;
- an airport hazard that is an obstruction reduces the size of the area available for the landing, taking off, and maneuvering of aircraft, tending to destroy or impair the utility of the airport and the public investment in the airport;
- the creation of an airport hazard is a public nuisance and an injury to the community served by the airport affected by the hazard;
- it is necessary in the interest of the public health, public safety, and general welfare to prevent the creation of an airport hazard;
- the creation of an airport hazard should be prevented, to the extent legally possible, by the exercise of the police power without compensation; and
- the prevention of the creation of an airport hazard and the elimination, the removal, the alteration, the mitigation, or the marking and lighting of an airport hazard are public purposes for which a political subdivision may raise and spend public funds and acquire land or interests in land.

Accordingly, it is declared that the City of Center benefits from the use of the Center Municipal Airport and the City Council of the City of Center permits the Center Municipal Airport to be used by the public to an extent that the airport fulfills an essential community purpose; therefore, the Center Municipal Airport is used in the interest of the public.

Therefore, be it ordered by the Shelby County-Center Joint Airport Zoning Board of the City Council of the City of Center, Texas, and the Commissioners Court of Shelby County, Texas:

Section 1. Short Title

These regulations shall be known and may be cited as the "**Center Municipal Airport Hazard Zoning Regulations**."

Section 2. Definitions

As used in these regulations, unless the context otherwise requires:

A. **Administrative Agency.** The appropriate person or office of a political subdivision which is responsible for the administration and enforcement of the regulations prescribed herein. The administrative agency is set forth in Section 3 of these regulations.

B. **Airport.** The Center Municipal Airport, Center, Texas; including the ultimate development of that facility.

C. **Airport Elevation.** The established elevation of the highest point on the runway, either existing or planned, at the airport measured in feet above mean sea level (MSL). The airport elevation of the Center Municipal Airport is 319 feet above mean sea level (MSL).

D. **Airport Hazard.** Any structure, tree, or use of land which obstructs the airspace required for the flight of aircraft or obstructs or interferes with the control, tracking, and/or data acquisition in the landing, takeoff, or flight at an airport or any installation or facility relating to flight, tracking, and/or data acquisition of the flight craft; is hazardous to, interferes with or obstructs such landing, takeoff, or flight of aircraft; or is hazardous to or interferes with tracking and/or data acquisition pertaining to flight and flight vehicles.

E. **Approach Surface**. A surface longitudinally centered on the extended runway centerline, extending outward and upward from each end of the primary surface and at the same slope as the approach zone height limitation slope set forth in Section 5 of these regulations. In plan, the perimeter of the approach surface coincides with the perimeter of the approach surface.

F. **Approach, Conical, Horizontal, and Transitional Zones.** These zones are set for in Section 4 of these regulations.

G. **Board of Adjustment**. A board so designated by these regulations as provided in Texas Local Government Code, §241.032. Provisions for the board of adjustment are set forth in Section 9 of these regulations.

H. **Conical Surface.** A surface extending outward and upward for the periphery of the horizontal slope at a slope of twenty (20) feet horizontally for each one (1) foot vertically for a horizontal distance of four thousand (4,000) feet.

I. **Hazard to Air Navigation.** An obstruction or use of land determined to have a substantial adverse effect on the safe and efficient utilization of navigable airspace.

J. **Height.** For the purpose of determining the height limits in all zones set forth in these regulations and shown on the hazard zoning map, the datum shall be height above mean sea level (MSL) elevation as measured in feet.

K. **Horizontal Surface.** A horizontal plane one hundred fifty (150) feet above the established airport elevation which in plan coincides with the perimeter of the horizontal zone.

L. **Nonconforming Use, Structure, or Tree.** Any structure, tree, or use of land which is inconsistent with the provisions of these regulations, and which exists as of the effective date of these regulations.

M. **Nonprecision Instrument Runway.** A runway having an existing instrument approach procedure utilizing air navigation facilities or other equipment that provides only horizontal guidance or area type navigation equipment. This also includes a runway for which a nonprecision instrument approach procedure has been approved or planned. Runway 17-35 is considered a nonprecision instrument runway.

N. **Obstruction.** Any structure, tree, or other object, including a mobile object, which exceeds a limiting height set forth in Section 5 of these regulations or is an airport hazard.

O. **Person.** An individual, firm, partnership, corporation, company, association, joint stock association, or body politic and includes a trustee, receiver, assignee, administrator, executor, guardian, or other representative.

P. **Primary Surface.** A 1,000-foot-wide surface on Runway 17-35 longitudinally centered on the runway extending the full length of the ultimate runway configuration plus two hundred (200) feet beyond each ultimate end of the runway. The elevation of any point on the primary surface is the same as the nearest point on the existing or ultimate runway centerline.

Q. **Runway.** A defined area on the airport prepared for the landing and taking off of aircraft along its length. The existing length of Runway 17-35 at Center Municipal Airport is 5,501 feet. The ultimate length of Runway 17-35 is 5,501 feet.

R. **Structure.** An object, including a mobile object, constructed or installed by man including, but not limited to, buildings, towers, cranes, smokestacks, poles, earth formations, overhead power lines, and traverse ways. Traverse ways are considered to be the heights set forth in 14 CFR Part 77.23.

S. **Transitional Surfaces.** Surfaces extending perpendicular to the runway centerline and the extended runway centerline outward from the edges of the primary surface and the approach surfaces at a slope of seven (7) feet horizontally for each one (1) foot vertically to where they intersect the horizontal surface. Transitional surfaces for those portions of the precision approach surface which extend through and beyond the limits of the conical surface extend at a slope of seven (7) feet horizontally for each one (1) foot vertically for a distance of five thousand (5,000) feet measured horizontally from either edge of the approach surface and perpendicular to the extended runway centerline.

T. **Tree.** Any type of flora and an object of natural growth.

Section 3. Administrative Agency

It shall be the duty of the office of the City Council of the City of Center to administer and enforce the regulations prescribed herein and is hereby designated as the administrative agency.

Section 4. Zones

In order to carry out the provisions of these regulations, there are hereby created and established certain zones which include all of the land lying beneath the approach surfaces, conical surface, horizontal surface, and transitional surfaces as they apply to the airport. Such surfaces are shown on the Center Municipal Airport Hazard Zoning Map dated _______________, and depicted on **Exhibit E1**, which is hereby attached to these regulations and made a part hereof. An area located in more than one of the following zones is considered to be only in the zone with the more restrictive height limitation. The various zones are hereby established and defined as follows:

A. **Approach Zones.** Approach zones are hereby established beneath the approach surfaces at each end of Runway 17-35 at the airport. The approach surface for each runway shall have an inner edge width of five hundred (500) feet, which coincides with the width of the primary surface, at a distance of two hundred (200) feet beyond each runway end, widening thereafter uniformly to a width of three thousand five hundred (3,500) feet at a horizontal distance of ten thousand (10,000) feet beyond the end of the primary surface. The centerline of the approach surface is the continuation of the centerline of the runway.

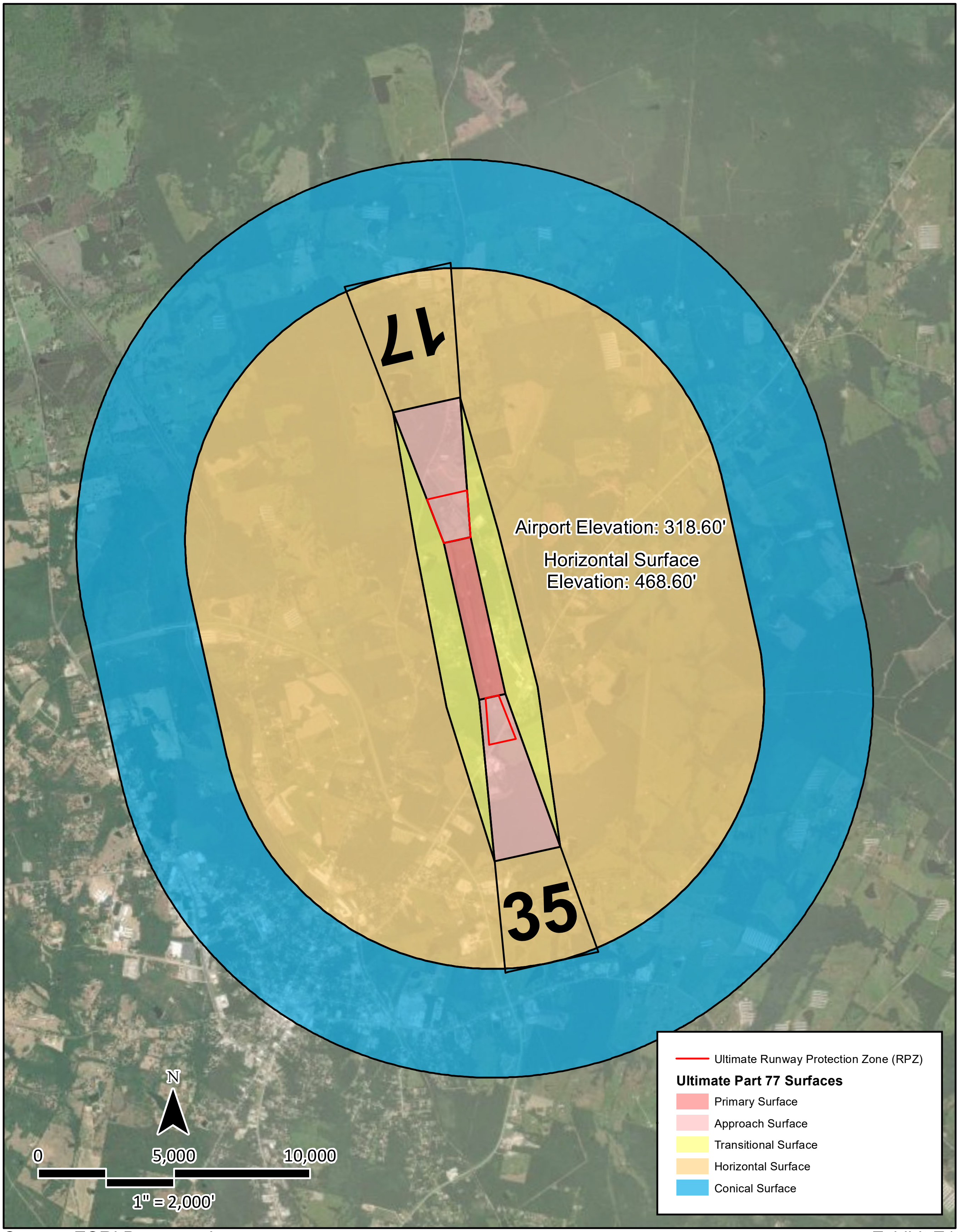
B. **Conical Zone.** A conical zone is hereby established beneath the conical surface at the airport which extends outward from the periphery of the horizontal surface for a horizontal distance of four thousand (4,000) feet.

C. **Horizontal Zone.** A horizontal zone is hereby established beneath the horizontal surface at the airport which is a plane one hundred fifty (150) feet above the established airport elevation, the perimeter of which is constructed by swinging arcs of ten thousand (10,000) feet radii from the center of each end of the primary surface and connecting the adjacent arcs by lines tangent to those arcs.

D. **Transitional Zones.** Transitional zones are hereby established beneath the transitional surfaces at the airport. Transitional surfaces, symmetrically located on either side of the runway, have variable widths as shown on the Center Municipal Airport Hazard Zoning Map. Transitional surfaces extend outward perpendicular to the runway centerline and the extended runway centerline from the periphery of the primary surface and the approach surfaces to where they intersect the horizontal surface. Where the precision instrument runway approach surface projects through and beyond the conical surface, there are hereby established transitional zones beginning at the sides of and at the same elevation as the approach surface and extending for a horizontal distance of five thousand (5,000) feet as measured perpendicular to the extended runway centerline.

Section 5. Height Limitations

Except as otherwise provided in Section 8 of these regulations, no structure shall be erected, altered, or replaced and no tree shall be allowed to grow in any zone created by these regulations to a height in excess of the applicable height limitations herein established for such zone except as provided in Paragraph E of this Section. Such applicable height limitations are hereby established for each of the zones in question as follows:



Source: ESRI Basemap Imagery,
Proposed Airport Development Concept

Exhibit E1
Ultimate Part 77 Surfaces

A. **Approach Zones.** Slope one (1) foot in height for each thirty-four (34) feet in horizontal distance beginning at the end of and at the same elevation as the primary surface and extending to a point of ten thousand (10,000) feet beyond the end of the primary surface.

B. **Conical Zone.** Slopes one (1) foot in height for each twenty (20) feet in horizontal distance beginning at the periphery of the horizontal zone and at one hundred fifty (150) feet above the airport elevation and extending to a height of three hundred fifty (350) feet above the airport elevation, or to a height of six hundred sixty-nine (669) feet above mean seal level.

C. **Horizontal Zone.** Established at one hundred fifty (150) feet above the airport elevation, or at a height of four hundred sixty-nine (469) feet above mean sea level.

D. **Transitional Zones.** Slope one (1) foot in height for each seven (7) feet in horizontal distance beginning at the sides of an at the same elevation as the primary surface and the approach surfaces.

E. **Excepted Height Limitation.** *Nothing contained in these regulations shall be construed as prohibiting the growth, construction, or maintenance of any structure or tree to a height of up to fifty (50) feet above the surface of the land at its location.*

Section 6. Land Use Restrictions

Except as provided in Section 7 of these regulations, no use may be made of land or water within any zone established by these regulations in such a manner as to create electrical interference with navigational signals or radio communications between the airport and aircraft, make it difficult for pilots to distinguish between airport lights and others, result in glare in the eyes of pilots using the airport, impair visibility in the vicinity of the airport, create potential bird strike hazards, or otherwise in any way endanger or interfere with the landing, taking off, or maneuvering of aircraft intending to use the airport.

Section 7. Nonconforming Uses, Structures, and Trees

A. **Nonconforming Uses.** Nothing contained in these regulations shall be construed as requiring changes in or interference with the continuance of any nonconforming use of land.

B. **Nonconforming Structures.** Nothing contained in these regulations shall be construed as to require the removal, lowering, or other change to any existing nonconforming structure including all phases or elements of a multiphase structure, the construction of which was begun prior to the effective date of these regulations and is diligently prosecuted.

C. **Nonconforming Trees.** Nothing in these regulations shall be construed as to require the removal, lowering, or other change to any nonconforming tree. However, any nonconforming tree which grows to a greater height than it was as of the effective date of these regulations is subject to the provisions of these regulations as described in Section 5 herein above.

Section 8. Permits and Variances

A. Permits. Any person who desires to replace, rebuild, substantially change, or repair a nonconforming structure or replace or replant a nonconforming tree must apply for and receive a permit, and the permit shall be granted. However, no permit shall be granted which would allow the establishment of an airport hazard or allow a nonconforming structure or tree to exceed its original height or become a greater hazard to air navigation than it was at the time of the adoption of these regulations. Applications for permits shall be applied to and issued by the administrative agency.

B. Variances. Any person who desires to erect, substantially change, or increase the height of any structure or establish or allow the growth of any tree which would exceed in the height limitations set forth in Section 5 of these regulations or change the use of property in such a way as to create a hazardous condition as described in Section 6 of these regulations must apply to the board of adjustment and receive a variance. The application for variance must be accompanied by a determination from the Federal Aviation Administration under 14 C.F.R. Part 77 as to the effect of the proposal on the operation of air navigation facilities and the safe, efficient use of navigable airspace.

Such variances shall be allowed where it is duly found that a literal application or enforcement of the regulations will result in practical difficulty or unnecessary hardship and the granting of relief would result in substantial justice, not be contrary to the public interest, and be in accordance with the spirit of these regulations.

C. Requirements and Reasonable Conditions

(1) Any permit granted may, at the discretion of the administrative agency, impose a requirement to allow the installation and maintenance, at the expense of the administrative agency, of any markers or lights as may be necessary to indicate to flyers the presence of an airport hazard.

(2) Any variance granted may, at the discretion of the board of adjustment, impose any reasonable conditions as may be necessary to accomplish the purpose of these regulations.

Section 9. Board of Adjustment

A. The Board of Adjustment of the City of Center is hereby designated as the board of adjustment for the purposes of these regulations and shall have and exercise the following powers:

(1) to hear and decide appeals from any order, requirement, decision, or determination made by the Administrative Agency in the administration or enforcement of these regulations;
(2) to hear and decide special exceptions to the terms of these regulations when the board is required to do so; and
(3) to hear and decide specific variances.

B. The board of adjustment shall be comprised of five (5) members and shall adopt rules for its governance and procedure in harmony with the provisions of these regulations. Meetings of the board of adjustment shall be held at the call of the chairman and at such times as the board of adjustment may determine. The chairman, or in his/her absence the acting chairman, may administer oaths and compel the attendance of witnesses. All hearings of the board of adjustment shall be public. The board of adjustment shall keep minutes of its proceedings showing the vote of each member upon each question or if any member is absent or fails to vote, indicating such fact and shall keep records of its examinations and other official actions, all of which shall immediately be filed in the office of the board of adjustment or in the office of the City Manager of the City of Center. All such records shall be public records.

C. The board of adjustment shall make written findings of fact and conclusions of law stating the facts upon which it relied when making its legal conclusions in reversing, affirming, or modifying any order, requirement, decision, or determination which comes before it under the provisions of these regulations.

D. The concurring vote of four (4) members of the board of adjustment shall be necessary to reverse any order, requirement, decision, or determination of the administrative agency, to decide in favor of the applicant on any matter upon which it is required to pass under these regulations, or to affect any variance to these regulations.

Section 11. Judicial Review

Any person aggrieved or any taxpayer affected by a decision of the board of adjustment may present to a court of record a petition stating that the decision of the board of adjustment is illegal and specifying the grounds of the illegality as provided by and in accordance with the provisions of Texas Local Government Code, §241.041. This same right of appeal is extended to the governing bodies of the City of Center, Texas, and Shelby County, Texas, and to the Shelby County-Center Joint Airport Zoning Board.

Section 12. Enforcement and Remedies

The governing bodies of the City of Center, Texas, or Shelby County, Texas, or the Shelby County-Center Joint Airport Zoning Board may institute in a court of competent jurisdiction an action to prevent, restrain, correct, or abate any violation of these regulations or of any order or ruling made in connection with their administration or enforcement including, but not limited to, an action for injunctive relief.

Section 13. Penalties

Each violation of these regulations or of any order or ruling promulgated hereunder shall constitute a misdemeanor and upon conviction shall be punishable by a fine of not more than $200, and each day a violation continues to exist shall constitute a separate offense.

Section 14. Conflicting Regulations

Where there exists a conflict between any of the regulations or limitations prescribed herein and any other regulation applicable to the same area, whether the conflict be with respect to the height of structures or trees, the use of land, or any other matter, the more stringent limitation or requirement shall control.

Section 15. Severability

If any of the provisions of these regulations or the application thereof to any person or circumstance is held invalid, such invalidity shall not affect other provisions or application of these regulations which can be given effect without the invalid provision or application and to this end, the provisions of these regulations are declared to be severable.

Section 16. Adherence with State Laws

Any actions brought forth by any person or taxpayer as a result of the administration, enforcement, or the contesting of these regulations will be in accordance with the provisions of Texas Local Government, §§241.001 et seq and other applicable state laws.

Section 17. Effective Date

Whereas, the immediate operation of the provisions of these regulations is necessary for the preservation of the public health, safety, and general welfare, an emergency is hereby declared to exist and these regulations shall be in full force and effect from and after their adoption by the Shelby County-Center Joint Airport Zoning Board.

Adopted by the Shelby County-Center Joint Airport Zoning Board this ______ day of _________ 20_____.

Chairman, ___________________________
Joint Airport Zoning Board

____________________________________ ____________________________________
Member Member

____________________________________ ____________________________________
Member Member

Attest:______________________________________
County Clerk of Shelby County, Texas

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