THE HEART OF ARIZONA WINE COUNTRY
COTTONWOOD

Cottonwood Municipal Airport

MASTER PLAN UPDATE

December 2022

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CHAPTER 1: INVENTORY OF EXISTING CONDITIONS

1.1. CHAPTER INTRODUCTION

As an initial step in the master planning process, the inventory provides a broad collection of data and information pertaining to the background, local setting, facilities, physical assets, environmental considerations, and activities of Cottonwood Municipal Airport (the Airport) and its surrounding environs. This chapter describes the Airport's existing conditions as of April 2020. The information in this chapter provides significant context and baseline data for the subsequent forecasts of aviation demand, facility requirements, and alternatives analyses included in this Master Plan Update.

Information and data for this inventory were provided by Cottonwood Municipal Airport tenants and stakeholders, City of Cottonwood staff, the Federal Aviation Administration (FAA), the Arizona Department of Transportation Aeronautics Group (ADOT), and various other agencies and resources. Web-based research, site visits, and interviews with Airport staff and other tenants were conducted to supplement this information.

1.2. BACKGROUND AND LOCAL SETTING

Cottonwood Municipal Airport (FAA location identifier: P52) is located in the City of Cottonwood, Arizona within Yavapai County in north-central Arizona. Encompassing approximately 8,123 square miles, Yavapai County is roughly the same size as the State of Massachusetts and contains a diverse terrain, including grasslands, desert plains, and mountains.[1] According to the U.S. Census Bureau's 2018 population estimates, Yavapai County is home to 231,993 residents and accounts for 3 percent of Arizona's total population.[2]

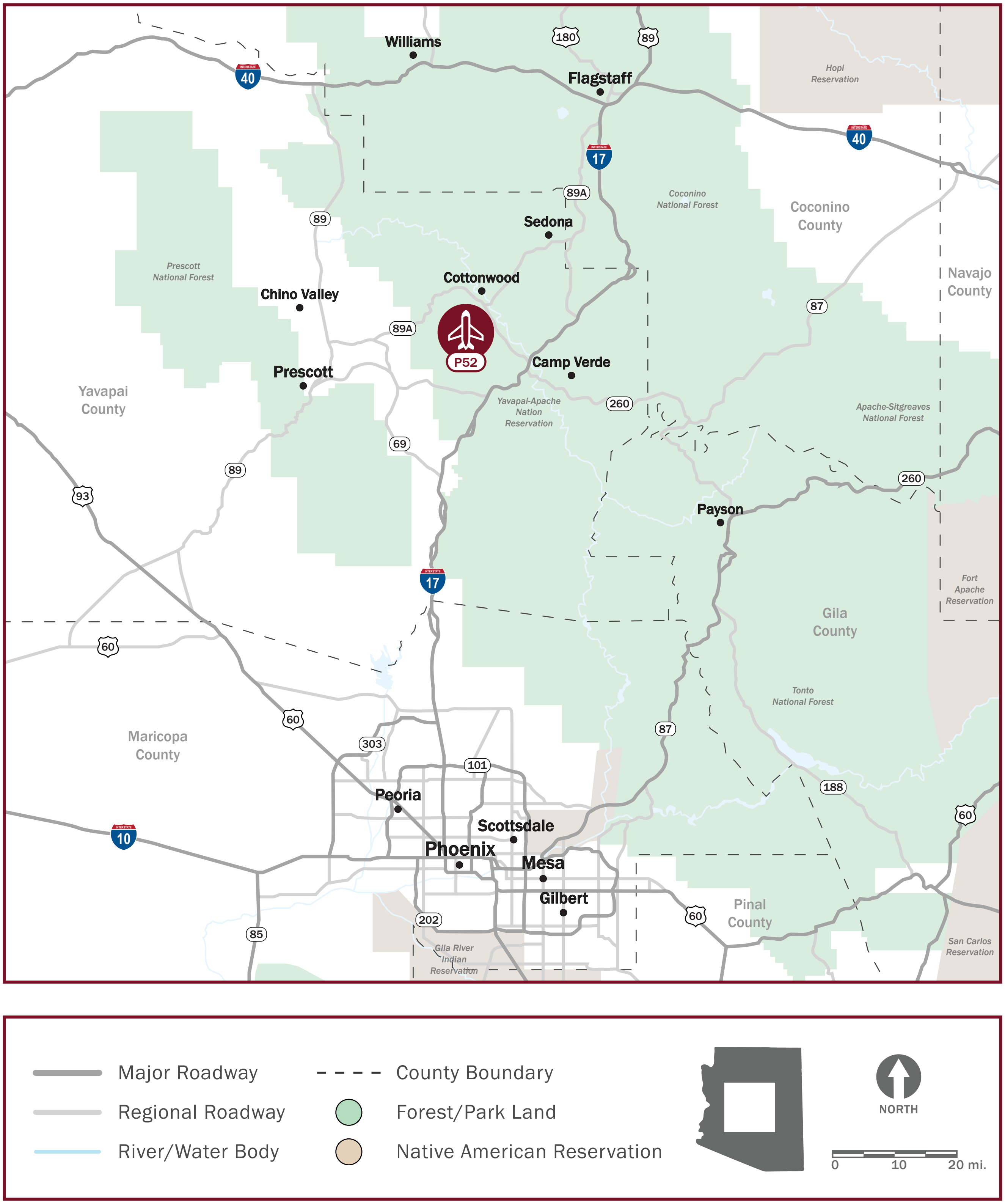
Source: Kimley-Horn

The Airport is located in the northwestern portion of the City of Cottonwood, approximately 40 miles southwest of the Flagstaff metropolitan area and 100 miles north of the Phoenix metropolitan area. Per the U.S. Census Bureau's 2018 population estimates, Cottonwood has a population of 12,199. Centrally located in Arizona's Verde Valley, the City is also home to Dead Horse Ranch State Park and the Verde River Greenway.

The Airport covers approximately 210 acres at an elevation of 3,560 feet above mean sea level (MSL). It is generally bounded to the north by West Mingus Avenue, the Cottonwood Water Works Well and a single-family residential community to the south, South Airpark Road to the east, and the City of Cottonwood Public Works facility and Mesquite Hills residential community to the west. The Airport is located approximately one quarter of a mile west of Arizona State Route 89A, which serves as the major north-south highway traversing the City of Cottonwood and the Verde Valley. The Airport's location is illustrated in **Figure 1.1**.

[1] Yavapai County Website, About Yavapai County, https://www.yavapai.us/about-us (accessed April 2020).
[2] U.S. Census Bureau, Quick Facts: Yavapai County (accessed April 2020).

Figure 1.1 - Map of Airport Vicinity



Sources:
Esri (accessed April 2020).
Kimley-Horn, 2020.

1.2.1. Ownership and Management

Cottonwood Municipal Airport is owned by the City of Cottonwood. Additionally, the City's five-member Airport Commission is responsible for overseeing capital improvements, maintenance, funding, tenants, and updates to the Airport's master plan.[3] Daily operations at the Airport are managed by the City-appointed Airport Manager.

1.2.2. Airport History

Cottonwood Municipal Airport, originally known as Clemenceau Airport, opened in 1929. The Airport was initially privately owned and included a 3,600-foot dirt runway, one hangar, and an office facility. Aircraft maintenance and fuel were offered to local and itinerant pilots, and weekend air shows were held to entertain residents. In 1940, the Airport was acquired by Yavapai County in order to establish a county airport and oversee future improvements, maintenance, and operations.

In the 1940s, Clemenceau Airport hosted primary flight training schools for both the Army and the Navy. After World War II, the Airport (then referred to as the Cottonwood-Clemenceau Airport due to the dwindling population of Clemenceau and the growing community of Cottonwood) offered pilot training, charter air service, scenic rides, and aircraft sales and maintenance services. Due to the influx of activity, funding was obtained in the 1950s to surface the taxiway and apron, repair the main hangar and maintenance shop, and replace the runway lights. Shortly thereafter, the Airport officially became known as the Cottonwood Airport. In 1968, the newly incorporated Town of Cottonwood (which became the City of Cottonwood in 1987) acquired the Airport from Yavapai County and has since operated the Airport through direct management and/or lease agreements with private entities.

Since its acquisition of the Airport, the City of Cottonwood has continuously invested in development and improvements. In 1976, the City constructed a 3,500-foot paved runway as well as a paved parallel taxiway and an aircraft tiedown/parking apron utilizing both federal and state grants. Additionally, medium intensity runway lighting (MIRL), apron lights, and security fencing were installed in subsequent years. In 1980, the runway was extended to its current length of 4,252 feet.

Prompted by previous Master Plan Updates (1986, 1993, 2001), later improvements at the Airport included the reconstruction of the parking apron, the addition of navigational aids (NAVAIDs) and a weather reporting system, the construction of new aircraft hangars, the acquisition of additional land, and the development of the Cottonwood Airpark commercial/industrial area east of the runway. As previously noted, the Airport Commission continues to oversee and facilitate maintenance, planning, and capital improvements at the Airport.

[3] City of Cottonwood Website, Airport Commission, https://cottonwoodaz.gov/356/Airport-Commission (accessed April 2020).

1.2.3. Capital Improvements and Grant History

The FAA Airport Improvement Program (AIP) provides grants for the planning and development of public-use airports in the U.S. **Table 1.1** provides a summary of Airport projects between 2009 and 2019 that have been funded through AIP grants.

Table 1.1 - Airport Grant History

Grant #	Fiscal Year	Project Description	Total
FAA AIP Grants [1]			
13	2009	Apron and Taxiway Rehabilitation	$489,610
14	2012	Automated Weather Observation System Installation (Design Only)	$30,165
15	2013	Automated Weather Observation System Installation	$175,836
16	2015	Apron Rehabilitation	$104,861
17	2016	Apron Rehabilitation	$962,954
18	2017	Apron Reconstruction	$1,474,609
19	2019	Airport Master Plan Update	$364,054
		Total	**$3,602,089**

Source:
FAA Airport Improvement Program Grant Histories (accessed March 2020).

Notes:
FY = Fiscal Year
N/A = Not applicable (state funds are not included in FAA AIP Grants)
1 = The FAA Fiscal Year the 12-month period beginning on October 1 and ending September 30 of the following year.

1.2.4. Regional Socioeconomic Data

This section examines historical trends and future projections of population for the City of Cottonwood, and population, employment, per capita personal income (PCPI), and gross regional product (GRP) for Yavapai County and the State of Arizona. Historical and forecast socioeconomic data for the County and the State were obtained from the U.S. Census Bureau and Woods & Poole Economics, Inc., an independent firm that specializes in economic and demographic data projections.

Population for the City of Cottonwood was determined from the City's 2015 Economic Development Strategic Plan, which estimates that the City's population will have a compound annual growth rate (CAGR) of 1.2% between 2010 and 2030. This CAGR and the forecast population in 2020 and 2030, respectively, were used to extrapolate the City's population for the years 2011 through 2029, and a linear regression analysis was applied to forecast the City's population through 2039. Ratios were then developed to compare the populations of the City and Yavapai County (e.g., in 2020, it was estimated that the City's population would account for approximately 5.13% of the County's population). To develop the City's projected population shown in **Table 1.2**, the ratios were applied to socioeconomic data that reflect updated population estimates.

Overall, these socioeconomic indicators reflect a solid economic base for continued aviation demand at the Airport. These data will be used to inform aviation demand forecasts for Cottonwood Municipal Airport

Table 1.2 - Historical and Forecast Socioeconomic Data

Year	Population			Employment[1]		PCPI[2]		GRP[3]
	Cottonwood[4]	Yavapai County	AZ	Yavapai County	AZ	Yavapai County	AZ	Yavapai County
Historical								
2009	11,302	211,172	6,343,154	83,156	3,264,078	34,366	40,707	$4,833,633,000
2010	11,245	210,983	6,407,774	80,860	3,208,327	33,938	40,188	$4,716,116,000
2011	11,205	211,023	6,473,497	80,354	3,268,484	34,476	40,935	$4,574,050,000
2012	11,233	211,977	6,556,629	81,640	3,322,734	34,928	41,428	$4,564,486,000
2013	11,342	214,426	6,634,999	83,296	3,398,934	35,131	40,797	$4,668,013,000
2014	11,481	217,739	6,733,840	85,992	3,461,582	35,898	41,508	$4,884,086,000
2015	11,614	220,845	6,833,596	87,832	3,536,249	36,547	42,275	$5,026,294,000
2016	11,757	224,591	6,945,452	89,651	3,610,514	37,172	43,004	$5,172,702,000
2017	11,902	228,055	7,048,876	91,436	3,684,143	37,791	43,730	$5,319,313,000
2018	12,048	231,993	7,171,646	93,209	3,757,545	38,416	44,467	$5,467,105,000
2019	12,196	236,849	7,296,043	94,986	3,831,392	39,052	45,218	$5,617,054,000
Forecast								
2024	13,003	256,388	7,911,239	104,012	4,209,122	42,312	49,109	$6,405,172,000
2029	13,795	277,139	8,567,674	113,170	4,597,078	45,487	52,926	$7,254,358,000
2034	14,700	298,576	9,249,655	122,332	4,990,266	48,325	56,299	$8,161,492,000
2039	15,583	320,202	9,942,245	131,633	5,391,529	51,168	59,650	$9,133,387,000
AAGR 2009-2019	**0.77%**	**1.16%**	**1.41%**	**1.31%**	**1.62%**	**1.29%**	**1.06%**	**1.41%**
AAGR 2019-2039	**1.23%**	**1.52%**	**1.56%**	**1.64%**	**1.72%**	**1.36%**	**1.39%**	**2.46%**

Sources:
U.S. Census Bureau (accessed March 2020).
Woods & Poole Economics, Inc., 2019.
City of Cottonwood Economic Development Plan, 2015.

Notes:
PCPI = Per capita personal income
GRP = Gross regional product
AAGR = Average annual growth rate
1 = Employment status includes population 16 years and over.
2 = PCPI is shown in 2019 dollars.
3 = GRP is shown in 2009 dollars.
4 = Population for the City of Cottonwood was determined based on data from the City's 2015 Economic Development Strategic Plan and Woods & Poole Economics, Inc.

Population

As shown in **Table 1.2**, the City of Cottonwood, Yavapai County, and the State of Arizona experienced population growth between 2009 and 2019 with average annual growth rates (AAGRs) of 0.77 percent, 1.16 percent, and 1.41 percent, respectively. Further, the populations are expected to continue to increase between 2019 and 2039 with a forecast AAGR of 1.23 percent for the City, 1.52 percent for the County, and 1.56 percent for the State.

Employment

Employment increases individual purchasing power and positive contributions to the economy. The growth in employment, or the number of employed individuals, in Yavapai County and the State of Arizona has outpaced population growth since 2009 with AAGRs of 1.31 percent and 1.62 percent, respectively. As shown, employment is projected to continue to rise faster than population through 2039. This key metric is an indicator that labor markets are expected to remain strong in the region and across the State.

Per Capita Personal Income (PCPI)

PCPI provides a broad measure of individual economic well-being and is another indicator regularly used to gauge the economic growth of a community. PCPI indicates the general ability of individuals to purchase products and services (e.g., personal aircraft or corporate travel). As noted in **Table 1.2**, both Yavapai County and the State of Arizona have experienced increases in PCPI since 2009. Moreover, the projected PCPI for both the County and the State are forecast to continue to increase over the next 20 years.

Gross Regional Product (GRP)

Gross regional product (GRP) is a key representation of the general health of a region's overall economy. The GRP of Yavapai County had an AAGR of 1.41 percent between 2009 and 2019 and a forecast AAGR of 2.46 percent through 2039, an indication of the region's strong projected growth.

1.3. AIRPORT ROLE

Airports play a critical role in the national, state, and local aviation systems. Therefore, various agencies at all levels of government participate in airport system planning to understand the relationship between airports within the system and airports' future requirements as they relate to the economy, population, geography, and projected demand. This section describes Cottonwood Municipal Airport's role within the national and state aviation systems as identified by the respective government agencies.

1.3.1. National Plan of Integrated Airport Systems (NPIAS)

The FAA established the National Plan of Integrated Airport Systems (NPIAS) to maintain development plans for public-use airports. The NPIAS identifies airports included within the national airport system, the role of each airport, and the amount and types of airport development eligible for federal funding under the AIP over a five-year period.[4] The NPIAS categorizes the nation's airports based on the types of services provided and

[4] Federal Aviation Administration, *2019-2023 National Plan of Integrated Airport Systems*, 2018.

the quantity of passengers enplaned, which influences the level of federal funding for which each type of airport is eligible.

The 2019-2023 NPIAS Report classifies Cottonwood Municipal Airport as a general aviation (GA) airport. The FAA defines GA airports as public-use airports with no scheduled service or less than 2,500 annual passenger boardings.[5] Approximately 88 percent of airports included in the NPIAS are classified as GA airports. The NPIAS also assigns categories to GA airports based on existing activity levels. Categorized as a "Basic" GA airport, Cottonwood Municipal Airport links the community with the greater national airport system and supports a variety of GA activities (e.g., emergency services, charter or critical passenger service, cargo operations, flight training, and personal flying).

1.3.2. Arizona State Aviation System Plan (SASP)

The ADOT Aeronautics Group recognizes the importance of proactive planning to ensure aviation continues its role in the statewide transportation system. As such, the Arizona State Aviation System Plan (SASP) was created in 1978 to supplement the NPIAS by assessing the state's existing airport system and its ability to meet current and future demand. The SASP analyzes a variety of issues affecting Arizona's aviation system, including funding, levels of service, available facilities, and non-aviation influences on airports. The current version of the SASP was published in 2018 and classifies Cottonwood Municipal Airport as a GA-Community airport. ADOT defines GA-Community airports as those that serve regional economies and serve various types of GA aircraft. [6]

For each airport classification, the SASP lists facility and service objectives that present the recommended minimum level of infrastructure and development at an airport in order to serve its role within the statewide aviation system. Cottonwood Municipal Airport meets all facility and service objectives based on criteria for GA-Community airports, with the exception of an automated weather reporting system and internet access. These components are discussed in further detail in later sections of this chapter and in **Chapter 3 - Facility Requirements** of this Master Plan Update.

1.4. CURRENT AVIATION ACTIVITY

This section provides information on current aviation activity at the Airport, including aircraft operations, operational fleet mix, and based aircraft. This information provides a baseline to inform aviation activity forecasts and future facility requirements in subsequent chapters of this Master Plan Update.

1.4.1. Aircraft Operations

An aircraft operation is defined as either a takeoff or a landing. Therefore, a takeoff and a landing such as a touch-and-go operation is counted as two operations. Operations are categorized as local or itinerant. Local operations are flights that depart from the Airport and remain in the Airport's traffic pattern or a designated

[5] Federal Aviation Administration, Airport Categories (accessed April 2020).
[6] Arizona Department of Transportation, *State Airport System Plan*, 2018.

practice area within a 20-mile radius of the Airport. Itinerant operations are flights that land at the Airport from another airport or depart from the Airport and leave the Airport's immediate area.[7] As an uncontrolled, non-towered airport, estimates of Cottonwood Municipal Airport's historical aircraft operations are published in the FAA's Terminal Area Forecast (TAF). According to the TAF, Cottonwood Municipal Airport had 18,900 operations in 2019. Of these operations, 8,000 were reported as local GA operations, 10,500 were itinerant GA operations, 300 were itinerant air taxi operations, and 100 were itinerant military operations. The FAA defines an air taxi as any aircraft designed to have a maximum seating capacity of 60 seats or less, or a maximum payload capacity of 18,000 pounds or less, carrying passengers or cargo for hire or compensation. According to the Airport, approximately five to ten percent of total operations were touch-and-go. Historical and future aircraft operations are discussed further in **Chapter 2 - Aviation Forecasts**.

It should be noted that City installed an operations tracking system at the Airport in November 2020. This system collects airport operational data via signals transmitted by aircraft Automatic Dependent Surveillance-Broadcast (ADS-B) and transponders. The data will be analyzed and considered in later chapters of this Master Plan Update.

1.4.2. Based Aircraft

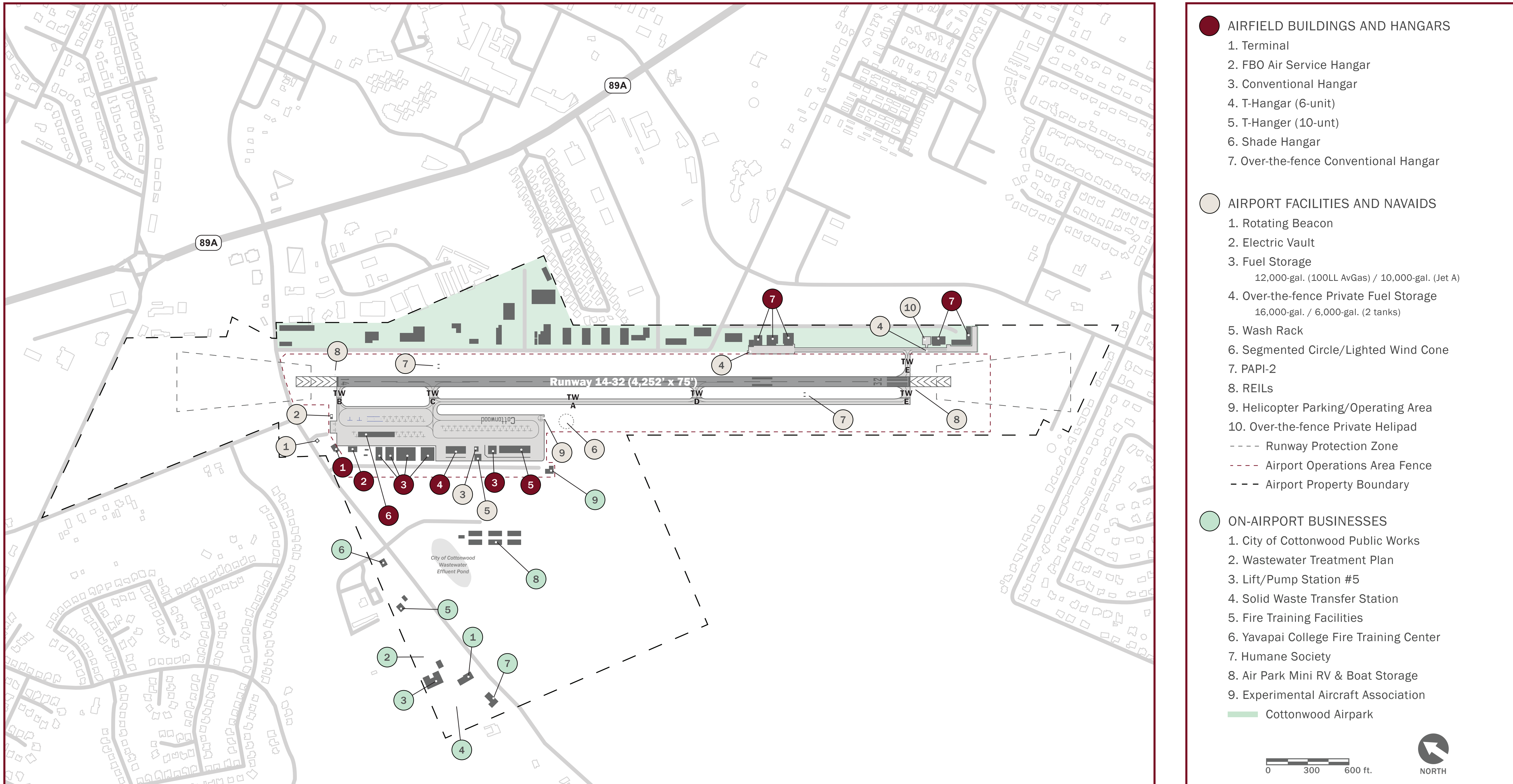
The FAA defines based aircraft as operational and airworthy aircraft registered in the FAA Aircraft Registry that are located at a specific airport for the majority of the year.[8] According to the FAA National Based Aircraft Inventory Program database, Cottonwood Municipal Airport had 64 based aircraft at the time of writing, including 44 single-engine aircraft, five multi-engine aircraft, two turboprop aircraft, two jets, and 11 helicopters. Like aircraft operations, historical and future based aircraft will be discussed further in **Chapter 2 - Aviation Forecasts** of this Master Plan Update.

1.5. AIRSIDE FACILITIES

Airside areas encompass facilities and infrastructure that accommodate aircraft operations at an airport, including runways, taxiways, aprons, NAVAIDs, and airport lighting. This section describes the primary airside facilities and infrastructure at Cottonwood Municipal Airport as of April 2020. The metrological conditions that impact airside facility usage and aircraft operations are also highlighted in this section. **Figure 1.2** illustrates the Airport's airside and landside facilities

[7] Federal Aviation Administration, Advisory Circular 150/5070-6B, Change 2, *Airport Master Plans*, 2015.
[8] Federal Aviation Administration, *General Aviation Airports: A National Asset*, May 2012.

Figure 1.2 - Existing Airport Facilities (2020)



Sources:
FAA 5010 Airport Master Record, 2020.
Cottonwood Municipal Airport FAA-Approved Airport Layout Plan, 2016.
Esri (accessed April 2020).
Kimley-Horn, 2020.

Note: 1 = Facilities are located outside of the airport operations area fence.

1.5.1. Airport Design Standards

Airside facility planning is largely driven by criteria and standards developed by the FAA that emphasize safety and efficiency while protecting federal investment in airport transportation infrastructure. These design criteria and standards are contained within FAA Advisory Circular 150/5300-13A, *Airport Design*, Change 1 (AC 150/5300-13A) and address various airport infrastructure and their functions. Airport sponsors that accept federal AIP grants are required to adhere to FAA design standards or obtain approval for any modification of standard (MOS).

Design standards are determined by the airport's designated critical aircraft and Airport Reference Code (ARC). Defined in AC 150/5300-13A, the critical aircraft is the most demanding aircraft that conducts at least 500 operations per year at an airport (excluding touch-and-go activity). This aircraft, or a combination of multiple aircraft that share similar physical and operational characteristics, is reflective of the demand that will regularly be placed on airport facilities and services. Also defined in AC 150/5300-13A, the ARC coding system relates airport design standards to the characteristics of aircraft that operate at an airport. The ARC is based on the airport's design aircraft and is comprised of two components: the aircraft approach category (AAC) and the airplane design group (ADG). The AAC is related to an aircraft's approach speed and the ADG is correlated to the aircraft's wingspan and tail height.

Both AAC and ADG are also components of the runway design code (RDC). The third component of RDC is approach visibility, which refers to a runway's visibility minimums expressed by runway visual range (RVR) in terms of feet. The RDC provides information needed to determine design standards that apply to a particular runway. The criteria of AAC, ADG, and RVR are detailed in Table 1.3, Table 1.4, and Table 1.5, respectively.

Table 1.3 - Aircraft Approach Categories

Aircraft Approach Category	Approach Speed
A	Approach speed less than 91 knots
B	Approach speed 91 knots or more but less than 121 knots
C	Approach speed 121 knots or more but less than 141 knots
D	Approach speed 141 knots or more but less than 166 knots
E	Approach speed 166 knots or more

Source: *FAA Advisory Circular 150/5300-13A, Change 1, Airport Design, 2014.*

Table 1.4 - Airplane Design Groups

Airplane Design Group	Tail Height (feet)	Wingspan (feet)
I	< 20	< 49'
II	20' - < 30'	49' - < 79'
III	30' - < 45'	79' - < 118'
IV	45' - < 60'	118' - < 171'
V	60' - < 66'	171' - < 214'

Source: *FAA Advisory Circular 150/5300-13A, Change 1, Airport Design, 2014.*

Table 1.5 - Runway Visual Range

Runway Visual Range (feet)	Visibility Minimums
VIS	Visual approach only
5,000	Not lower than 1 mile
4,000	Lower than 1 mile but not lower than 3/4 mile
2,400	Lower than 3/4 mile but not lower than 1/2 mile (CAT-I PA)
1,600	Lower than 1/2 mile but not lower than 1/4 mile (CAT-II PA)

Source: *FAA Advisory Circular 150/5300-13A, Change 1, Airport Design, 2014.*

Cottonwood Municipal Airport was assigned an ARC of B-I in the Airport's 2001 Master Plan Update and the Airport's current FAA-approved Airport Layout Plan (ALP) published in 2006, with the Citation I as the critical aircraft for Runway 14-32. Both the 2001 Master Plan Update and the ALP recommended the Airport ultimately plan for a future ARC of B-II and use the Beechcraft King Air 300 as the critical aircraft. However, a review of operational data from the FAA's Traffic Flow Management System Count (TFMSC) database show zero Beechcraft King Air 300 operations at the Airport in 2019. Furthermore, analysis of the TFMSC data and discussions with Airport management have resulted in an existing ARC designation of A-I (small) with all aircraft within the A-I (small) category making up the Airport's critical aircraft. The FAA defines "small" aircraft as those with a maximum certified takeoff weight (MTOW) of 12,500 pounds or less. The Airport's future ARC and critical aircraft are evaluated in **Chapter 2 - Aviation Forecasts** of this Master Plan Update

With an RVR of 5,000 feet, Runway 14-32 has an RDC of A-I-5000. A summary of design standards based on the Airport's critical aircraft, ARC, and RDC is shown in **Table 1.6** and a list of non-standard conditions at the Airport is provided in **Table 1.9**.

1.5.2. Runway 14-32

Cottonwood Municipal Airport has a single runway oriented in a northwest-southeast alignment with a designation of Runway 14-32. Measuring 4,252 feet long by 75 feet wide, the runway was originally constructed in 1976 and later extended to its current length in 1980. The runway is constructed of asphalt and has 10-foot-wide unpaved shoulders.[9] Both runway ends have marked blast pads, paved surfaces the provide erosion protection beyond runway ends, each measuring 300 feet long by 75 feet wide. The runway has an effective gradient of 0.97 percent, with Runway 14 at an elevation of 3,519 feet above MSL and Runway 32 at an elevation of 3,560 feet MSL. The runway is equipped with MIRLs, both runway ends are equipped with runway end identifier lights (REILs), and Runway 32 is equipped with nonprecision pavement markings and a precision approach path indicator (PAPI).[10] The runway's lighting and NAVAIDs are further discussed in **Section 1.5.9** and **Section 1.5.10**, respectively. Along with runway design standards, the existing characteristics of Runway 14-32 are listed in **Table 1.6**.

[9] Arizona Department of Transportation, Airport Pavement Management System IDEA (accessed April 2020).
[10] Federal Aviation Administration, Airport Data and Information Portal (accessed April 2020).

Dimensional Criteria

Dimensional criteria are established by the FAA in AC 150/5300-13A. The following criteria apply to runways and their surrounding areas.[11]

- **Runway Safety Area (RSA):** The RSA is an area surrounding the runway and centered about the runway centerline that reduces the risk of damage to an aircraft in the event of an undershoot, overshoot, or excursion from the runway. The RSA must be cleared, graded, free of hazardous surface variations, and free of objects, except for objects needed for air navigation or aircraft ground maneuvering.
- **Runway Object Free Area (ROFA):** The ROFA is an area surrounding the runway and centered about the runway centerline that must be cleared of all above-ground objects, except those needed for air navigation or aircraft ground maneuvering purposes. In addition, taxiing and holding aircraft are permitted to operate within the ROFA.
- **Runway Obstacle Free Zone (ROFZ):** The ROFZ is a three-dimensional volume of airspace along the runway and extended runway centerline that protects aircraft landing or taking off from the runway. The ROFZ extends 200 feet beyond the end of each runway and must be clear of all aircraft and object penetrations except for NAVAIDs that need to be located in the ROFZ due to their function of providing air navigation.
- **Runway Protection Zone (RPZ):** The RPZ is a trapezoidal area on the ground that is centered about the extended runway centerline. The RPZ's function is to enhance the safety and protection of people and property on the ground. There are both approach and departure RPZs applicable to each runway end, and their location is dependent upon landing and takeoff distances. The approach RPZ dimension is also a function of the type of aircraft and approach visibility minimums associated with the particular runway end. In order to effectively enhance the safety and protection of people and property on the ground, the FAA recommends airport owner control over the land within which the RPZ is located. At Cottonwood Municipal Airport, both the approach and departure RPZs are co-located, are the same dimensions, and are fully located within the Airport's boundary.

A summary of the Airport's existing design standards is presented in **Table 1.6**, and a full analysis of required dimensional criteria associated with the Airport's existing and future ARC is presented in **Chapter 2 - Facility Requirements** of this Airport Master Plan Update.

[11] Federal Aviation Administration, Advisory Circular 150/5300-13A, *Airport Design*, Change 1, 2014.

Table 1.6 - Summary of Existing Runway Characteristics and Design Standards (2020)

Runway Component	Runway 14-32		Design Standard - A-I (small)
	14	32	
Runway Length	4,252 feet		Varies[1]
Runway Width	75 feet		60 feet
Aircraft Approach Category (AAC)	A		-
Airplane Design Group (ADG)	I (small)		-
Runway Visual Range (RVR)	5,000 feet		-
Runway Design Code (RDC)	A-I-5000		-
Critical Aircraft	All A-I (small) aircraft		-
Pavement Type	Asphalt		-
Pavement Markings	Basic	Nonprecision	-
Edge Lights	Medium Intensity Runway Lights (MIRL)		-
Declared Distances	None		-
Displaced Threshold	None	None	-
Runway End Elevation (above mean sea level)	3,519 feet	3,560 feet	-
Approach Lighting System	None	None	-
Runway End Identifier Lights (REILs)	Yes	Yes	-
Runway Visual Range (RVR) Equipment	None	None	-
Visual Approach Aids	PAPI 2L	None	-
Runway Shoulder Width	10 feet (unpaved)		10 feet
Blast Pad Length	300 feet	300 feet	60 feet
Blast Pad Width	75 feet	75 feet	80 feet
Runway Centerline to Holding Position Distance	125 feet		125 feet
Runway Centerline to Parallel Taxiway Centerline	150 feet		150 feet
Runway Centerline to Aircraft Parking Area	240 feet		125 feet
Runway Safety Area (RSA) Width	120 feet		120 feet
RSA Length Beyond Runway End	240 feet	240 feet	240 feet
Runway Object Free Area (ROFA) Area Width	250 feet		250 feet
ROFA Length Beyond Runway End	240 feet	240 feet	240 feet
Runway Obstacle Free Zone (ROFZ) Width	250 feet		250 feet
ROFZ Length Beyond Runway End	200 feet	200 feet	200 feet
Approach/Departure Runway Protection Zone (RPZ) Length	1,000 feet	1,000 feet	1,000 feet
Approach/Departure RPZ Inner Width	250 feet	250 feet	250 feet
Approach/Departure RPZ Outer Width	450 feet	450 feet	450 feet

Sources:
FAA 5010 Airport Master Record, 2020.
FAA Advisory Circular 150/5300-13A, Change 1, Airport Design, 2014.
Arizona Department of Transportation, Airport Pavement Management System IDEA (accessed April 2020).
Cottonwood Municipal Airport FAA-Approved Airport Layout Plan, 2006.
Kimley-Horn, 2020.

Notes:
PAPI 2L = Precision approach path indicator – two lights
1 = Runway length is described in FAA AC 150/5325-4 and in aircraft flight manuals. Appropriate runway lengths are determined by airport elevation, local prevailing surface wind and temperature, runway condition and slope, and aircraft performance characteristics.
Values in the table are rounded to the nearest foot.

1.5.3. Taxiways

Taxiways provide aircraft access between runways, aprons, hangars, terminals, and other airside facilities. Cottonwood Municipal Airport has one partial parallel taxiway (Taxiway A) and four runway entrance/exit taxiways (Taxiways B, C, D, and E). Taxiways B and C also serve as ramp connectors between Runway 14-32 and the aircraft parking apron. In addition to connecting Taxiway A with Runway 32, Taxiway E also provides airfield access to the taxilane and private hangars located outside the airfield of fence on the southeast portion of the Airport. The Airport's taxiways are summarized in **Table 1.7**.

Table 1.7 - Airport Taxiways

Taxiway	Type	Taxiway Width (feet)
A	Partial Parallel	40
B	Runway Entrance/Exit and Ramp Connector	30
C	Runway Entrance/Exit and Ramp Connector	50
D	Runway Entrance/Exit	40
E	Runway Entrance/Exit	50

Sources:
Cottonwood Municipal Airport FAA-Approved Airport Layout Plan, 2006.
Nearmap (accessed April 2020).

Taxiway Design Standards

The FAA established specific standards for taxiway design with the publication of AC 150/5300-13A in February 2014. These standards provide guidance on taxiway dimensions and layouts to enhance airfield safety. Previous guidance on taxiway design was based on ADG (which is established by the critical aircraft's wingspan and tail height) but did not account for aircraft undercarriage dimensions, which must be considered to ensure taxiway turns, or fillets, can accommodate specific aircraft. Therefore, the taxiway design group (TDG) was created based on aircraft main gear width (MGW) and cockpit-to-main gear (CMG) distance.[12] With the fleet of A-I (small) aircraft serving as the critical aircraft, the Airport has a TDG of 1A. Taxiway and taxilane design standards for the Airport's ADG and TDG are presented in **Table 1.8.** It should be noted that TDG standards were established after the publication of the Airport's 2001 Master Plan Update.

[12] Federal Aviation Administration, Advisory Circular 150/5300-13A, *Airport Design*, Change 1, 2014.

Table 1.8 - Taxiway Design Standards (2020)

Taxiway Component	Design Standard (feet)	Meets Standard
Design Standards based on Airplane Design Group (ADG = I)		
Taxiway Safety Area (TSA)	49	Yes
Taxiway Obstacle Free Area (TOFA)	89	Yes
Taxilane Obstacle Free Area (OFA)	79	No
Taxiway Centerline to Parallel Taxiway/Taxilane Centerline	70	Yes
Taxiway Centerline to Fixed or Movable Object	44.5	Yes
Taxilane Centerline to Parallel Taxilane Centerline	64	Yes
Taxilane Centerline to Fixed or Movable Object	39.5	No
Taxiway Wingtip Clearance	20	Yes
Taxilane Wingtip Clearance	15	Yes
Design Standards based on Taxiway Design Group (TDG = 1A)		
Taxiway Width	25	Yes
Taxiway Edge Safety Margin	5	Yes
Taxiway Shoulder Width	10	No

Sources:
FAA 5010 Airport Master Record, 2020.
FAA Advisory Circular 150/5300-13A, Change 1, Airport Design, 2014.
Cottonwood Municipal Airport FAA-Approved Airport Layout Plan, 2006.
Nearmap (accessed April 2020).
Kimley-Horn, 2020.

1.5.4. Helicopter Operating Area

A helicopter operating area is an area dedicated for the takeoff and landing of helicopters. These areas provide clearly marked areas away from potential obstructions that may compromise the safety of the aircraft or persons on the ground. The Airport has one helicopter operating area, which is located outside of the airfield fence and serves the private hangars along Airpark Road. The helicopter operating area is approximately 9,000 square feet and does not contain touchdown and lift-off (TLOF) or final approach and take-off (FATO) markings. The Airport also has a marked helicopter parking area located on the southeast corner of the main apron. As a parking area and not a designated helicopter operating area, it is standard for helicopters to taxi to a runway end before taking off. Helicopters taking off from a runway end should follow standard departure procedures.

1.5.5. Nonstandard Conditions

A summary of nonstandard conditions present at the Airport is provided in **Table 1.9**. Nonstandard conditions will be further addressed in **Chapter 3 - Facility Requirements** of this Master Plan Update.

Table 1.9 - Summary of Nonstandard Conditions

ADG / TDG	Design Standard Not Met	Details
ADG I	Standard blast pad dimensions are 80 feet wide by 60 feet long.	The Airport's existing blast pads measure 300 feet long by 75 feet wide.
ADG I	Taxilane OFA is required to be 79 feet / Taxilane centerline to fixed or movable object is required to be a minimum of 39.5 feet.	Aircraft open tie-downs and the marked helicopter parking position on the main apron, as well as over-the-fence structures on the east side of the Airport, do not meet taxilane separation standards.
TDG 1A	Taxiway shoulder width must be a minimum of 10 feet.	Taxiway shoulders are not present at the Airport. Although paved taxiway shoulders are not required for airports with an ARC of A-I (small), taxiways should include recommended measures such as turf or bituminous stabilized soil.
Airfield Geometry	Taxiway fillets design standard.	AC 150/5300-13A introduced new design standards for taxiway fillets that include tapered pavement edges leading up to a turn. The existing taxiway fillets at the Airport do not meet these standards.
Airfield Geometry	Situational awareness turns from apron to runway.	Taxiways B and C provide taxiing aircraft direct runway access from the Airport's main apron to Runway 14-32 without requiring a turn.

Sources:
FAA Advisory Circular 150/5300-13A, Change 1, Airport Design, 2014.
Kimley-Horn, 2020.

Notes:
ADG = Airplane design group
TDG = Taxiway design group

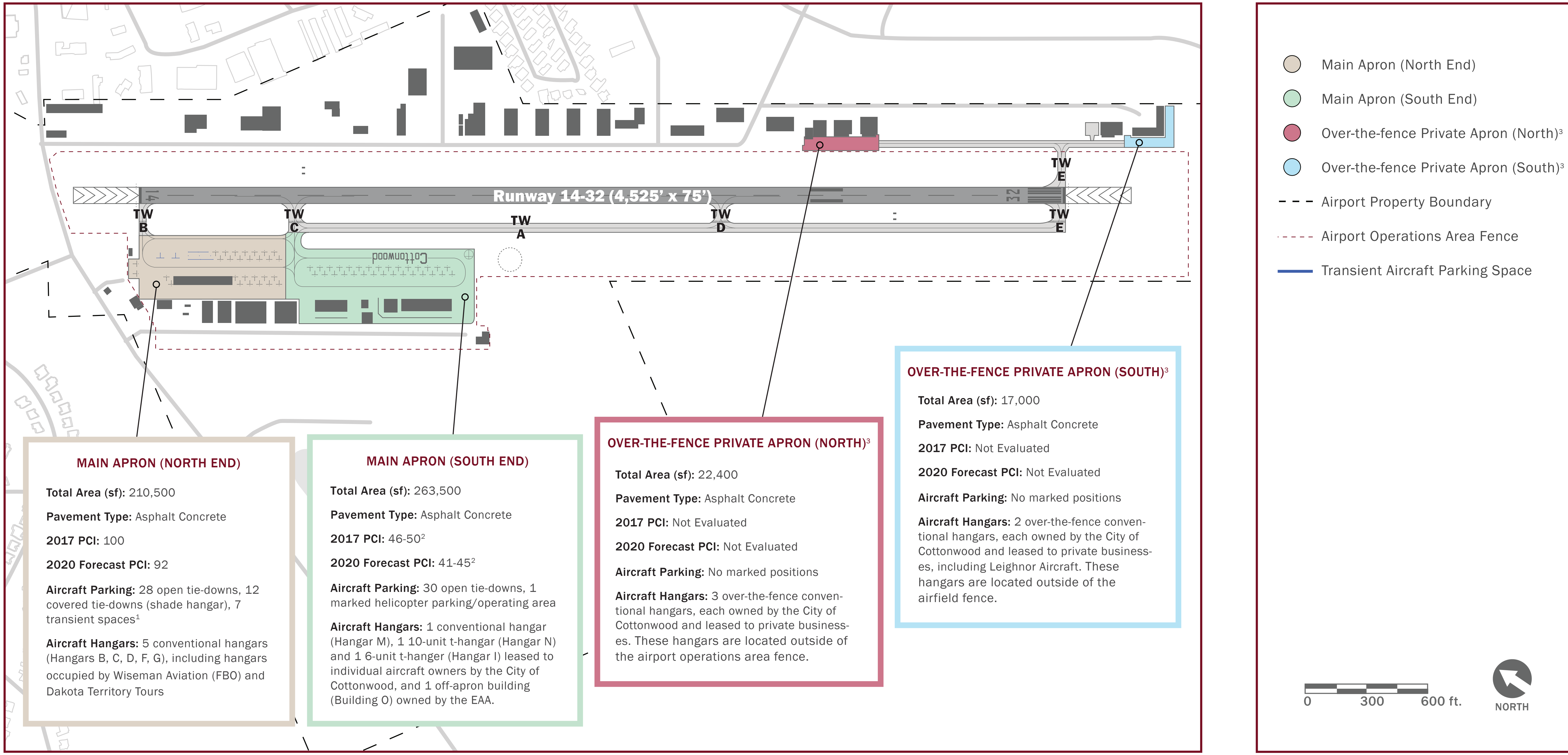
1.5.6. Aircraft Hangars and Parking

Hangars are covered or enclosed structures that provide space for the storage or maintenance of aircraft. As of April 2020, the Airport has 13 hangar structures that provide approximately 93,634 square feet of aircraft storage space. Of the hangars, 11 are box hangars (enclosed buildings) including an aircraft maintenance hangar and five privately leased hangars beyond the airfield fence. The other two hangars are t-hangars that hold six and ten aircraft, respectively. The hangars are 100 percent occupied and there are 14 aircraft owners on the hangar waitlist. Construction of two additional private hangars outside of the airfield fence on the southeast portion of the property was nearing completion at the time this chapter was drafted. The Airport has 65 open tie-down and 12 covered tie-down spaces under a t-shade structure, located on the main apron. Seven of the open tie-down spaces are designated for transient aircraft and are delineated with blue striping. 11 open tie-down spaces and all of the covered tie-down spaces are leased. Aircraft hangars and tie-down spaces are displayed in **Figure 1.3**.

1.5.7. Apron Areas

Aprons are located in the non-movement area of an airfield and provide aircraft access to terminals, hangars, and parking areas. Aprons generally accommodate the loading and unloading of passengers and cargo, fueling, maintenance, and aircraft parking. Cottonwood Municipal Airport has three apron areas: one on the northwest portion of the airfield that serves the Airport's terminal, fueling and maintenance areas, and based and transient aircraft parking areas; and two over-the-fence aprons on the southeast portion of the airfield that provide access to five private hangars and a helipad. The Airport's aprons are depicted in **Figure 1.3**.

Figure 1.3 - Airport Aprons, Tie-Downs, and Hangar Facilities



Sources:
FAA 5010 Airport Master Record, 2020.
Cottonwood Municipal Airport FAA-Approved Airport Layout Plan, 2016.
Arizona Department of Transportation, Airport Pavement Management System IDEA (accessed April 2020).
Esri (accessed April 2020).
Kimley-Horn, 2020.

Notes:
1 = Transient tie-downs are marked in blue and are available for free to transient aircraft for up to 10 days.
2 = Main apron was inspected in three sections. See PCI map below for exact boundaries.
3 = Hangars are located outside of the airport operations area fence.
Apron names in this figure are not official names but are used in this Master Plan Update for identification purposes.

1.5.8. Airfield Pavement

Airfield pavement such as runways, taxiways, and aprons represent a significant capital investment for the City of Cottonwood. Since this pavement directly impacts operational efficiency and the safety of aircraft, timely maintenance and rehabilitation of pavement infrastructure is critical. The ADOT Aeronautics Group maintains a statewide airport pavement management system (APMS) that evaluates pavement infrastructure at the State's public-use airports and provides airports, ADOT, and the FAA with information to help optimize pavement management programs.[13] As pavements deteriorate over time, continuous assessments and routine maintenance are needed to extend pavement life.

Runway Pavement Strength

The FAA employs the Aircraft Classification Number – Pavement Classification Number (ACN-PCN) method to report runway pavement strength.[14] PCN expresses the relative load carrying capacity of a pavement section in terms of standard single-wheel load. ACN are determined for specific aircraft models and express the relative effect of the aircraft on the pavement. To prevent damage and ensure the life span of the pavement, the ACN of aircraft using the pavement should not typically exceed the pavement's PCN. Heavier aircraft operations may be permissible, though frequent operations by heavier aircraft may shorten the pavement's lifespan.

A runway strength analysis for the Airport was completed in 2014 as part of the APMS. The analysis evaluated Runway 14-32 in two sections: one section for the runway ends and one section for the remainder of the runway. The APMS currently identifies these sections as RW1432CT-20 and RW1432CR-10, respectively (visible in **Figures 1.4** and **1.5**). The PCN report assigned section RW1432CT-20 with a PCN of 3/F/D/Y/T and section RW1432CR-10 with a PCN of 5/F/D/X/T. The report's final recommended PCN for Runway 14-32 was 3/F/D/Y/T based on the structural capacity of the weakest pavement section. The report noted that this PCN is insufficient to accommodate some aircraft operating at the Airport. A detailed analysis of runway pavement strength and future requirements will be completed in **Chapter 3 – Facility Requirements.**

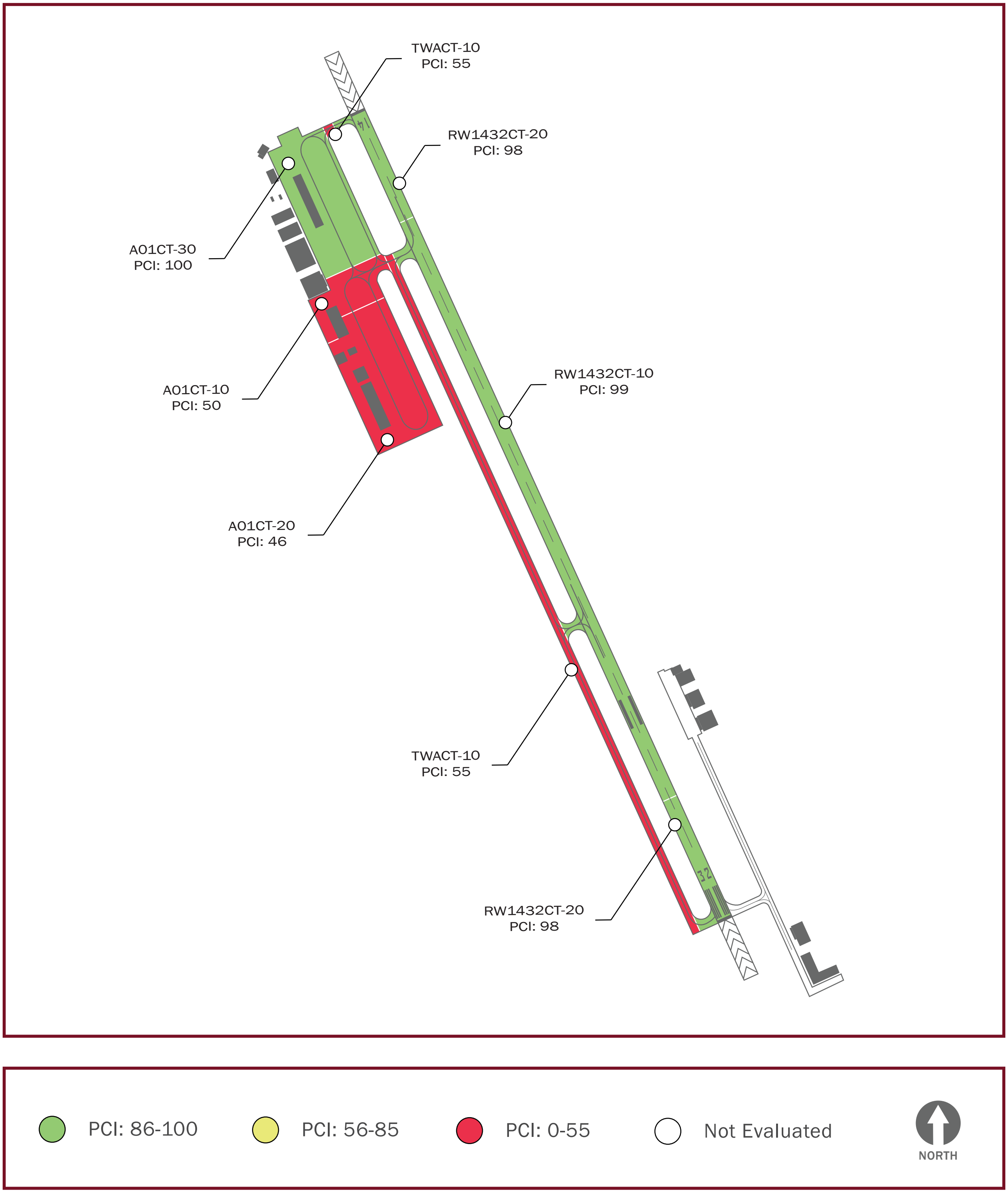
Source: Kimley-Horn

Airfield Pavement Condition

ADOT maintains an online database with pavement condition details for all public-use airports in the state system. Pavement condition is expressed as a numerical rating called Pavement Condition Index (PCI). PCI is calculated based on the distresses observed during condition surveys and is represented by a numerical index between 0 and 100, where 0 is the worst possible condition and 100 is the best possible condition. According to the APMS online database, Cottonwood Municipal Airport was last inspected in 2017. The 2017 PCI values from this inspection are illustrated in **Figure 1.4** and the 2020 forecast PCI values are displayed in **Figure 1.5**.

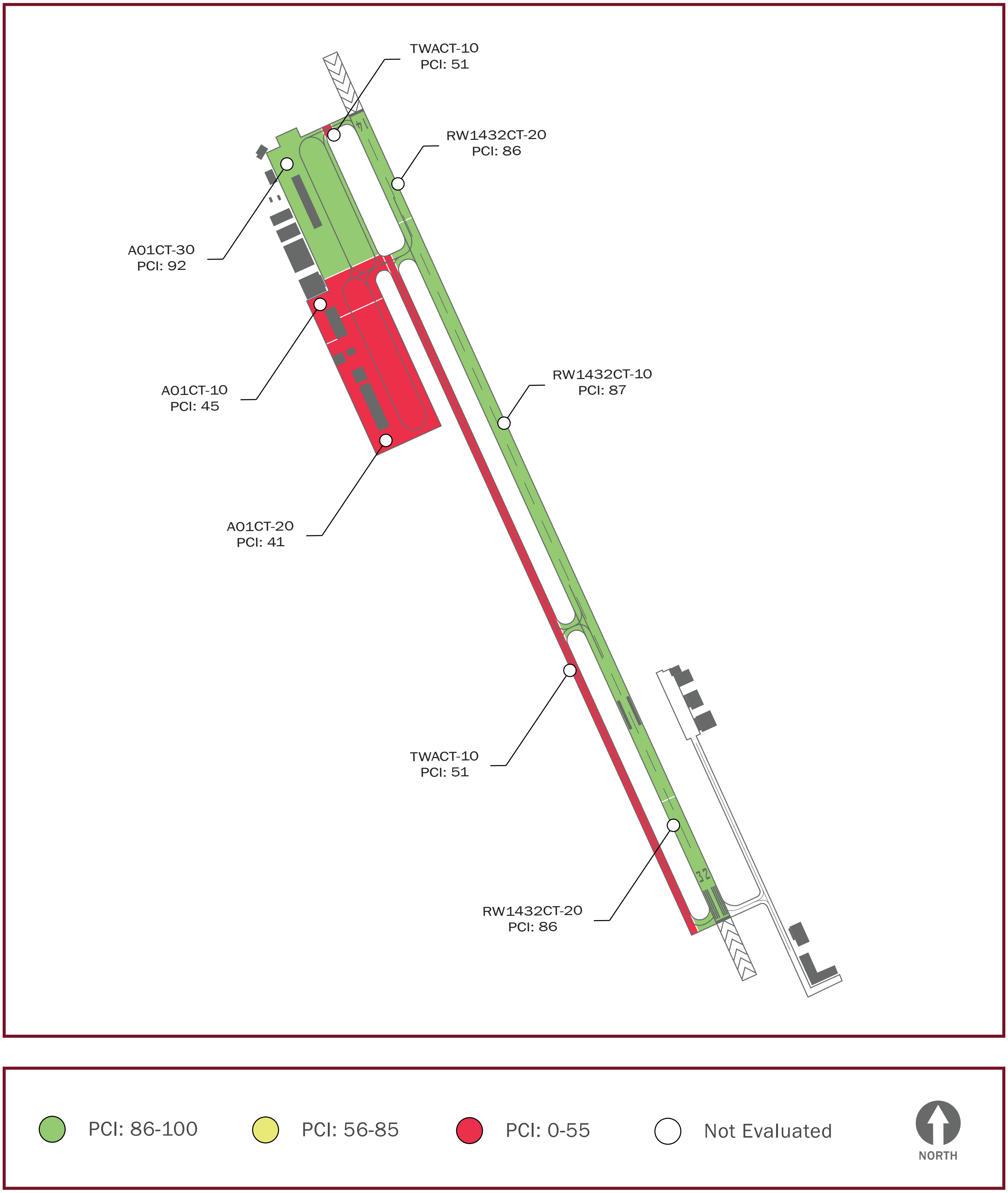
[13] Arizona Department of Transportation, *Arizona Airport Pavement Management System Update*, 2010.
[14] Federal Aviation Administration, Advisory Circular 150/5300-13A, Change 1, *Airport Design*, 2014.

Figure 1.4 - Forecast Pavement Condition Index (2017)



Sources:
Arizona Department of Transportation, Airport Pavement Management System IDEA (accessed April 2020).
Kimley-Horn, 2020.

Figure 1.5 - Forecast Pavement Condition Index (2020)



Sources:
Arizona Department of Transportation, Airport Pavement Management System IDEA (accessed April 2020).
Kimley-Horn, 2020.

Arizona Pavement Preservation Program

In conjunction with the APMS, ADOT established the Arizona Pavement Preservation Program (APPP) to determine necessary projects statewide, develop PCI forecast models, and prioritize project funding accordingly. Two reports are developed and are periodically updated to inform the program's priorities; the Unlimited Budget APPP, which prioritizes projects based on pavement conditions, and the Constrained Budget APPP, which prioritizes projects based on pavement condition *and* pavement use. Both reports were last updated in 2018 for the years 2019 through 2024. As listed in **Table 1.10**, two projects at Cottonwood Municipal Airport are included in the 2019-2024 Unlimited Budget APPP. It should be noted that the 2019 work has not been completed as of April 2020.[15] No projects at Cottonwood Municipal Airport were included in the 2019-2024 Constrained Budget APPP.

Table 1.10 - 2019-2024 Unlimited Budget APPP at Cottonwood Municipal Airport

Year	Location on Airport	Branch and Section ID	Work Type	Estimated Cost
2019	Northern portion of main apron	A01CT-30	P-608 Application	$124,000
2022	Northern portion of main apron	A01CT-30	P-608 Application	$133,000
			Total Estimated Cost	**$257,000**

Source: *Arizona Department of Transportation, Airport Pavement Management System IDEA (accessed April 2020).*

Notes:
Pavement branch and section IDs can be found on the PCI maps in this chapter.
Per FAA Advisory Circular 150/5370-10H, P-608 Application is the FAA's specification for a specialized type of Emulsified Asphalt Seal Coat. Sealcoating is the process of applying a protective coating to asphalt-based pavements to provide a layer of protection from the elements.

1.5.9. Airfield Lighting

Airfield lighting is critical for the safe and efficient operation of aircraft during nighttime and periods of low visibility. At Cottonwood Municipal Airport, Runway 14-32 is equipped with MIRLs to identify the edge of usable pavement. Additionally, both runway ends are equipped with REILs to provide pilots on approach with identification of the runway ends. Taxiway A is not equipped with taxiway edge lighting (reflectors line the taxiway edges) and the terminal and apron areas are lit via area lighting.

1.5.10. Navigational Aids

NAVAIDs are ground-based visual or electronic devices that provide course guidance, altitude information, or weather conditions to pilots. The following NAVAIDs are found at the Airport:

- **Automated Weather Observation System (AWOS):** An AWOS provides continuous, real-time information on airport weather conditions. Located at midfield and immediately south of the segmented circle, the Airport's AWOS is an AWOS III and reports information such as altimeter, wind speed and directions, density altitude, visibility, and precipitation accumulation.[16] According to data from the FAA and National Oceanic and Atmospheric Administration (NOAA), as of April 2020 the Airport's AWOS reporting of inconsistent data has rendered the system inoperable. A new AWOS III is undergoing installation at the Airport; it is anticipated the NAVAID will be functional by early 2022.

[15] Arizona Department of Transportation, Airport Pavement Management System IDEA (accessed April 2020).
[16] Federal Aviation Administration, Surface Weather Observation Stations, 2020.

- **PAPIs:** PAPIs provide guidance information through a combination of lights that help pilots acquire and maintain the correct runway approach. PAPIs consist of fixed boxes with a sequence of two or four lights (two at Cottonwood Municipal Airport) situated on the left side of the runway.
- **REILs:** REILs consist of two synchronized flashing lights positioned on each corner of the runway and provide pilots with identification of the end of the landing threshold. REILs serve as visual NAVAIDs in addition to forms of airfield lighting.
- **Rotating beacon:** Rotating beacons display alternative flashing lights to provide airport identification to pilots at night or during periods of low visibility. Cottonwood Municipal Airport's rotating beacon is located immediately north of the terminal and is mounted on a standalone tower. The beacon is 36 inches in diameter and contains rotating lights projecting alternating green and white beams of light, 180 degrees apart. The beacon operates from sunset to sunrise.

Source: Kimley-Horn

- **Segmented circle with lighted wind indicator / supplemental wind indicator:** A segmented circle is a visual indicator that provides airport traffic pattern information to pilots. Wind indicators, also known as wind socks or wind cones, provide pilots with wind direction and strength prior to takeoff and landing. The Airport's segmented circle indicates a right traffic pattern for Runway 14-32 and is located at midfield, immediately south of the main apron and east of the Experimental Aircraft Association (EAA) building. A lit wind indicator is located at the center of the segmented circle, and a supplemental wind indicator is affixed atop the airfield fence east of Runway 14.

1.5.11. Meteorological Conditions

Climate and meteorological conditions can significantly influence airport operations and planning. This section describes the current meteorological trends and characteristics at Cottonwood Municipal Airport.

Local Climate

Located in north-central Arizona at approximately 3,560 feet MSL, the City of Cottonwood experiences a semi-desert climate that is characterized by variety of weather conditions, including warm summers with temperatures frequently climbing above 100 degrees Fahrenheit, cool winters with temperatures typically falling into the upper twenties in December and January, and moderate humidity.[17] The average annual precipitation for Cottonwood is approximately 12 inches.[18]

As previously noted, a new AWOS is being installed at the Airport, however current on-site weather data is unavailable. Furthermore, the nearest National Weather Service Forecast Office is located in Bellemont, Arizona, approximately 36 miles northwest of the Airport at 7,130 feet MSL and does not accurately represent the conditions in Cottonwood. Therefore, for purposes of this Master Plan Update, the mean

[17] The University of Arizona, *The Soils and Climate of Yavapai County*, 2018.
[18] Arizona State Park website, *Dead Horse Ranch Annual Weather* (accessed April 2020).

maximum temperature (the average daily maximum air temperature) during the hottest month of the year (July) from the Airport's most recent FAA-approved ALP of 98.4 degrees Fahrenheit was used.

Runway Use and Crosswind Coverage

A prevailing wind is one that blows predominately from a specific direction. A runway is ideally oriented when aircraft can take off and land into the wind, increasing aircraft efficiency. Thus, the prevailing wind direction determines the desired alignment and configuration of a runway. Aircraft can only tolerate limited crosswind, a component of wind that blows perpendicular to the runway centerline. According to the FAA, a crosswind runway should be considered when a runway orientation provides less than 95 percent wind coverage for an airport's AAC and ADG.[19] If a runway does not meet this 95 percent coverage, then construction of an additional runway may be advisable. The allowable crosswind component for each AAC/ADG is shown in **Table 1.11**. With an existing ARC of A-I (small), the Airport's runway configuration should provide 95 percent wind coverage for the 10.5-knot crosswind component.

Table 1.11 - Crosswind Components

Allowable Crosswind	Aircraft Approach Category/Airplane Design Group
10.5 knots	A-I & B-I
13 knots	A-II & B-II
16 knots	A-III, B-III & C-I through D-III
20 knots	A-IV through D-VI, E-I through E-VI

Source: *FAA Advisory Circular 150/5300-13A, Change 1, Airport Design, 2014.*

The crosswind coverage of a runway is determined based on historical wind data from the local weather observation station. Because the Airport's AWOS was inoperable as of April 2020, wind data were collected from Sedona Airport's AWOS III P/T, located approximately 16 miles northwest of Cottonwood Municipal Airport, and Ernest A. Love Field's Automated Surface Observing System (ASOS) in Prescott, approximately 23 miles southwest of the Airport. These two locations were utilized for comparison purposes. Using this data, **Table 1.12** shows the calculated wind coverage of Runway 14-32 for the four crosswind components. It should be noted that, per FAA guidelines, this analysis uses the Airport's true runway headings of 155 and 335 degrees. While runway designations represent the magnetic heading when they are created (Runway 14-32 represents the magnetic headings of 140 degrees and 320 degrees, respectively), the Earth's magnetic lines slowly drift over time causing the true runway headings to shift while the runway's name remains.

Based on historical wind data obtained from weather observing stations at airports in Sedona and Prescott, the existing runway orientation at Cottonwood Municipal Airport falls below the FAA's recommendation for the crosswind component of 10.5 knots for all categories *except* the instrument flights rules (IFR) wind component of 10.5 knots at Sedona. According to FAA guidance, a crosswind runway should be considered at the Airport to meet the 95 percent requirement. While runway orientation and crosswind runway alternatives are further analyzed in **Chapter 3 - Facility Requirements** of this Master Plan Update, activation

[19] Federal Aviation Administration, Advisory Circular 150/5300-13A, Change 1, *Airport Design*, 2014.

of the Airport's new AWOS and more accurate wind data are required before a crosswind runway can be considered.

Table 1.12 - Runway 14-32 Crosswind Coverage

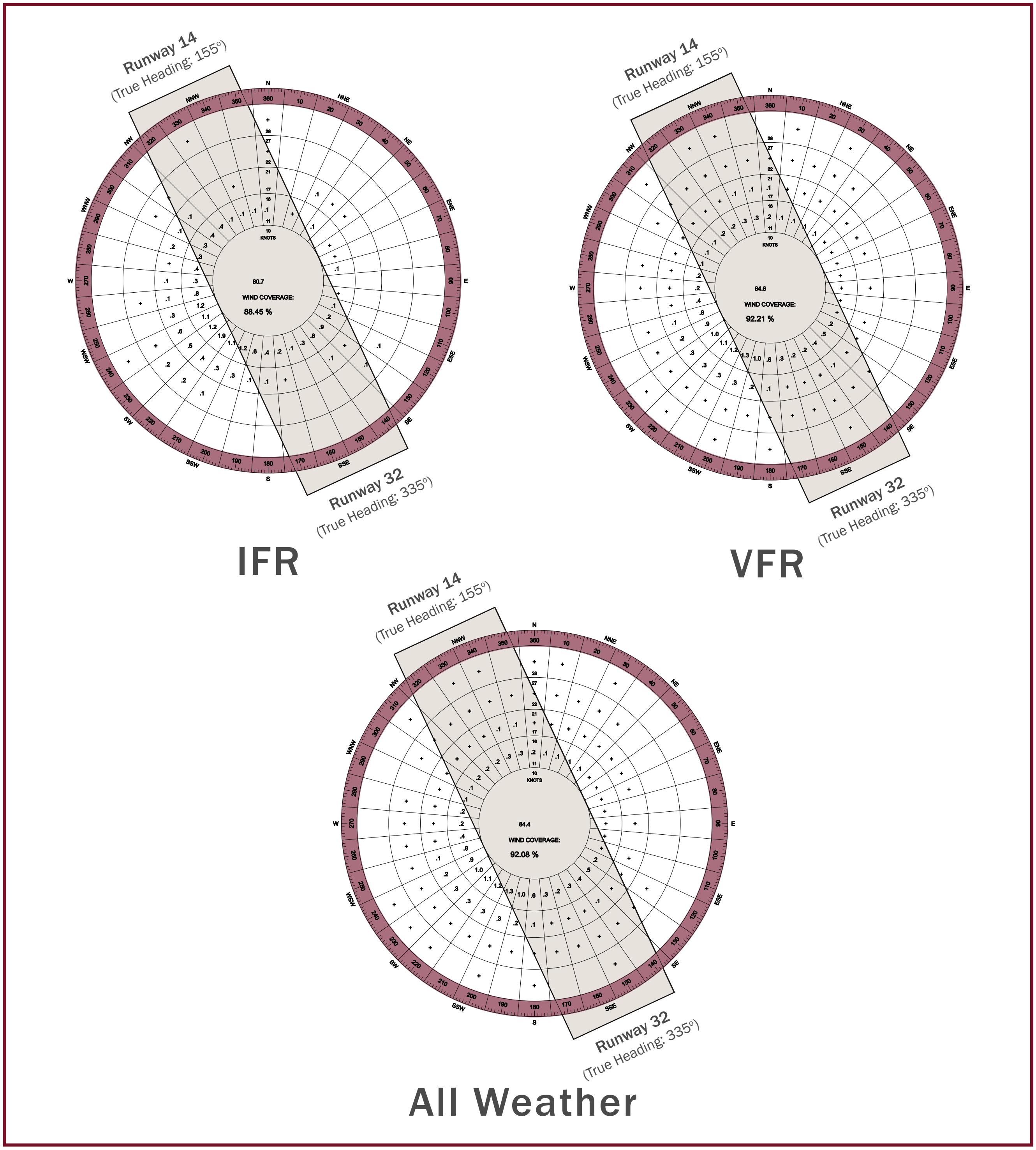
Allowable Crosswind	VFR	IFR	All Weather
Wind Data from Sedona Airport AWOS III P/T			
10.5 knots	89.25%	98.00%	89.51%
13 knots	94.69%	99.04%	94.82%
16 knots	99.28%	99.75%	99.30%
20 knots	99.91%	99.94%	99.91%
Wind Data from Prescott Ernest A. Love Field ASOS			
10.5 knots	92.21%	88.45%	92.08%
13 knots	95.61%	92.84%	95.51%
16 knots	98.60%	97.14%	98.55%
20 knots	99.68%	99.13%	99.66%

Sources:
FAA Wind Rose Generator 2019 (true runway headings of 155º, 335º).
NOAA National Climate Data Center (2010-2019) (244,441 total observations at SEZ; 89,448 total observations at PRC).
Kimley-Horn, 2020.

Notes:
VFR = Visual Flight Rules
IFR = Instrument Flight Rules
AWOS = Automated Weather Observing Systems
ASOS = Automated Surface Observing Systems
Yellow text = wind coverage falls between 94 percent and 95 percent
Red text = wind coverage does not meet the FAA's 95 percent recommendation

The historical wind data for Prescott was also used to generate visual flight rules (VFR), IFR, and all-weather wind roses for 10.5 knots, displayed in **Figure 1.6**. The wind roses for 10.5 knots are included here to correspond with the Airport's existing ARC of A-I (small).

Figure 1.6 - Wind Roses (10.5-knot wind coverage; True runway headings of 155°, 335°)



Sources:
FAA AGIS Wind Analysis Tool.
NOAA National Climate Data Center (2010-2019) (89,448 total observations).
Kimley-Horn, 2020.

Notes:
VFR = Visual Flight Rules
IFR = Instrument Flight Rules
Wind data period is 2009-2019.
Due to the inoperable nature of the AWOS at Cottonwood Municipal Airport, wind data was used from the ASOS at Prescott Ernest A. Love Field.

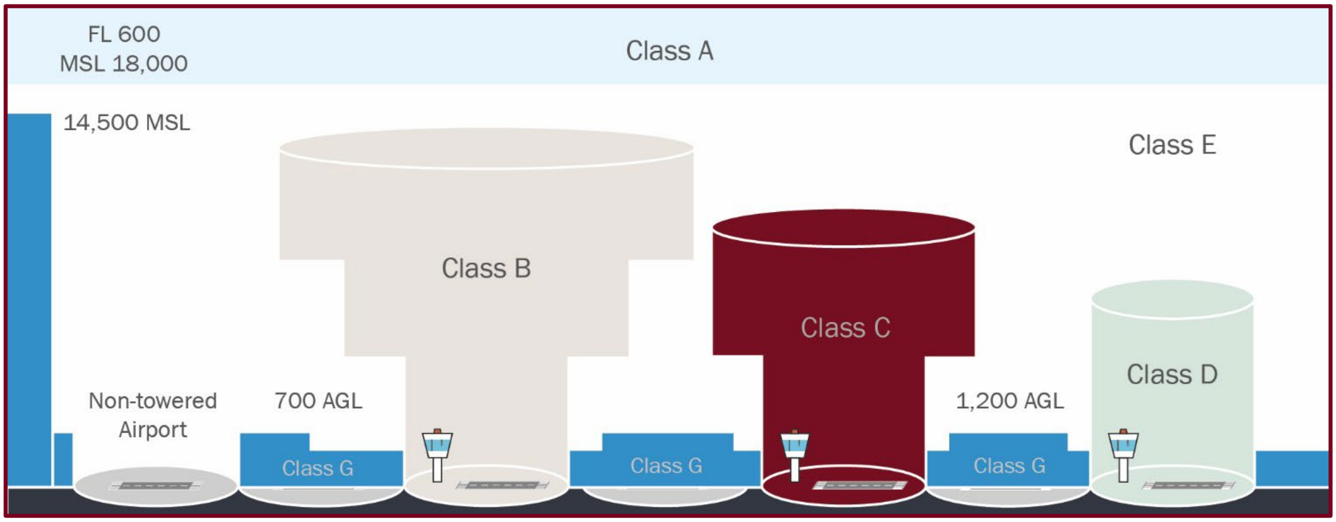
1.6. AIRSPACE

The National Airspace System (NAS) was created by the FAA to create a safe and efficient airspace environment for all aviation operations. The NAS is made up of a network of airport, air navigation, and Air Traffic Control (ATC) facilities and is governed by a set of rules and regulations that allow for the coordination and control of navigable airspace within the U.S. This section describes the surrounding airspace and existing procedures and capabilities at Cottonwood Municipal Airport to determine the airspace's ability to accommodate anticipated demand and traffic patterns throughout the planning horizon.

1.6.1. Airspace Classifications

The NAS consists of various classifications of airspace based on level of service and operating rules. These classifications impose requirements on the operation of aircraft, including visibility minimums, cloud clearance, communication with the ATC, and specific aircraft equipment. As illustrated in **Figure 1.7**, airspace is generally categorized as controlled or uncontrolled and special use or other airspace. Controlled airspace (Classes A, B, C, D, and E) refers to airspace in which ATC services are provided. Uncontrolled airspace (Class G) is airspace in which ATC has no authority or responsibility to control. Special use airspace designates airspace where certain activities occur or where limitations must be imposed. Other airspace refers to the remaining airspace not covered by the aforementioned classifications.[20]

Figure 1.7 - Classifications of Airspace



Sources:
Federal Aviation Administration, Advisory Circular 150/5300-13A, Change 1, Airport Design, 2014.
Kimley-Horn, 2020.

The classifications of airspace and their relation to the Airport are described in **Table 1.13**. Additionally, the VFR sectional chart displaying the Airport and the surrounding airspace is presented in **Figure 1.8.**

[20] Federal Aviation Administration, Pilot's Handbook of Aeronautical Knowledge, 2016.

Table 1.13 - Classifications of Airspace

Airspace Class	Description	Relation to Cottonwood Municipal Airport
Controlled Airspace		
Class A	Airspace generally from 18,000 feet MSL up to and including flight level (FL) 600 (60,000 feet MSL). Unless otherwise authorized, all operations within Class A airspace are conducted under IFR.	All Class A airspace above the Airport is controlled by the Albuquerque Air Route Traffic Control Center.
Class B	Airspace generally from the surface to 10,000 feet MSL surrounding major commercial airports. To enter this airspace, communication and/or clearances must be received from ATC.	The nearest Class B airspace to the Airport surrounds Phoenix Sky Harbor, approximately 55 NM southwest of the Airport.
Class C	Airspace generally from the surface to 4,000 feet AGL surrounding medium-sized commercial airports. Class C airspace typically consists of a surface area with a five-NM radius and an outer circle with a ten-NM radius that extents from 1,200 feet to 4,000 feet AGL. Aircraft must establish two-way radio communications with the ATC prior to entering this airspace.	There is no Class C airspace within the vicinity of the Airport. The nearest Class C airspace surrounds Tucson International, approximately 165 NM southeast of the Airport.
Class D	Airspace generally from the surface to 2,500 feet AGL surrounding all other airports that have an airport traffic control tower (ATCT). Class D airspace typically contains a horizontal radius of 5 NM from an airport, extending from the surface up to a designated vertical limit above the airport. Aircraft must establish two-way radio communications with the ATC prior to entering this airspace.	The nearest Class D airspace to the Airport surrounds Prescott's Ernest A. Love Field and Flagstaff Pulliam Airport.
Class E	General controlled airspace not classified as Class A, B, C, or D. This airspace typically begins at 1,200 feet AGL and extents up to, but does not include, 18,000 feet MSL. However, where specified, Class E airspace can begin at 700 feet AGL.	Class E airspace begins 700 feet above the Airport where Class G airspace ends. All local flights will enter the Class E airspace that surrounds the Verde Valley.
Uncontrolled Airspace		
Class G	The remaining airspace is considered uncontrolled. Class G airspace lies between the surface and the overlaying Class E airspace (700 to 1,200 feet AGL). Although ATC does not control this airspace, VFR rules still apply.	The Airport lies within Class G airspace. The Class G airspace at the Airport extends from the surface up to 700 feet AGL where it abuts Class E airspace.

Airspace Class	Description	Relation to Cottonwood Municipal Airport
Special Use Airspace		
Military Operations Areas (MOAs)	MOAs consist of airspace with defined limits established for the purpose of separating military training activities from IFR traffic.	MOAs in the vicinity of the Airport include the Bagdad 1 MOA and the Gladden 1 MOA, each located approximately 50 NM southwest of the Airport.
Alert Areas	Alert areas contain high volumes of pilot training or an unusual type of aerial activity.	The A-231 Alert Area is located approximately 60 NM southwest of the Airport and is noted on the sectional chart for containing a concentration of student jet transition training.
Grand Canyon Special Flight Rules Area	This special airspace area is designated by the FAA to promote safe aircraft operations and navigation for VFR aircraft within the Grand Canyon National Park. These flight rules apply to all aircraft operations below 14,500 feet MSL and include restricted zones, flight corridors, special communication frequencies, and VFR checkpoints.	The Grand Canyon Special Flight Rules Area is located approximately 83 NM north of the Airport.
Other Airspace		
Special Conservation Areas	In these areas, pilots are requested to maintain a minimum altitude of 2,000 feet AGL.	Several special conservation areas surround the Airport, including the Verde Valley Bald Eagle Breeding Area, the Woodchute Wilderness Area, the Sycamore Canyon Wilderness Area, and the Munds Mountain Wilderness Area.
Military Training Routes (MTRs)	MTRs are routes used by military aircraft to maintain proficiency in tactical flying. These routes are generally established below 10,000 feet MSL for operations at speeds in excess of 250 knots.	Numerous MTRs are present west of the Airport and are associated with the area's MOAs.

Sources:
FAA, Pilot's Handbook of Aeronautical Knowledge, 2016.
FAA, VFR Sectional Aeronautical Charts (accessed April 2020).

Notes:
IFR = Instrument Flight Rules
VFR = Visual Flight Rules
NM = Nautical miles
AGL = Above ground level
ATCT = Airport traffic control tower
MSL = Mean sea level

Figure 1.8 - VFR Sectional Aeronautical Chart

Sources:
FAA National Aeronautical Charting Office (accessed April 2020).
Kimley-Horn, 2020.

Note: A full VFR sectional chart legend can be found on the FAA's VFR Charts website: https://www.faa.gov/air_traffic/flight_info/aeronav/digital_products/vfr/

1.6.2. Standard Operating Procedures

Standard operating procedures govern the movement of arriving and departing aircraft in the vicinity of an airport. These procedures increase airspace safety and efficiency and ensure the orderly flow of traffic. The majority of aircraft operations at the Airport are conducted under VFR. Unlike aircraft operating under IFR where ATC is responsible for separation from other aircraft and obstacles, aircraft operating under VFR are responsible for maintaining separation from other aircraft and obstacles themselves.

Standard Arrival Procedures

For arriving aircraft, the Airport utilizes a left-hand rectangular traffic pattern for Runway 14 and a right-hand rectangular pattern for Runway 32.[21] Arriving aircraft must utilize the standard traffic pattern entry procedures for an uncontrolled airport. Traffic pattern altitudes are 4,050 feet MSL (500 feet AGL) for helicopters, 4,350 feet MSL (800 feet AGL) for single-engine aircraft, 4,550 feet MSL (1,000 feet AGL) for multi-engine aircraft, and 5,050 feet MSL (1,500 feet AGL) for turbine aircraft.

Standard Departure Procedures

Aircraft departing the Airport via Runway 14 are requested to maintain the runway heading for 1 nautical mile (NM) beyond the runway's departure end and reach 500 feet AGL before turning.[22] Aircraft departing via Runway 32 are requested to maintain the runway heading for 0.6 NM beyond the runway's departure end and reach 500 feet AGL before turning.

1.6.3. Instrument Flight Procedures

As previously described, VFR and IFR present two unique sets of criteria, procedures, and guidelines under which pilots operate. Instrument flight procedures aid pilots flying under IFR in determining their position, navigating between points, and approaching and departing an airport. This section describes existing procedures at Cottonwood Municipal Airport.

Instrument Approach Procedures

Under VFR conditions, pilots may approach an airport using visual cues. IFR conditions occur when cloud ceilings are lower than 1,000 feet AGL and visibility becomes less than 3 statute miles. Under these conditions, only properly trained pilots with adequately equipped aircraft are permitted to fly and must follow FAA-published instrument approach procedures. Cottonwood Municipal Airport is served by one Standard Instrument Approach Procedure (SIAP), an Area Navigation (RNAV) Global Positioning System (GPS) that is aligned with Runway 32. The approach has a descent path of 3.60 degrees and supports AAC A through C. The RNAV GPS Runway 32 SIAP includes a Lateral Navigation (LNAV) approach—a nonprecision approach that uses a minimum decent altitude and does not provide vertical guidance—and a Circling approach, used to align an aircraft with a runway when a straight-in landing is not possible.

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[21] City of Cottonwood, Cottonwood Municipal Airport Operating Rules, 2010.

[22] Federal Aviation Administration, Airport Data and Information Portal (accessed April 2020).

Instrument Departure Procedures

Instrument departure procedures are preplanned IFR procedures that provide obstruction clearance from the airport area to the en route structure of the flight. Cottonwood Municipal Airport is served by one published Obstacle Departure Procedure (ODP). ODPs are designed to use the least restrictive route of flight while avoiding obstructions in the area. The Airport's ODP, named MINGY ONE, helps pilots taking off on Runway 14 to avoid obstacles including utility lines, vehicles on Mingus Avenue, trees, and buildings. Similarly, MINGY ONE helps pilots taking off on Runway 32 avoid obstacles including a utility box, fencing, buildings, trees, and poles.

1.6.4. Noise Abatement

The Airport's noise abatement procedures were updated in 2019. According to Airport and City officials, the increased noise was not a result of local aircraft traffic, but likely from an increase in training flights that originated at neighboring Ernest A. Love Field in Prescott. The Airport's Noise Action Plan designates Runway 32 as the "calm wind" runway to encourage pilots to take off to the north given the residential communities within close proximity of Runway 14's departure end. The Noise Action Plan also prompted the placement of signage throughout the Airport to remind pilots of the appropriate noise abatement procedures. Additionally, standard arrival and departure procedures were enacted at the Airport to avoid continuous aircraft overflight of local residential land uses, as previously discussed. The Airport also discourages touch-and-go activity from occurring 30 minutes before sunset and 30 minutes after dawn, which varies depending on the time of year.[23]

1.7. LANDSIDE FACILITIES

Landside facilities support aircraft maintenance, surface transportation, pilots, passengers, employees, and cargo. This section describes the major landside facilities and tenants at Cottonwood Municipal Airport.

1.7.1. Terminal Building

The Airport's terminal building is located on the northwest side of the property near the intersection of Mingus Avenue and the Airport's access road. The approximately 1,600-square-foot terminal building includes areas dedicated for Airport administration, flight planning, restroom facilities, and other GA services.

1.7.2. Flight Instruction

Leighnor Aircraft provides rental aircraft and flight training to the general public at Cottonwood Municipal Airport. The company operates out of hangar #3, an approximately 10,000 square-foot facility located at the southern terminus of Airpark Road on the southeast portion of the Airport. Leighnor Aircraft employs three instructors at their Cottonwood location and offers flight training to local and visiting student pilots. The EAA Chapter 952 Verde Valley also hosts periodic events at the Airport that offer discovery flights and flight instruction opportunities to aspiring pilots via scholarships for youth.

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[23] Federal Aviation Administration, Airport Data and Information Portal (accessed April 2020).

1.7.3. Cottonwood Airpark

Cottonwood Airpark is an on-Airport industrial/commercial park located east of Runway 14-32 along Airpark Road. The property is owned by the City of Cottonwood and leased to various tenants. Cottonwood Airpark, Inc. is the primary lease holder of this land, managing and subleasing the property on behalf of the City. As of April 2020, Cottonwood Airpark is home to businesses offering a wide variety of products and services, including commercial cleaning services, metal materials and supplies sales, event and party rentals, automobile parts sales and services, health and beauty product sales, gymnastics training, and veterinary services. Aviation tenants located in the Airpark provide aircraft access via a private, secure taxilane that is fenced off from the airfield operating area.

1.8. SUPPORT FACILITIES

Airport support facilities are critical to meeting the needs of aircraft and Airport users. This section describes the support facilities and infrastructure at Cottonwood Municipal Airport, including aircraft fuel storage, utility systems, emergency services, and Airport security.

1.8.1. Fuel Facilities

There are two aircraft fuel facilities at the Airport. One facility is located on the south portion of the main apron between the six-unit t-hangar and the conventional hangar. This aboveground fuel storage and dispensing facility consists of two 10,000-gallon tanks: one contains 100LL AvGas and is owned by the City of Cottonwood; the second contains Jet A fuel and is privately owned but is periodically made available for public use. This facility's fuel sales between Fiscal Years 2015 and 2019 are presented in **Table 1.14**. In July 2020 the Airport was notified by the FAA that the privately-owned fuel tank was out of compliance and must be removed. At the time of writing, the Airport is in the process of mitigating the noncompliant fuel tank via relocation. The second fueling facility is located outside of the airfield fence in the northwest corner of the north private apron. This aboveground facility is reserved for tenants of the hangar.

Table 1.14 - Main Apron Fuel Facility Sales

Fiscal Year*	Fuel Gallons Sold	Fuel Sales
2015	43,336.67	$202,400.02
2016	72,595.11	$279,477.43
2017	64,392.25	$258,129.75
2018	69,239.56	$296,046.60
2019	62,927.64	$251,710.56
Total	**312,491.23**	**$1,287,764.36**

Sources:
Cottonwood Municipal Airport Management.
Wiseman Aviation.

Note: ** = City of Cottonwood fiscal year is July – June.*

1.8.2. Wash Rack

Wash racks are designated areas for the cleaning of aircraft that are designed to reduce or eliminate negative impacts to the environment. The Airport's wash rack is located on the south portion of the main apron and adjacent to the fueling facility. The wash rack is uncovered and encompasses approximately 2,500 square feet.

1.8.3. Airport Maintenance

The City of Cottonwood is responsible for upkeep and maintenance of the Airport. While there is no dedicated maintenance facility on Airport property, the City's Public Works facility is located approximately one quarter of a mile southwest of the Airport on Mingus Avenue. City staff representing the Public Works department provide airport maintenance on an as-needed basis.

1.8.4. Aircraft Rescue and Firefighting

Title 14 Code of Federal Regulations Part 139 (14 CFR Part 139) mandates that airports with scheduled or unscheduled air carrier aircraft with more than 30 seats, or those that serve scheduled air carrier aircraft containing 9 to 31 seats, must provide on-airport aircraft rescue and firefighting (ARFF) equipment and services during operations.[24] Since Cottonwood Municipal Airport's existing operations do not include these services, the Airport is not Part-139 certified and on-airport ARFF equipment is not required. The City of Cottonwood Fire and Medical Department provides emergency services to the Airport. The Department's facility is located approximately 0.9 miles east of the Airport near the intersection of 6th Street and Aspen Street.

1.8.5. Airport Emergency Plan

The City completed an Airport Emergency Plan in 2011 that addresses various potential emergency events at Cottonwood Municipal Airport, including aircraft accidents, structural fires, terrorist threats, and hazardous material spills. Following the guidance of several FAA advisory circulars, the Airport Emergency Plan outlines general response plans to mitigate further harm and damage and delineates the roles and responsibilities of the departments, agencies, and organizations that may contribute to an emergency response. The plan is reviewed and revised, if necessary, on an annual basis.[25]

1.8.6. Airport Fencing and Security

The airfield is completely enclosed by a chain link fence that varies in height from four to six feet. There are six gates along the fence's perimeter, including one security gate southwest of the terminal that provides vehicle access to the Airport's hangars, one security gate northeast of the terminal that provides vehicle access to the main apron, and four security gates near the private hangars on the southeast portion of Airport property. Additionally, one gate provides access between the southeast taxilane and Runway 14-32. All gates are maintained by the Airport and are controlled by either the Airport or adjacent tenants. Gates are kept

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[24] Federal Aviation Administration, Airport Safety, 2020.
[25] City of Cottonwood, *Airport Emergency Plan*, 2011.

closed and locked when not in use and airfield access is available via key cards through all security gates except for the gate to the east hangars which may be opened via remote control.

1.8.7. Utility Infrastructure

Major utilities serving the Airport include water, sanitary sewer, electricity, and natural gas. The Airport is served by the following utility providers:

- **Water:** City of Cottonwood
- **Sanitary sewer:** City of Cottonwood
- **Electrical service:** Arizona Public Service Electric
- **Natural gas:** UniSource Energy

1.9. LAND USE AND ZONING

Land use and zoning near an airport can have significant impacts on airport operations and growth. This section provides an overview of the current land uses and zoning in the vicinity of Cottonwood Municipal Airport and their implications for airport development.

1.9.1. Existing Land Use

According to the FAA, land use compatibility near an airport is focused primarily on noise levels in the community and the safety of persons and property both on the ground and in the air.[26] Generally, land uses such as industrial or commercial are considered to be compatible with aviation-related operations while residential and institutional land uses (e.g., schools, hospitals, churches) are considered to be non-compatible. The areas immediately north, south, and east of Cottonwood Municipal Airport are heavily developed with residential, industrial, and commercial land uses. West of the Airport are light industrial, commercial, and residential land uses as well as large tracts of undeveloped land. Existing land uses in the vicinity of the Airport are displayed in **Figure 1.9** and additional details are provided below.

- **Northern Airport Vicinity:** The Airport owns a large tract of land between Mingus Avenue and West Black Hills Drive to control the land that falls within the Runway 14 approach RPZ. An industrial park and a few commercial land uses reside northeast of the Airport, and the Black Hills Estates community is located northwest of the Airport in the Town of Clarkdale.
- **Southern Airport Vicinity:** Similar to the Airport's northern boundary, the Airport owns land south of Runway 32 to control areas within the RPZ. Land uses south of the Airport are predominantly residential and include the Mesquite Springs Subdivision and the Verde Village (Unit 8) community, with both communities extending south into unincorporated Yavapai County.
- **Eastern Airport Vicinity:** Immediately east of the Airport, along Airpark Road, is the Cottonwood Airpark and other commercial and industrial land uses. The City owns and leases facilities in the

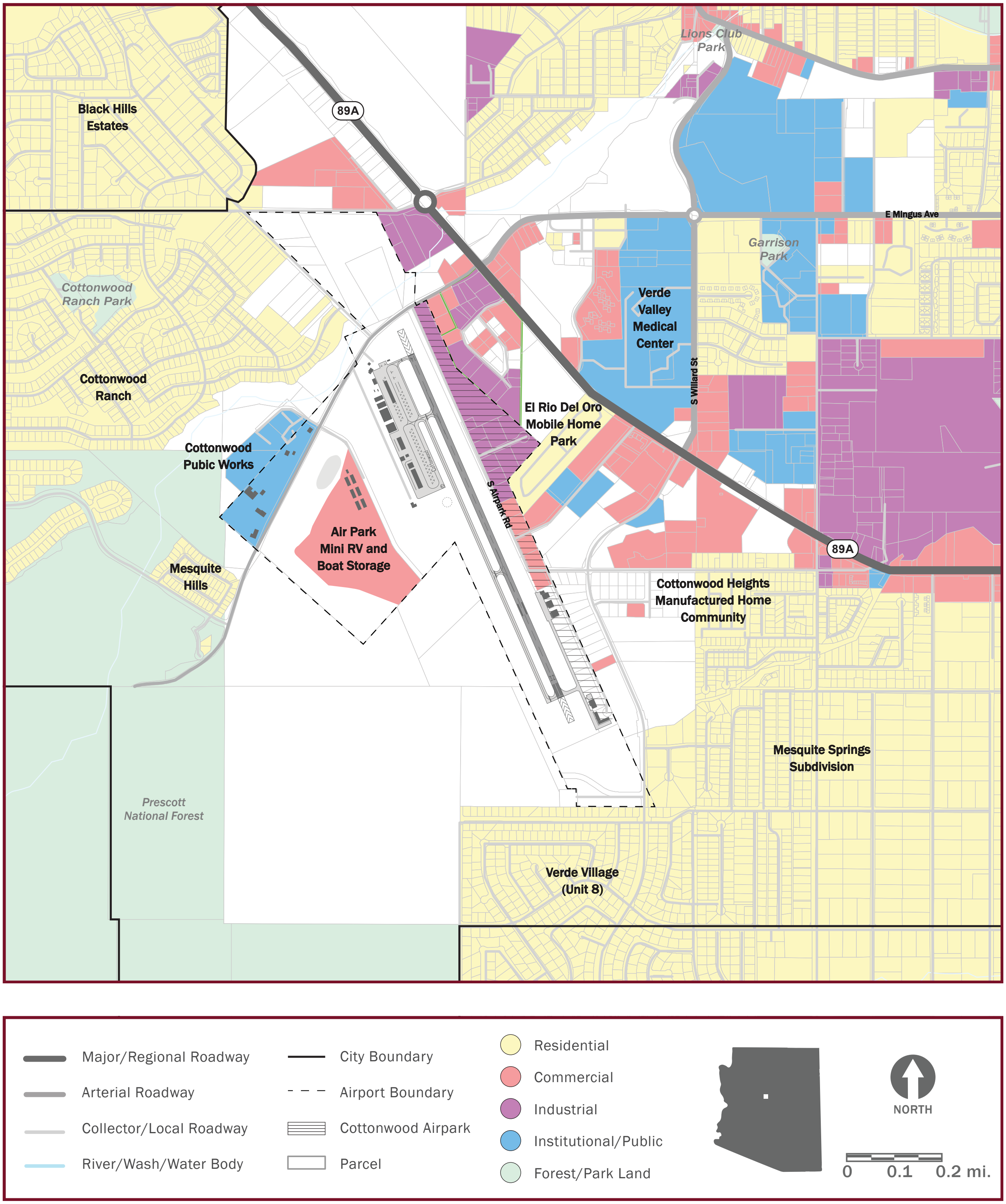
[26] Federal Aviation Administration, Order 1050.1F *Environmental Impacts: Policies and Procedures*, 2015.

Cottonwood Airpark. Between the Airport and State Route 89A are the El Rio Del Oro and Cottonwood Heights mobile home parks as well as various commercial businesses. East of State Route 89A is a combination of commercial, industrial, and residential land uses, including the Verde Valley Medical Center.

- **Western Airport Vicinity:** West of the airfield, the Air Park Mini RV & Boat storage facility and the City of Cottonwood Public Works facility are both located on Airport property. Additionally, the Cottonwood Ranch community is located approximately 500 feet northwest of the Airport's terminal and immediately west of the Runway 14 RPZ. Further west, the Mesquite Hills community is located adjacent to the Public Works facility and borders the Prescott National Forrest. There is undeveloped land between the Airport and Prescott National Forest.

Although much of the existing development near the Airport is residential, which is generally considered to be non-compatible with aviation-related operations, most of this development is outside of aircraft flight paths. According to the Airport's 2019 noise contours, only five mobile homes in the El Rio Del Oro Mobile Home Park were located within noise-impacted areas. New noise contours have been developed as a part of this Master Plan Update and should be incorporated into the City's future land use planning as appropriate.

Figure 1.9 - Existing Land Use Map



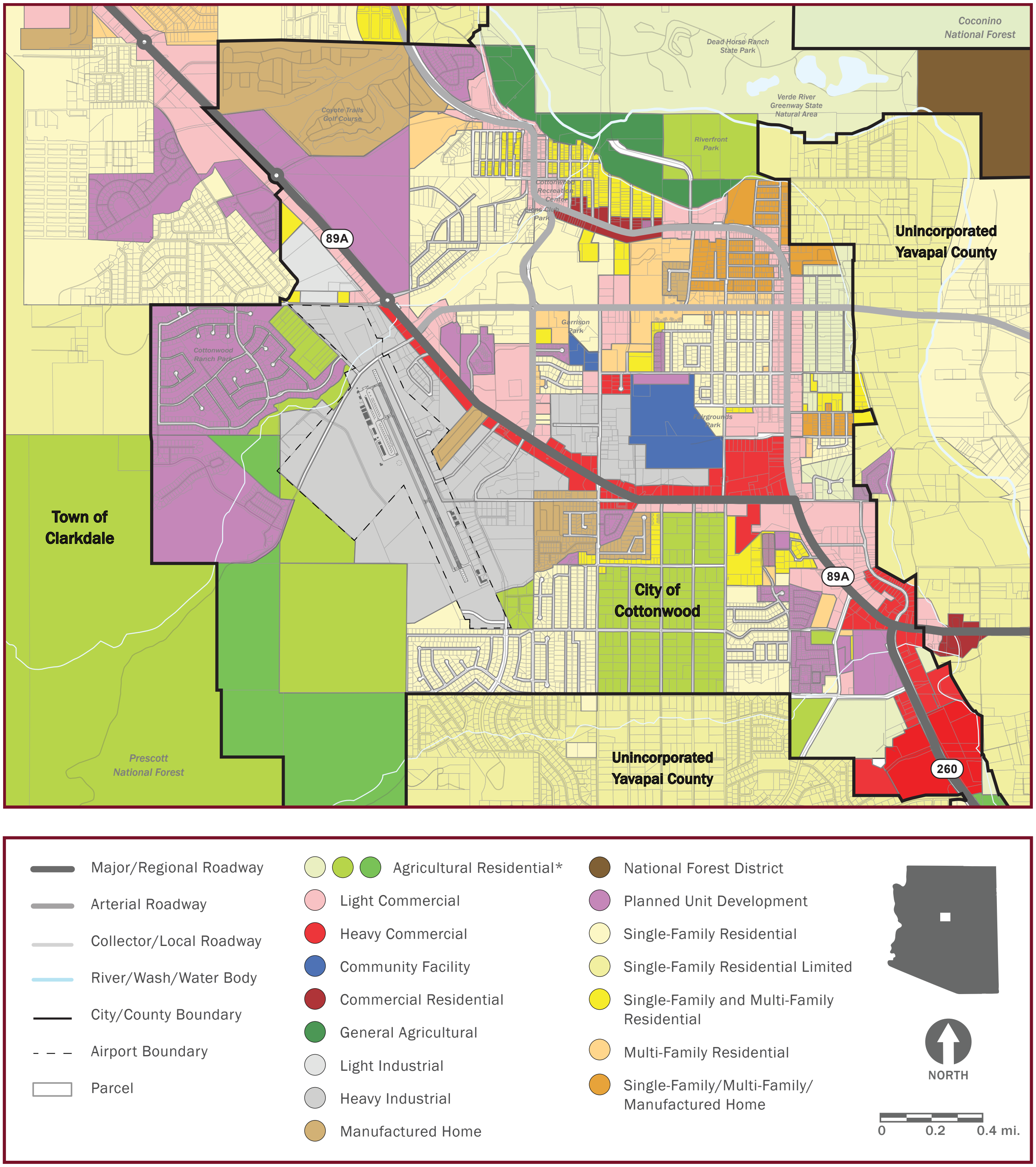
Sources:
Google Earth (accessed April 2020).
Esri (accessed April 2020).
Kimley-Horn, 2020.

1.9.2. Zoning

Zoning is the division of an area into districts for the primary purpose of regulating the use of land to promote public health, safety, and general welfare. Zoning in the jurisdictions surrounding the Airport—including the City of Cottonwood, the Town of Clarkdale, and unincorporated Yavapai County—is shown in **Figure 1.10**. Under the City of Cottonwood Zoning Ordinance, Cottonwood Municipal Airport and the majority of land immediately east of the Airport are zoned as Heavy Industrial.[27] Excluding parcels located along State Route 89A that are zoned for commercial use, the land immediately surrounding the Airport is predominately zoned for various residential uses, including single-family residential, multiple-family residential, agricultural residential, manufactured home, and planned unit development. Further west and north, land within the corporate limits of the Town of Clarkdale is zoned for various residential uses. Further east and south, land within unincorporated Yavapai County is zoned almost exclusively for single-family residential use.

[27] City of Cottonwood Zoning Ordinance (accessed April 2020).

Figure 1.10 - Zoning Map (City of Cottonwood, Town of Clarkdale, Unincorporated Yavapai County)



Sources:
City of Cottonwood, Official Zoning Map (accessed April 2020).
Town of Clarkdale, Zoning Map (accessed April 2020).
Yavapai County, Interactive Zoning Map (accessed April 2020).
Kimley-Horn, 2020

Notes:
** = The City of Cottonwood Zoning Ordinance includes three classifications of Agricultural Residential zoning districts.*
For comparison, the zoning districts for the City of Cottonwood, the Town of Clarkdale, and Yavapai County were consolidated into categories based on similar zoning.

1.9.3. Land Use Planning

Land use planning at and around an airport ensures that new and existing development is compatible with aviation-related activities in relation to both safety and noise concerns. In 2014, the City of Cottonwood adopted the Cottonwood General Plan 2025, a document that outlines the City's vision for future growth and development. The General Plan recognizes the importance of the Airport to the local and regional economies. It includes guidelines to encourage new business in the area and to ensure neighboring development does not adversely impact the long-term economic viability and potential growth of the Airport and surrounding areas. The General Plan groups the Airport with the West Side Planning Area, which includes the Cottonwood Ranch and Mesquite Hills planned communities and approximately 482 acres of undeveloped ranch properties west of the Airport.[28] The General Plan identifies these undeveloped properties as potential future residential land uses but acknowledges the need for sound attenuation measures for any new residential development.

1.10. SURFACE TRANSPORTATION

Cottonwood Municipal Airport is served by a network of on-Airport, access, and regional roadways that connect the Airport to the surrounding communities. **Figure 1.11** illustrates the roadways in the vicinity of the Airport. This section describes the transportation facilities near the Airport and the related municipal transportation planning efforts.

[28] City of Cottonwood, Cottonwood General Plan 2025, 2014.

Figure 1.11 - Regional and Local Roadways

Sources:
City of Cottonwood, Cottonwood General Plan 2025
Esri (accessed April 2020).
Kimley-Horn, 2020.

1.10.1. Major and Regional Roadways

Major and regional roadways include freeways, highways, and arterials that serve multiple communities and accommodate large volumes of traffic. These roadways provide access to the Airport but are principally used for non-Airport purposes. The regional roadways near Cottonwood Municipal Airport are summarized below.

- **Interstate 17:** Interstate 17 is a major north-south Interstate highway located approximately 12 miles southwest of the Airport. Interstate 17 is entirely located within the State of Arizona, running between Interstate 10 in Phoenix and Interstate 40 in Flagstaff. The City of Cottonwood and the Airport are connected to Interstate 17 via State Route 260. For reference, Interstate 17 is displayed on the inset map in **Figure 1.11**.
- **State Route 89A:** State Route 89A is a major north-south arterial located east of the Airport. State Road 89A runs between State Route 89 in Prescott and Interstate 17 in Flagstaff. The undivided route varies between two and four lanes, with four lanes near the Airport. The Airport may be accessed from State Route 89A via Mingus Avenue and Willard Street.
- **State Route 260:** State Route 260 is a major east-west arterial located southeast of the Airport that connects State Route 89A in Cottonwood to U.S. Route 191 in Eager. The undivided route varies between two and four lanes, with four lanes near the Airport. State Route 260 also connects the City of Cottonwood and the Airport to Interstate 17.

1.10.2. Local and Airport Access Roadways

Collector, local, and airport access roadways serve as the landside interface between the regional roadway system and the Airport's terminal and facilities. The following provides a summary of the pertinent local and access roadways in the vicinity of Cottonwood Municipal Airport.

- **6th Street:** 6th Street is a north-south, two-lane collector road located east of the Airport. The roadway is located entirely within the City of Cottonwood and runs from Mingus Avenue in the north to its southern terminus at Fir Street. 6th Street connects the residential communities southwest of the Airport to State Route 89A, Mingus Avenue, and the Airport.
- **12th Street:** Located east of the Airport, 12th Street is a north-south, two-lane collector road that runs parallel to 6th Street. The roadway connects Main Street in the north and Fir Street in the south and connects residential communities and commercial businesses in Cottonwood with State Route 89A, Mingus Avenue, and the Airport.
- **Airpark Road:** Airpark Road is located immediately east of the Airport and runs parallel to Runway 14-32. The two-lane, unmarked road provides access to the businesses in the Mingus Industrial Park, the Cottonwood Airpark, and the Cottonwood Business Park as well as the private hangars on the southeast portion of the Airport.

- **Cottonwood Street:** Cottonwood Street is an east-west, two-lane local road that connects State Route 89A with Airpark Road. The roadway services various residential and commercial land uses east of the Airport.
- **Fir Street:** Fir Street is an east-west, two-lane collector road located southwest of the Airport. The roadway runs from State Route 206 in the east to Chuckawalla Street to the west. Fir Street runs along the City of Cottonwood boundary and serves the area's residential communities, commercial businesses, and Mingus Union High School.
- **Main Street:** Main Street is a north-south, four-lane arterial road located east of the Airport. The undivided roadway runs from its southern terminus at Camino Real in the City of Cottonwood to Cement Plant Road in the Town of Clarkdale. The roadway's designation changes from Main Street to South Broadway at Hogan Drive and continues north until Main Street curves to the west toward its northern terminus. Main Street primarily serves residential and commercial uses east of the Airport.
- **Mingus Avenue:** Mingus Avenue is an east-west, two-lane arterial roadway that intersects the Airport's boundary north of Runway 14 and provides primary access to the Airport's terminal and facilities. The roadway runs from State Route 89A in the east and turns into an unpaved road southeast of Mesquite Hills Drive, meeting its western terminus shortly thereafter. In the City of Cottonwood, Mingus Avenue serves residential, commercial, and industrial land uses northeast of the Airport.
- **Willard Street:** Willard Street is a north-south arterial roadway located east of the Airport. The roadway runs from its northern terminus at Main Street to its southern terminus at West Mesquite Drive. Willard Street intersects three regional roadways in Cottonwood—Main Street, Mingus Avenue, and State Route 89A—and serves numerous commercial and residential land uses east and south of the Airport.

1.10.3. Transportation Planning

With a collection of federal, state, and local roadways, transportation planning in the vicinity of the Airport requires close coordination of various stakeholders, including local jurisdictions, regional agencies, and the general public. At the regional level, Yavapai County, the Verde Valley Transportation Planning Organization, and ADOT published the Verde Valley Master Transportation Plan in 2016. Similar to a comprehensive plan, this plan presents a cohesive, long-term guide to future development and transportation improvements within the Verde Valley and identifies specific projects to improve the transportation system. **Table 1.15** highlights the projects within the Verde Valley Master Transportation Plan that are near the Airport. While no specific timeline is given, all projects near the Airport are listed in the Verde Valley Master Transportation Plan as "near-term" projects, or those that address the most critical needs and deficiencies and have a reasonable potential for obtaining funding.

Table 1.15 - Verde Valley Master Transportation Plan Projects near Cottonwood Municipal Airport

Project ID	Project Location	Project Description	Estimated Cost
N-6	SR 89A / SR 260	Conduct a traffic study to evaluate performance and operation of intersection.	$75,000
N-8	SR 260 / Fir Street	Conduct a traffic study to evaluate performance and operation of intersection.	$30,000
N-16	SR 89A: Mingus Avenue to SR 260	Conduct an access management assessment to identify improvement scenarios.	$50,000
N-24	SR 89A: 6th Street	Major pavement rehabilitation.	$1,881,000
N-30.1	Broadway: 0.5mi west of Bill Gray Road to SR 89A	Major pavement rehabilitation.	$4,250,000*
N-30.2	Mingus Avenue: SR 89A to 18th Street	Major pavement rehabilitation.	
N-30.2	Black Hills Drive: SR 89A to 0.9mi west of SR 89A	Major pavement rehabilitation.	
N-30.4	Fir Street: Chuckwalla Street to Willard Street	Major pavement rehabilitation.	
N-30.5	Willard Street: SR 89A to Mingus Avenue	Major pavement rehabilitation.	
N-30.6	Old State Highway 279: Rio Mesa Trail to Ogden Ranch Road	Major pavement rehabilitation.	
N-35	Broadway: Main Street (Cottonwood) to Main Street (Clarkdale)	Upgrade to major collector with bike lanes and sidewalks in both directions. Install center turn lane or median with left-turn pockets where feasible.	$332,800
N-36	West Loop Phase 1: Black Hills Drive to Fir Street	Construct two-lane minor collector with bike lanes and sidewalks in both directions. Install center turn lane or median with left-turn pockets where feasible. Extend Black Hills Drive and Mingus Avenue to connect with West Loop Road.	$4,294,500
N-37	Groseta Ranch Road: SR 89A to North Main Street	Pave roadway to be a two-lane minor collector with bike lanes and sidewalks in both directions. Install center turn lane or median with left-turn pockets where feasible.	$3,676,500
N-38	Mingus Avenue: North Main Street to Willard Street	Upgrade roadway to an arterial with bike lanes and sidewalks in both directions. Install center turn lane or median with left-turn pockets where feasible.	$128,000
N-39	Main Street: SR 89A to Mingus Avenue	Upgrade roadway to an arterial with bike lanes and sidewalks in both directions. Install center turn lane or median with left-turn pockets where feasible.	$102,400
N-40	Fir Street Extension: SR 260 to SR 89A	Extend Fir Street to SR 89A as a four-lane minor collector roadway	$1,345,500
N-41	Tissaw Road: Cornville Road to SR 89A	Coordinate with developer to construct a four-lane major collector roadway.	$5,830,500
		Total Estimated Cost	**$21,996,200**

Source: *Arizona Department of Transportation, Verde Valley Master Transportation Plan, 2016.*

Notes:
SR = State Route
** = Projects N-30.1 to N-30.6 are part of the Cottonwood major pavement rehabilitation program.*

Locally, the Circulation Element of the Cottonwood General Plan 2025 provides a framework for future transportation network improvements and policies within the City of Cottonwood and adjacent areas over a 25-year planning period. To meet the projected needs of the community, the Circulation Element presents projects that emphasize traffic safety and efficiency, multimodal transportation, pedestrian safety, and long-term sustainability. Proposed projects near the Airport include a bicycle facility along Airpark Road and Airport Road up to Black Hills Drive and, in concert with the Verde Valley Master Transportation Plan, a new roadway connecting Mingus Avenue from the Mesquite Hills community to Fir Street south of the Airport as part of the West Loop connector road. Both regional and local transportation projects may contribute to increased automobile and pedestrian traffic near the Airport.

1.10.4. Airfield Circulation and Automobile Parking

Access to the Airport's terminal is provided via Mingus Avenue. The terminal has seven standard marked parking spaces, one handicapped space, and approximately 5,300 square feet of unmarked parking area south of the terminal. When necessary, the Airport also utilizes an approximately 57,000 square-foot unpaved area north of the terminal for additional overflow automobile parking. Primary access to the airfield and its hangars is provided by an entrance road and a security gate located south of the terminal. There are also approximately 50 paved parking spaces along this access road, which runs parallel to the Airport's aircraft parking aprons from Mingus Avenue to the EAA building.

Airpark Road provides access to private hangars outside of the airfield fence on the southeast portion of the Airport. As previously discussed, there are four security gates that provide access to the complex's taxilane, three located in between various hangars and one located on a small access drive north of the helipad. An additional gate provides access from the taxilane to Taxiway E and the airfield. There is a total of 17 marked parking spaces in this area, 15 standard and two handicapped, and roadside parking along Airpark Road is also common near these hangars.

1.11. ENVIRONMENTAL OVERVIEW

The environmental setting of the Airport and its surroundings is discussed in this section. This section also provides an overview of the environmental factors that could potentially be affected by future Airport development. This information was gathered through a review of environmental documents, agency databases, and previous studies.

1.11.1. Air Quality

Under the authority of the Clean Air Act (42 U.S.C. 7401-7671q) , the U.S. Environmental Protection Agency (EPA) established National Ambient Air Quality Standards (NAAQS) for six criteria air pollutants that are considered harmful to public health and the environment: carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), ozone (O_3), particulate matter ($PM_{2.5}$ and PM_{10}), and sulfur dioxide (SO_2).[29] An area with ambient air concentrations exceeding the NAAQS for one or more criteria pollutants is known as a "nonattainment area."

[29] U.S . Environmental Protection Agency, NAAQS Table, 2016.

State and local governments of nonattainment areas have three years to develop implementation plans outlining how areas will attain and maintain the standards by reducing air pollutant emissions.[30] The Arizona Department of Environmental Quality (ADEQ) is responsible for monitoring air quality throughout the state and attaining the EPA NAAQS. Based on the EPA's Nonattainment/Maintenance Status Report (as of March 31, 2020) and the ADEQ 2019 Air Quality Report, Yavapai County contains no nonattainment areas.

1.11.2. Endangered and Threatened Species

The Endangered Species Act (16 U.S.C. 1531-1544, 87 Stat. 884) and the Fish and Wildlife Coordination Act (16 U.S.C. 661-667e, 48 Stat. 401) require that agencies' actions do not jeopardize the existence of endangered or threatened species or their habitats. The U.S. Fish and Wildlife Service (USFWS) has jurisdiction over federally endangered and threatened species in Arizona. The USFWS also designates certain bird species as Birds of Conservation Concern—bird species that represent the highest conservation priority—under the Migratory Bird Treaty Act (16 U.S.C. 703-712) and the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668c). Locally, the Arizona Game and Fish Department (AZGFD) is the state agency responsible for monitoring and managing endangered and threatened species.

With a diverse terrain consisting of desert land, grasslands, streams, mountains, and rock formations, Yavapai County is home to a variety of threatened and engendered species and migratory Birds of Conservation Concern. According to the USFWS's Information for Planning and Consulting tool, there are 19 federally listed threatened or endangered species, ten critical habitats (specific geographic areas that contain features essential to the conservation of an endangered or threatened species), and 34 Birds of Concern in Yavapai County. As depicted in Table 1.16, there are nine federally listed threatened or endangered species, seven critical habitats, and 13 Birds of Conservation Concern within the general vicinity of the Airport (approximately a 2-mile radius).

[30] U.S . Environmental Protection Agency, *Nonattainment Areas for Criteria Pollutants Green Book*, 2020.

Table 1.16 - Endangered, Threatened, and Birds of Concern Species within the Airport's Environs

Common Name	Scientific Name	Status / Breeding Season
Birds		
Southwestern Willow Flycatcher	Empidonax traillii extimus	Endangered
Yellow-billed Cuckoo	Coccyzus americanus	Threatened
Reptiles		
Northern Mexican Gartersnake	Thamnophis eques megalops	Threatened
Fishes		
Gila Chub	Gila intermedia	Endangered
Loach Minnow	Tiaroga cobitis	Endangered
Razorback Sucker	Xyrauchen texanus	Endangered
Spikedace	Meda fulgida	Endangered
Woundfin	Plagopterus argentissimus	Experimental Population*
Flowering Plants		
Arizona Cliffrose	Purshia (=Cowania) subintegra	Endangered
Birds of Conservation Concern		
Bald Eagle	Haliaeetus leucocephalus	October 15 – July 31
Black Throated Sparrow	Amphispiza bilineata	March 15 – September 5
Black-chinned Sparrow	Spizella atrogularis	April 15 – July 31
Black-throated Gray Warbler	Dendroica nigrescens	May 1 – July 20
Common Black-hawk	Buteogallus anthracinus	April 1 – September 20
Golden Eagle	Aquila chrysaetos	January 1 – August 31
Gray Vireo	Vireo vicinior	May 10 – August 20
Lark Bunting	Calamospiza melanocorys	Breeds elsewhere
Lewis's Woodpecker	Melanerpes lewis	April 20 – September 30
Phainopepla	Phainopepla nitens	March 1 – August 20
Rufous Hummingbird	Selasphorus rufus	Breeds elsewhere
Rufous-winged Sparrow	Aimophila carpalis	June 15 – September 30
Virginia's Warbler	Vermivora virginiae	May 1 – July 31

Source: *U.S. Fish and Wildlife Service Information for Planning and Consultation tool (accessed April 2020).*

Notes:
Endangered = A species in danger of extinction throughout all or a significant portion of its range.
Threatened = A species likely to become endangered within the foreseeable future throughout all or a significant portion of its range.
** = Experimental populations are species reintroduced to areas outside of the species' current range but within the species' historic range.*
The area for this analysis consists of an approximate two-mile radius around Cottonwood Municipal Airport.

1.11.3. Water Resources

Stormwater Management

Large volumes of stormwater runoff associated with airport infrastructure and operations can impact local water resources. At Cottonwood Municipal Airport, industrial activities include pavement maintenance; aircraft storage, maintenance, and fueling; aircraft and vehicle washing; and fuel storage and delivery. Fuel, lubricants, solvents, and paints are among the products stored, transferred, used, and disposed of as a result of these activities.[31] Section 401 of the Clean Water Act (33 U.S.C. 1251, et seq.) and the National Pollutant Discharge Elimination System (NPDES) establish quality standards and guidelines that govern water discharges from industrial facilities, construction sites, and municipal storm sewer systems. Additionally, ADEQ facilitates the Arizona Pollutant Discharge Elimination System (AZPDES) Permit Program, which has been granted regulatory authority by the EPA over pollutant discharges into Arizona surface water. To ensure compliance with federal and State regulations, airports must evaluate how activities may impact local water resources and implement appropriate measures to reduce or eliminate adverse environmental impacts.

The City of Cottonwood is located in the Verde River Watershed with the Verde River as the main receiving water in the area.[32] In 2016, ADEP issued AZPDES permit number AZG2016-002 to the City to authorize stormwater discharge into the Verde River Watershed. Additionally, the Airport was granted a Multi-Sector General Permit by the EPA in 2008 that permits stormwater discharge into Waters of the U.S. Pursuant to the requirements of these permits, the City prepared an Airport Stormwater Pollution Prevention Plan (SWPP) in 2013. The SWPP outlines requirements and procedures for the Airport's pollutants and associated facilities (e.g., fuel farm, waste oil storage area), including documentation, storage, spills and leaks prevention and response, and compliance inspections.

Two washes and a gulch traverse the Airport. The Del Monte Wash intersects the northern boundary of the Airport north of Mingus Avenue, the Silver Springs Gulch runs immediately south of Runway 32, and the Railroad Wash begins east of the Airport near the intersection of Airpark Road and Calvary Way.[33] Stormwater on the northern half of the Airport, including the main apron, is conveyed north toward Mingus Avenue and into a detention basin. The basin provides an opportunity for pollutants to settle out of stormwater prior to flowing east via the Del Monte Wash and ultimately discharging into the Verde River. Stormwater on the southern half of the Airport but north of Taxiway D runs south and then is conveyed east via an underground storm drain. This stormwater then flows east via the Railroad Wash and is discharged into the Verde River. Stormwater south of the underground storm drain is conveyed south of Runway 32, flows east via the Silver Springs Gulch, and is discharged into the Verde River.[34]

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[31] City of Cottonwood, Cottonwood Municipal Airport Stormwater Pollution Prevention Plan, 2013.
[32] City of Cottonwood, Stormwater Management Plan, 2016.
[33] Federal Emergency Management Agency, Flood Insurance Rate Map Number 04025C1756G, Revised 2010.
[34] City of Cottonwood, Cottonwood Municipal Airport Stormwater Site Plan, 2013.

Floodplains

As defined by the Federal Emergency Management Agency (FEMA), floodplains are lowland and relatively flat areas adjoining inland and coastal waters that are subject to a 1 percent or greater chance of flooding in any given year.[35] Floodplains are identified on FEMA's Flood Insurance Rate Maps (FIRM) to support the U.S. National Flood Insurance Program. Cottonwood Municipal Airport is located on FEMA FIRM number 04025C1756G, dated September 3, 2010. According to the FIRM, portions of the Airport's property are located within the 100-year floodplains (one percent annual chance of flooding) associated with the Del Monte Wash, the Railroad Wash, and Silver Springs Gulch. Outside of these floodplains, the Airport and the majority of its surroundings are designated as Zone X, or the 500-year floodplain. There are no surface waters located on Airport property, and there are no wild or scenic rivers on or near the Airport.[36]

Wetlands and Waters of the U.S.

The EPA defines wetlands as areas where water covers the soil all or part of the time, such as marshes, swamps, bogs, and fens. Waters of the U.S. includes all surface water bodies, such as drainage ditches, intermittent streams, streams, lakes, and ponds, as well as vegetated wetlands adjacent to water bodies.[37] Wetlands and Waters of the U.S. are protected under Sections 401 and 404 of the Clean Water Act (33 U.S.C. 1251, et seq.) and Executive Order 11990, *Protection of Wetlands*. Federal mandates require that agencies avoid impacts to wetlands and Waters of the U.S. to the greatest extent possible. If impacts are unavoidable, agencies must explain that no practical alternative exists and provide measures to mitigate the proposed development's unavoidable impacts.

The USFWS National Wetlands Inventory (NWI) indicates that two wetlands intersect the Airport's property. These wetlands are part of the Del Monte Wash and the Silver Springs Gulch and are classified as R4SBJ, meaning they are riverine systems of intermittent streams that may be intermittently flooded. There is also wetland immediately north of the Airport that is classified as R4SBC, meaning it is a riverine system of intermittent streams that are seasonally flooded. These wetlands are depicted in Figure 1.12. In June 2020, the definition of "Waters of the U.S." will be amended by the EPA and the Department of the Army under the new Navigable Waters Protection Rule.[38] Coordination with the U.S. Army Corps of Engineers would be needed if any potential airport development would impact these wetlands to determine if they are considered Waters of the U.S. under the Navigable Waters Protection Rule and subject to Sections 401/404 of the Clean Water Act.

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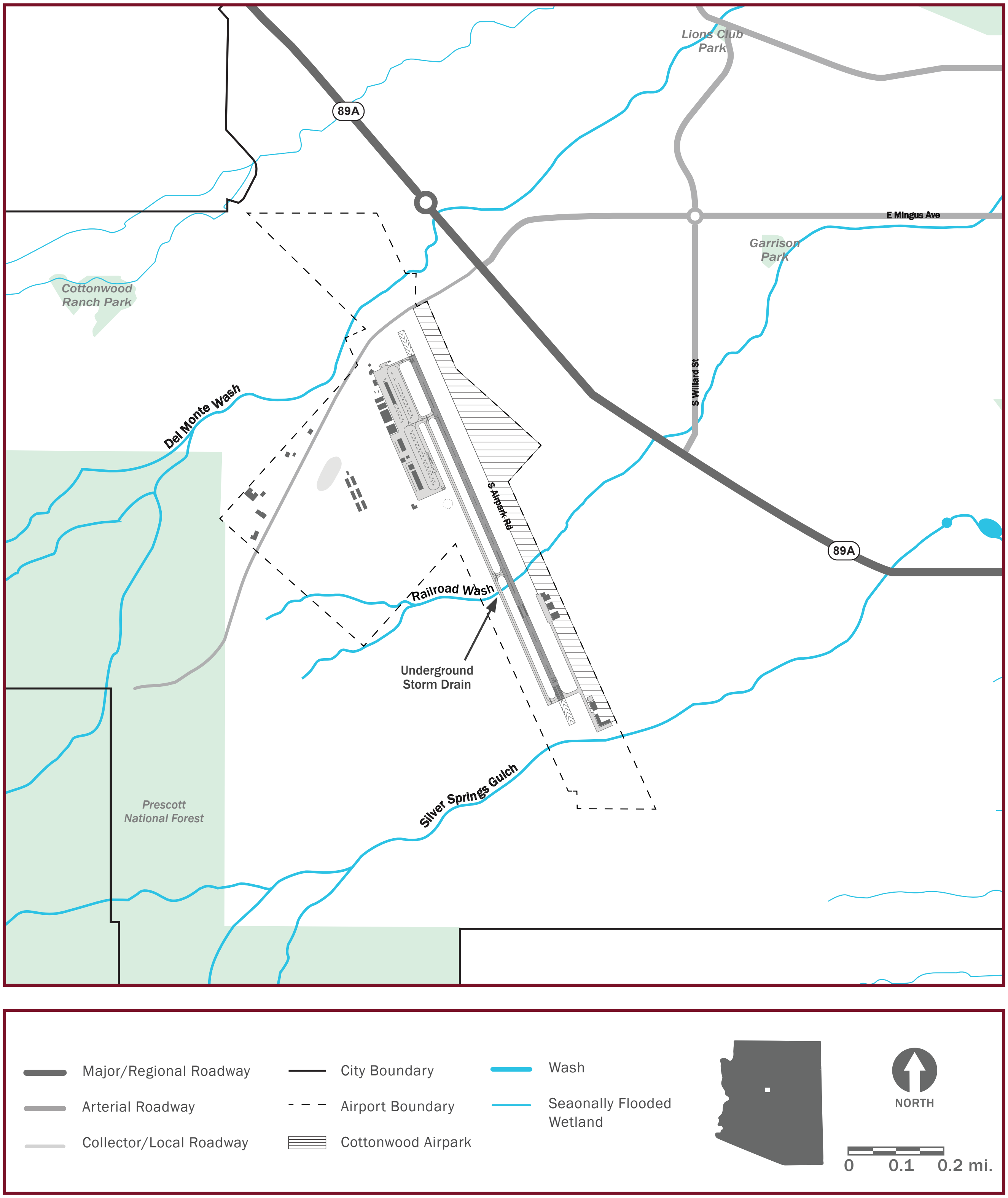
[35] Federal Emergency Management Agency, Executive Order 11988 - *Floodplain Management*, 1977.
[36] National Wild and Scenic Rivers System, National System Map (accessed April 2020).
[37] Federal Emergency Management Agency, Determining if your project will affect "Waters of the U.S.", 2015.
[38] Environmental Protection Agency, Current Implementation of "Waters of the United States," 2020.

Figure 1.12 - Federal Wetlands near the Airport



Sources:
U.S. Fish and Wildlife Service, National Wetlands Inventory (accessed April 2020).
Federal Emergency Management Agency, Flood Insurance Rate Map (FIRM) Nos. 04025C1756G and 04025C1757H.
Kimley-Horn, 2020.

1.11.4. Noise Exposure

As previously discussed, the compatibility of existing and planned land uses in the vicinity of an airport is generally attributed to the noise impacts on adjacent communities related to airport operations. Title 14 CFR Part 150 provides procedures, standards, and guidance for controlling planning for aviation noise compatibility in an airport's environs. These procedures and standards are used to prepare noise exposure maps and noise compatibility programs, which help communities plan for compatible land use around airports to minimize impacts for noise exposure.

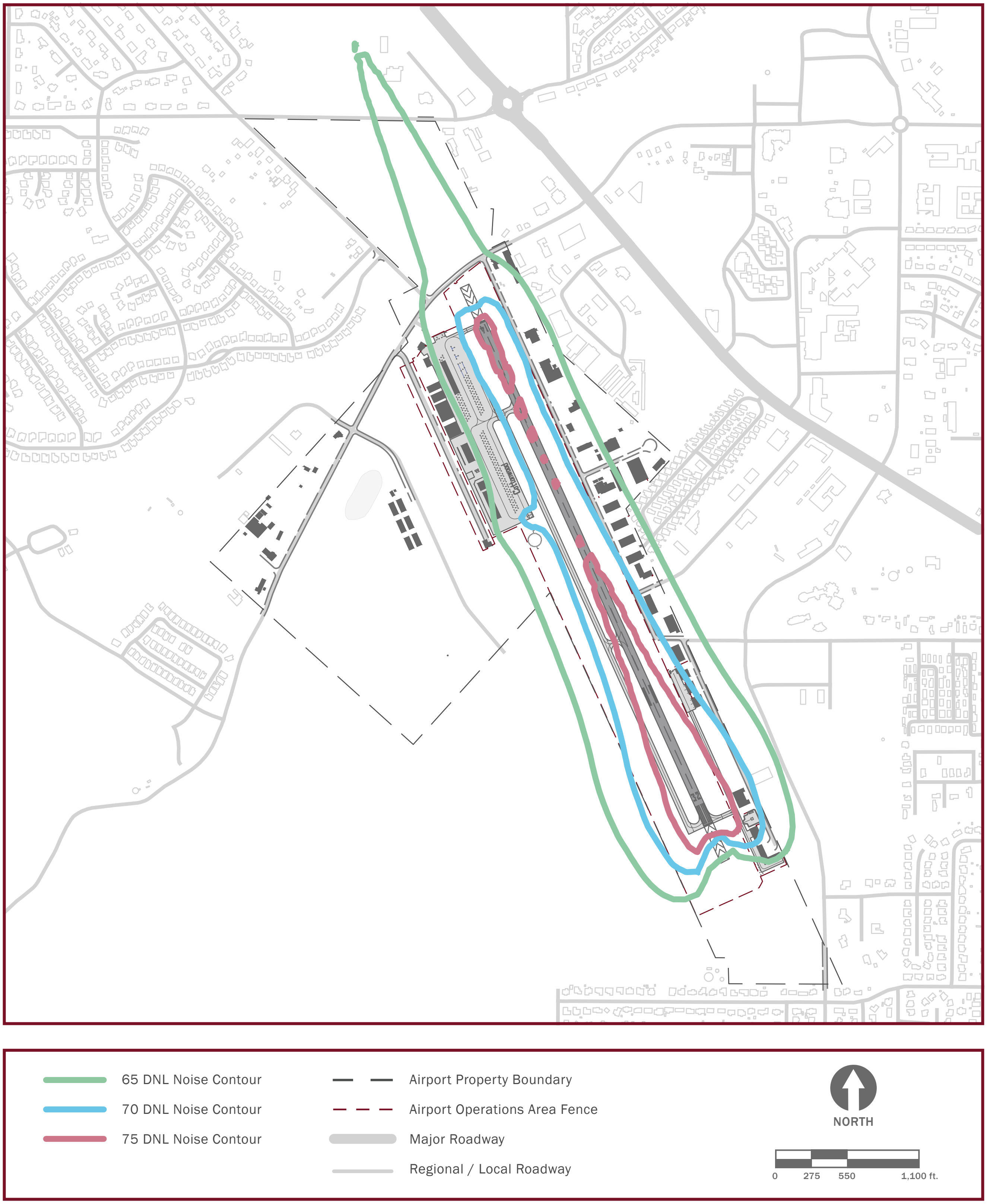
The FAA utilizes the day-night average sound level (DNL) noise metric as the standard metric to determine noise exposure of communities in the vicinity of airports. DNL is used to reflect a person's cumulative exposure to sound over a 24-hour period, expressed as the noise level (in decibels) for the average day of the year on the basis of annual aircraft operations. Noise exposure maps are developed to inform land use compatibly and planning. Displayed in **Figure 1.13**, an official noise exposure map was developed to reflect noise contours representing DNL 65, 70, and 75 decibel (dB) noise levels at the Airport in 2019.

Consistent with 14 CFR Part 150, *Airport Noise Compatibility Planning*, the FAA has adopted the DNL 65 dB as the threshold of significant exposure. Therefore, residential land uses are considered compatible only if located outside of the DNL 65 noise contour. As shown in **Figure 1.13**, five mobile homes in the El Rio Del Oro Mobile Home Community, east of Runway 14-32, are currently located within the 2019 DNL 65 noise contour.

Future noise contours were developed as part of this Master Plan Update and will be depicted in the ALP. Although DNL 65 dB is the established threshold in relation to 14 CFR Part 150 and the FAA, noise contours for the DNL 55 dB sound level were developed and depicted within this study to identify and account for noise impacted areas in context with heavy residential land uses near the Airport. Of note, future noise contours depictured in the ALP are based on the operational fleet mix as reported by the Airport's new aircraft operations tracking system, installed in November 2020. Additional information on the Airport's existing and future operational fleet mix is presented in **Chapter 2 – Aviation Forecasts** and **Chapter 3 – Facility Requirements**.

As previously noted in **Section 1.6.4**, voluntary noise abatement procedures have been established at the Airport to minimize aircraft noise disturbances over the surrounding communities. The Airport's Noise Action Plan designates Runway 32 as the "calm wind" runway to encourage pilots to take off to the north given the residential communities within close proximity of Runway 14's departure end. The Noise Action Plan also prompted the placement of signage throughout the Airport to remind pilots of the appropriate noise abatement procedures. Additionally, standard arrival and departure procedures were enacted at the Airport to avoid continuous aircraft overflight of local residential land uses, as previously discussed. The Airport also discourages touch-and-go activity from occurring 30 minutes before sunset and 30 minutes after dawn, which varies depending on the time of year.

Figure 1.13 - 2019 Noise Contour Map



Sources:
Coffman Associates, 2021.
Kimley-Horn, 2020.

1.11.5. Department of Transportation Act, Section 4(f)

Section 4(f) of the U.S. Department of Transportation (U.S. DOT) Act of 1966, codified in 49 U.S.C. 303 and 23 U.S.C. 138, provides protection for specially designated properties, including publicly owned parks, recreation areas, wildlife and waterfowl refuges, or significant historic sites. Section 4(f) only applies to projects that receive funding or require approval from the U.S. DOT. As described below, there are several Section 4(f) resources in the vicinity of the Airport.

- **Cottonwood Kid's Park:** Cottonwood Kid's Park is located approximately one mile east of the Airport on South 12th Street, between Birch Street and Cherry Street, and is adjacent to the City's fairgrounds. Owned and maintained by the City of Cottonwood, the park includes soccer fields, picnic tables, and a permanent restroom facility. The park also hosts various family events throughout the year.
- **Garrison Park:** Garrison Park is located approximately three quarters of a mile east of the Airport on Brian Mickelson Parkway near the intersection of Mingus Avenue and 6th Street. The park is owned and maintained by the City of Cottonwood and includes children's play equipment, a swing set, a basketball hoop, and a large ramada equipped with picnic tables and grills.
- **Lions Club Park:** Lions Club Park is located approximately three quarters of a mile northeast of the Airport near the intersection of Mingus Avenue and Willard Street and is owned and maintained by the City of Cottonwood. The park offers twelve basketball hoops, three soccer fields, a swing set, children's play equipment, picnic tables, and two baseball/softball diamonds equipped with lighting.
- **Prescott National Forest:** The eastern boundary of Prescott National Forest is approximately one quarter of a mile west of the Airport. The forest is comprised of 1.25 million acres in Yavapai and Coconino Counties. The Prescott National Forest includes mountains, lakes, rivers, and wildlife, and it accommodates a variety of outdoor recreational activities such as hiking, horseback riding, mountain biking, and rock climbing. As part of the U.S. National Forest System, the Prescot National Forest is managed and protected by the U.S. Forest Services and the U.S. Department of Agriculture.

1.11.6. Hazardous Materials

The use, storage, and disposal of hazardous materials is governed by various state and federal statutes. Federal guidance and regulations for hazardous materials are provided by the Resource Conservation and Recovery Act (42 U.S.C. 6901, et seq.), the Comprehensive Environmental Response, Compensation, and Liability Act (42 U.S.C. Section 9601), and the Community Environmental Response Facilitation Act (Public Law 102-426). On the state level, the ADEQ Waste Programs Division is responsible for enforcing the requirements of the Resource Conservation and Recovery Act and monitoring the generation, management, transportation, storage, and disposal of hazardous waste in Arizona. Aircraft fuel is the most common hazardous substance in regular use at the Airport. Other hazardous substances used in smaller amounts include lubricants and solvents, used oils, filters, cleaning residues, spent batteries, and other materials and products associated with aircraft operations and maintenance.

In addition to hazardous substances used at the Airport, there are several contaminated sites and areas of concern near the Airport. According to the ADEQ, there is one Superfund site, three Brownfields, and one Water Quality Assurance Revolving Fund (WQARF) site in the general vicinity of the Airport.[39]

A Superfund site is an area where a federal program identifies and clears uncontrolled hazardous waste. Located approximately 19 miles southwest of the Airport in the Town of Dewey-Humboldt, the Superfund site is the former location of the Iron King Mine and Humboldt Smelter. The cleanup of the site has been ongoing since 2011 and has included the removal of contaminants such as arsenic and lead.[40]

A Brownfield is land that contains or is perceived to contain hazardous substances, pollutants, or contaminants. To mitigate hazardous conditions on Brownfields, ADEQ established the Brownfields Assistance Program (BAP) in 2003 to provide grant funding to Arizona communities and organizations for environmental assessment, cleanup, and restoration projects. There are three Brownfields near the Airport, each located east of the Airport along Main Street and within the City of Cottonwood[41].

- **Cottonwood Community Club House:** The Cottonwood Community Club House, formerly known as the Cottonwood Civic Center, is located approximately one mile northeast of the Airport in Old Town Cottonwood at the intersection of Main Street and Balboa Street. Built in 1939, the Cottonwood Community Club House is constructed of local sandstone and river rock and is a historic building within the community. A BAP grant was awarded to the City of Cottonwood in 2017 to perform asbestos and lead-based paint abatement on the building.
- **Two Gardner's Recycling Sites:** Located approximately one mile northeast of the Airport in Old Town Cottonwood, these two adjacent Brownfields are former recycling collection sites on which the City intended to build parking lots to serve local businesses and the Jail Trail. Known as the Gardner's Recycling sites, an environmental assessment of the property revealed soil contamination from heavy metals as a result of large junk piles on the land. A BAP grant was awarded to the City of Cottonwood in 2011 to perform further assessments and site remediation. A parking lot was constructed on the northern lot in 2013 and remediation is ongoing at both sites.

A WQARF site is designated by the State of Arizona as having contaminated soil and/or groundwater that may pose a risk to public health or the environment. ADEQ's WQARF program identifies, assesses, and mitigates the threat of these sites throughout the state. The Highway 260 and Main Street area is a large WQARF site located east of the Airport, bounded by Mingus Avenue to the north, Mongini Lane to the south, the Verde River to the east, and 15th Street to the west.[42] The site includes a mixture of public, commercial and residential land uses along Main Street.[43] Tetrachloroethene was identified as a contaminate of concern

[39] Arizona Department of Environmental Quality, eMaps (accessed April 2020).
[40] Arizona Department of Environmental Quality, Superfund Site: Iron King Mine and Humboldt Smelter, 2019.
[41] Arizona Department of Environmental Quality, Brownfields Grant Site Locations, eMaps (accessed April 2020).
[42] Arizona Department of Environmental Quality, WQARF Registry (accessed April 2020).
[43] Arizona Department of Environmental Quality, WQARF Site: Highway 260 and Main Street, 2020.

in several wells in this area as a result of two dry cleaning businesses, and a Remedial Investigation (RI) of the site to assess the extent of contamination and evaluate remediation options is ongoing.

These Superfund, Brownfield, and WQARF sites will not impact future development at the Airport. However, given the industrial land uses in the immediate vicinity of the Airport, ADEQ's list of contaminated sites should be consulted prior to the Airport beginning development or expansion projects.

1.11.7. Historic, Cultural, and Archeological Resources

The National Historic Preservation Act of 1966 (16 U.S.C. 470) established the National Register of Historic Places (NRHP) to identify historic properties worthy of preservation. Additionally, under the Arizona Historic Preservation Act (A.R.S. 41-861 et seq.) the Arizona State Historic Preservation Office designates properties as having local historical, cultural, or archaeological significance in the Arizona State Register of Historic Places (ARHP). As shown in **Table 1.17**, the City has eight properties and one historic district listed on the NRHP.[44] The City does not have any properties or districts identified on the ARHP that are not included on the NRHP, but the Tuzigoot National Monument in Clarkdale is registered as an Archeological Site by the U.S. National Park Service and is located approximately 2.3 miles from the Airport. These designated places will not impact future development at the Airport. However, pursuant to the National Historic Preservation Act, a cultural resource survey will need to be completed prior to any development to identify potential historic, cultural, or archeological resources on Airport property and the possible impacts of development action.

Table 1.17 - City of Cottonwood Properties and Districts Listed on the National Register of Historic Places

Property / District	Property Type	Date Listed	Distance from Airport (miles)
Building at 826 North Main Street	Office	9/19/1986	0.9
Clemenceau Public School	Offices/Museum	9/19/1986	0.7
Cottonwood Commercial Historic District	Historic District	5/18/2000	0.9
Edens House	Private Residence	9/19/1986	1.0
Master Mechanic's House	Private Residence	9/19/1986	0.6
Smelter Machine Shop	Senior Center	9/19/1986	0.8
Superintendent's Residence	Office (vacant)	10/14/1986	0.7
UVX Smelter Operations Complex	Offices (4 buildings)	9/19/1986	0.7
Willard House	Private Residence	9/19/1986	1.2

Sources:
U.S. National Park Service, National Register of Historic Places Database (accessed April 2020).
City of Cottonwood, Cottonwood General Plan 2025 - Historic Preservation Element, 2014.
Kimley-Horn, 2020.

[44] U.S. National Park Service, National Register of Historic Places Database (accessed April 2020).

CHAPTER 2: AVIATION FORECAST

2.1. COVID-19 PREFACE

In December 2019, a new strain of coronavirus (COVID-19) emerged in Wuhan, China. On March 11, 2020, the World Health Organization (WHO) declared COVID-19 a global pandemic. In response, the U.S. government issued restrictions on travel into the U.S. by foreign nationals and advised U.S. citizens to avoid all international travel to contain the outbreak. In addition, 42 states announced "shelter-in-place" orders that required people to stay in their homes except to purchase groceries and other goods, care for a relative or friend, seek necessary health care, or go to a job that was labeled "essential." As nationwide COVID-19 cases began to wane in May 2020, shelter-in-place orders were gradually lifted and local economies slowly reopened. However, a second surge in cases, especially in southern and western states including Arizona, prompted the temporary reversal of many reopening plans and brought further uncertainty to the future of the virus and the country's long-term economic health.

As of August 2020, nationwide COVID-19 cases and virus-related deaths were on the decline. However, the virus has engulfed the world and forced the global economy to a near standstill. It has impacted nearly every industry and sector, resulting in significant financial loss, supply chain complications, and further uncertainty. While the immediate economic impacts from the pandemic have been evident, the long-term effects on GA remain largely unknown in the absence of historical precedent. From analyzing existing Airport data and consulting industry organizations and publications, this preface describes various factors related to COVID-19 that may impact GA operations and demand forecasts at Cottonwood Municipal Airport.

2.1.1. General Aviation Demand

According to the National Business Aviation Association (NBAA), COVID-19 has led to widespread declines in traffic and revenue at GA airports across the country. Fuel sales generally represent a substantial portion of income for small airports and FBOs, and overall fuel sales nationwide have dropped in Q1 of 2020.[45] Additionally, as more aircraft sit dormant, ongoing maintenance and continued airworthiness requirements are delayed. Tourism has also been a victim of COVID-19, and a steep decline in air tour operations have reflected this trend.

Cottonwood Municipal Airport experienced a 51 percent and 58 percent year-over-year decrease in AvGas 100L and Jet A fuel sales by volume, respectively, for the month of March 2020. It can be reasonably deduced that this significant decrease in fuel sales was a direct result of COVID-19, including stay-at-home orders and individual safety precautions. Despite this decrease, the Airport experienced a 25 percent, 60 percent, and 25 percent year-over-year increase in AvGas 100L fuel sales for the months of April, May, and June 2020, respectively, and a 29-percent year-over-year increase in Jet A fuel sales for the month of June 2020. This indicates that any immediate impacts that were experienced at the Airport at the onset of the

[45] National Business Aviation Association, COVID-19 Impacting General Aviation Airports, 2020.

COVID-19 outbreak were largely temporary and that long-term activity is likely to be unaffected over the 20-year planning horizon.

2.1.2. Expired Pilot Licenses and Certificates

Federal regulations require pilots to renew medical certificates, pilot and instructor certificates, instrument proficiency checks, and airman knowledge tests within prescribed time periods. Many of these renewals, exams, and checks must be performed in person. Closed businesses and travel restrictions resulting from COVID-19 have created a barrier for pilots to meet the necessary airman and aircraft requirements. In April 2020, the FAA issued various relief to pilots in the wake of the pandemic, including extensions of pilot medical certificates, knowledge test results, flight instructor certificates, and instrument currency requirements.[46] Although relief has been issued, a backup in license and certificate renewals may cause a short-term dip in GA traffic. Alternatively, some pilots may choose not to renew the required licenses and certificates due to economic or health concerns, potentially impacting GA in the long term.

2.1.3. Business Jet Aircraft

COVID-19's impact on global business is vast. While the FAA has forecast an overall increase in business jet aircraft over the next 20 years, a reduction in corporate profits may adversely impact business jet demand.[47] Additionally, as the pandemic forces people to rely on telecommuting and teleconferencing technologies, businesses may pull back on travel spending in the long term. Although these factors may affect GA airports that largely cater to business jets, Cottonwood Municipal Airport does not currently nor is projected to serve a substantial amount of corporate/business activity and it is not anticipated that the Airport will be significantly impacted by industry impacts associated with COVID-19. Rather, the Airport's existing jet operations associated with leisure travel and type ratings are expected to continue to grow as forecast in this report.

2.1.4. CARES Act

The Coronavirus Aid, Relief, and Economic Security (CARES) Act (H.R. 748, Public Law 116-136) was signed by the President on March 27, 2020. The CARES Act included $10 billion in economic relief to be distributed to eligible U.S. airports in response to COVID-19. The Act increased the federal share of Airport Improvement Program (AIP) grants to 100 percent for FAA fiscal year 2020, and new funds were distributed by various formulas for all airports that are part of the national airport system, including commercial service airports, reliever airports, and some public-owned general aviation airports. Under the CARES Airport Program, general aviation airports received funds based on their categories as listed in the current NPIAS Report.[48] Classified as a Basic GA airport in the 2019-2023 NPIAS, Cottonwood Municipal Airport was eligible to receive $20,000.[49] The CARES Act funds were available to reimburse operational expenses, debt service payments, and capital expenditures directly related to the Airport.

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[46] Federal Aviation Administration, Special Federal Aviation Regulation, 2020.
[47] Federal Aviation Administration, *FAA Aerospace Forecast 2020-2040*, 2020.
[48] Federal Aviation Administration, 2020 CARES Act Grants (https://www.faa.gov/airports/cares_act/)
[49] Federal Aviation Administration, CARES Act Airport Grants – Frequently Asked Questions, 2020.

2.1.5. Future Outbreaks

Experts have indicated that additional outbreaks may occur in the future, especially during the fall and winter seasons.[50] According to the Arizona Department of Health Services, in July 2020 the State of Arizona experienced a steep spike in new COVID-19 cases and gradual increases in COVID-19-related hospitalizations and deaths, the majority of which were located in Maricopa County.[51] While the uptick in cases may be related to an overall increase in testing availability, the July 2020 spike is an example of the extreme uncertainty of the pandemic.

Future outbreaks may require additional mitigative measures such as business closures and travel restrictions, which may further affect a recovering economy. This scenario would heavily impact an already crippled aviation industry, and airports may face similar challenges to those experienced during the pandemic's initial onset. Further, a rise in COVID-19 cases in certain areas and varying regulations enacted by local governments may inconsistently impact GA operations on a regional basis.

As previously discussed, operational and fuel sales data indicate that, despite an initial decrease in activity due to the onset of stay-at-home orders and personal safety precautions, Cottonwood Municipal Airport has experienced healthy growth year-over-year in April, May, and June 2020. This indicates that overall activity at the Airport should remain steady in the near-term with possible fluctuations based on potential regional outbreaks, and that long-term activity is not expected to be adversely impacted by COVID-19.

[50] Center for Infectious Disease Research and Policy, *Report: The Future of the COVID-19 Pandemic*, 2020.
[51] Arizona Department of Health Services, COVID-19 Data Dashboard (https://www.azdhs.gov/preparedness/epidemiology-disease-control/infectious-disease-epidemiology/covid-19/dashboards/index.php)

2.2. CHAPTER INTRODUCTION

Forecasting aviation activity is a critical step to ensuring airport planning and development efforts are consistent with future demand and needs. The forecasts are used to determine the type, size, and timing of new or expanded facilities, and also help justify the financial investment required for airport improvements. Forecasts are among the two components of a Master Plan Update that are reviewed and approved by the FAA—the other being the ALP.

This chapter presents forecasts of aviation activity at Cottonwood Municipal Airport for a 20-year planning horizon, with 2019 as the base year and 2039 as the ultimate forecast year. These forecasts are unconstrained, implying that requisite facilities will be developed to accommodate all aviation activity demand over the forecast period. Specific facility needs resulting from these forecasts are presented in later chapters of this Master Plan Update.

Included in this chapter are overviews of historical aviation activity, assumptions used in forecast analyses, and methodologies used to project future demand at the Airport. Data were collected from various FAA sources, including TAF records, the TFMSC database, FAA Form 5010-1 Airport Master Record (5010 Airport Master Record), and the FAA National Based Aircraft Inventory Program. Additionally, socioeconomic data for the City of Cottonwood, Yavapai County, and the State of Arizona were evaluated for conditions and trends that may impact demand at the Airport.

2.3. TRENDS AND FACTORS THAT IMPACT AVIATION DEMAND

Understanding aviation trends and related factors can provide direction and insight to the forecast methodology outcomes and aid in the selection of a preferred forecast. Since activity at Cottonwood Municipal Airport is associated with GA, this section primarily focuses on trends at the national, regional, and local levels that impact non-commercial activity.

The FAA provides an overview of GA trends and forecasts in its annual Aerospace Forecast. The most recent Aerospace Forecast, published in April 2020 for Fiscal Years 2020 to 2040, has acknowledged that GA activity in the U.S. has experienced a decline in recent years but the long-term outlook remains stable, with a slight decrease in the total GA fleet of 0.9 percent over the next twenty years. The future of GA will be characterized by a decline in fixed-wing piston aircraft and a growth in turbine aviation activity (including rotorcraft)—largely in conjunction with an increase in the corporate aviation sector. Additionally, increases in experimental and light sport aircraft are also forecast to further offset the decline in fixed-wing piston aircraft. With new and more sophisticated aircraft entering the market, especially the increasing size of the business jet fleet and the growing popularity of light sport aircraft, total GA hours flown is forecast to increase despite the declining number of GA aircraft. Overall, GA operations are forecast to increase an average 0.4 percent annually through 2040, driven primarily by increases in turbine-powered aircraft.

The number of certified pilots and the demand for commercial pilots also impacts GA activity trends. Although the number of GA pilots is projected to decrease approximately 0.2 percent annually between 2020 and 2040, individuals pursuing commercial pilot and air transport pilot (ATP) certificates utilize GA aircraft in their initial flight training phases. According to the *FAA Aerospace Forecast 2020-2040*, the number of both commercial pilot and ATP certificates have steadily increased between 2016 and 2019 and are forecast to continue to increase at an annual rate of 0.7 percent through 2040. While some tenants at Cottonwood Municipal Airport do provide flight training, there is not a designated commercial pilot training program currently active at the Airport.

GA activity is largely driven by economic factors, and the forecasts developed for this Master Plan Update consider the routine ebb and flow in aviation activity levels while projecting likely long-term trends. Although historical data are used to project Airport needs and future demand, it is important to recognize that short-term fluctuations in activity may occur due to unforeseen factors. Economic health and strong consumer spending in the U.S. have served as catalysts for growth in business jet aircraft and other GA activity. However, unforeseen factors such as political instability, trade wars, and health crises can have adverse economic impacts and negatively affect GA. The preface to this chapter specifically addresses the impacts and uncertainties associated with the COVID-19 pandemic.

Additional uncertainties in GA forecasting include future oil prices, the implementation of NextGen technologies, and increasing concerns over aviation's environmental impact. According to the U.S. Government Accountability Office (GAO), a positive correlation has been found to exist between oil prices and GA hours flown.[52] Although oil prices were forecast to gradually increase on an annual basis, recent market volatility as a result of COVID-19 has further proven the considerable uncertainty of the future of oil prices.

NextGen is an FAA initiative to develop new technology geared toward making air travel safer and more efficient by replacing older and existing technology. As part of the NextGen initiative, aircraft operators (both commercial and private) are required to pursue NextGen practices and equip aircraft with updated technologies. This requirement has historically proven to be a slight deterrent to small and recreational aircraft activity and could continue to impact system-wide operational activity in the future. Additionally, increasing concerns about aviation's environmental impacts (including noise pollution and emissions) could potentially be a catalyst for more stringent requirements and greater barriers to entry for pilots, ultimately limiting GA's growth.

As previously discussed, GA related to corporate travel is expected to increase over the next 20 years. This trend has greatly impacted operations at Cottonwood Municipal Airport as there have been recent spikes in corporate jet activity. It is anticipated that the Airport's new FBO, its central location within the Verde Valley, and current demand will continue to draw corporate jet activity well into the future. A detailed discussion on future operations and based aircraft is presented later in this chapter.

[52] U.S. Government Accountability Office, Impact of Fuel Price Increases on the Aviation Industry, 2014.

2.4. HISTORICAL ACTIVITY

As a GA airport, Cottonwood Municipal Airport's two primary indicators of activity are aircraft operations and based aircraft. An aircraft operation is defined as either a takeoff or a landing, with a touch-and-go counting as two operations. The FAA defines based aircraft as operational and airworthy aircraft registered in the FAA Aircraft Registry that are located at an airport for the majority of the year.[53] Several data sources identify operational information and based aircraft at the Airport:

- **FAA TAF:** The TAF is the official FAA forecast of aviation activity for U.S. airports, containing historical data and projections for active airports in the NPIAS. The TAF is updated annually, and reports data based on the FAA's fiscal year (October 1 through September 30).
- **FAA TFMSC:** The TFMSC database reports operations by aircraft type, weight class, date, approach and design category, and user class. However, it does not always contain this data for every operation conducted at an airport because it is usually derived from filed flight plans and/or radar detection.
- **5010 Airport Master Record:** The 5010 Airport Master Record contains data describing the physical and operational characteristics of civil public-use airports, joint-use military airports, and private-use military airports that are active and in the NAS. The data source provides a "snapshot" of operational activity and based aircraft for the year it is published based on TAF data.
- **FAA National Based Aircraft Inventory Program:** Airports are required to upload based aircraft data to the FAA National Based Aircraft Inventory Program database (BasedAircraft.com) annually for registered aircraft to be properly validated at the correct airport. It is often the case that a host airport accommodates aircraft that are not captured in the database as being registered at that airport. This is typically attributed to an aircraft being registered at a location other than at the host airport's location, or when an aircraft is based seasonally at multiple airports.

As a GA airport with no ATCT, accurate historical operational data are largely limited. The FAA's TAF applies macroeconomic industry assumptions to forecasts for most non-towered GA airports. Available data published in the FAA's TFMSC database are based on filed IFR flight plans and often do not accurately reflect total operations at non-towered airports. Additionally, there are often discrepancies between the actual number of based aircraft that require permanent or semi-permanent accommodations and the number that is validated in the FAA's National Based Aircraft Inventory Program. However, as the official forecast and based aircraft database of U.S. airports, respectively, the TAF and the National Based Aircraft Inventory were considered to be the best resources from which to develop forecasts of aviation demand.

It should be noted that the Airport installed an aircraft operations tracking system in November 2020, which allows for the monitoring of takeoff and landing operations more accurately. Based on preliminary review of the operations tracking system, approximately 55,300 annual operations are estimated by 2039. While this estimate differs greatly from the approved forecasts within this chapter, the difference in operations will not

[53] Federal Aviation Administration, *General Aviation Airports: A National Asset*, May 2012.

impact demand capacity or facility recommendations. Therefore, the approved forecasts within this chapter are adequate to justify the recommended improvements of this Master Plan Update. Historical based aircraft and GA operations from the TAF, the National Based Aircraft Inventory Program, the 5010 Airport Master Record, and the Airport's 2001 Master Plan Update forecasts are presented in **Table 2.1** and **Table** 2.2.

Table 2.1 - Historical Based Aircraft

Year	FAA Terminal Area Forecast	National Based Aircraft Inventory Program	Arizona State Aviation System Plan	5010 Airport Master Record	2001 Master Plan Update Forecast
2009	57	-	-	-	-
2010	55	-	-	-	50
2011	50	-	-	-	-
2012	52	-	-	-	-
2013	52	-	-	-	-
2014	52	-	-	-	-
2015	14	-	-	-	56
2016	16	-	44	-	-
2017	15	-	-	-	-
2018	33	-	-	-	-
2019	33	64	-	34	-
AAGR 2009 - 2019	**-4.21%**	-	-	-	-

Sources:
FAA Terminal Area Forecast (issued January 2020).
FAA National Based Aircraft Inventory Program.
Arizona State Aviation System Plan Update, 2018.
FAA Form 5010-1, Airport Master Record (effective May 21, 2020).
Cottonwood Municipal Airport, 2001 Master Plan Update.

Note:
AAGR = Average annual growth rate

Table 2.2 - Historical General Aviation Operations

Year	FAA Terminal Area Forecast	Arizona State Aviation System Plan	5010 Airport Master Record	2001 Master Plan Update Forecast
2009	18,700	-	-	-
2010	18,700	-	-	25,500
2011	18,700	-	-	-
2012	18,700	-	-	-
2013	18,700	-	-	-
2014	18,700	-	-	-
2015	18,800	-	-	29,000
2016	18,800	19,000	-	-
2017	18,800	-	-	-
2018	18,800	-	-	-
2019	18,800	-	20,740*	-
AAGR 2009 - 2019	**1.06%**	-	-	-

Sources:
FAA Terminal Area Forecast (issued January 2020).
Arizona State Aviation System Plan Update, 2018.
FAA Form 5010-1, Airport Master Record (effective May 21, 2020).
Cottonwood Municipal Airport, 2001 Master Plan Update.

Notes:
AAGR = Average annual growth rate
** = Operations for 12 months ending 4/22/2019*

2.5. FORECASTING ASSUMPTIONS

Aviation activity at an airport is generally driven by controllable factors (e.g., hangar rents, services provided, maintenance of facilities) and non-controllable factors (e.g., local/national economic conditions, availability of funding, location). As shifts in activity type and volume are anticipated to occur over the 20-year planning horizon, the following assumptions pertaining to forecast development have been identified:

- Based on historical activity and existing facilities and services, it is assumed the Airport will continue to sustain its FAA-designated GA status by catering to smaller GA aircraft, including single and twin piston, small- to medium-sized turboprop aircraft, and some small- to medium-sized corporate jets. The Airport is not expected to serve scheduled commercial service over the 20-year planning horizon.
- Socioeconomic data provided by Woods & Poole Economics, Inc. and the City of Cottonwood's 2015 Economic Development Strategic Plan are indicative of existing and future conditions at the State, regional, and local levels.
- The Airport will continue to be included in the FAA's NPIAS and will be eligible to receive AIP grants.
- Forecasts presented in this chapter are unconstrained, meaning that there are no extenuating circumstances that are anticipated to limit or restrict potential demand or operational functionality of the Airport.

2.6. SOCIOECONOMIC FORECASTS

Given an airport's role within the regional and national system and the demands of the population base that it serves, the socioeconomic conditions of a local community can often influence existing and future aviation-related activity. Therefore, some forecasts of aircraft operations and based aircraft in this chapter utilize historical and forecast socioeconomic data to identify expected aviation demand. The following is a recap of the socioeconomic data and forecasts for the City of Cottonwood, Yavapai County, and the State of Arizona as presented in **Chapter 1 - Inventory of Existing Conditions**:

- **Population:** The City of Cottonwood, Yavapai County, and the State of Arizona experienced population growth between 2009 and 2019 with AAGRs of 0.77 percent, 1.16 percent, and 1.41 percent, respectively. Populations are expected to continue to increase between 2019 and 2039 with forecast AAGRs of 1.23 percent for the city, 1.52 percent for the county, and 1.56 percent for the state.
- **Employment:** The growth in employment in Yavapai County and the State of Arizona has outpaced population growth since 2009 with AAGRs of 1.31 percent and 1.62 percent, respectively. Employment is projected to continue to rise faster than population through 2039, with forecast AAGRs of 1.64 percent for the County and 1.72 percent for the State. This key metric is an indicator that labor markets are expected to remain strong in the region and across the State.
- **PCPI:** PCPI provides a broad measure of individual economic well-being and is another indicator used to gauge the economic growth of a community. PCPI indicates the general ability of individuals to purchase products and services (e.g., personal aircraft or corporate travel). Both Yavapai County

(1.29 percent) and the State of Arizona (1.06 percent) have experienced increases in PCPI since 2009. Projected PCPI for both the county and the state are forecast to increase over the next 20 years, with AAGRs of 1.36 percent and 1.39 percent, respectively.

- **GRP:** GRP is a key representation of the general health of a region's overall economy. The GRP of Yavapai County had an AAGR of 1.41 percent between 2009 and 2019 and a forecast AAGR of 2.46 percent through 2039, an indication of the region's strong projected growth.

2.7. BASED AIRCRAFT FORECASTS

As previously noted, based aircraft are defined as operational and airworthy aircraft registered in the FAA Aircraft Registry that are located at a specific airport for the majority of the year. Forecasts of based aircraft influence the planning and development of required hangar space, aircraft parking apron, and other related facilities. As seen above in **Table 2.2**, the TAF shows that based aircraft at Cottonwood Municipal Airport have declined between 2009 and 2019, characterized by a substantial dip in based aircraft between 2014 and 2015. The data published in the TAF differ substantially from the FAA National Based Aircraft Inventory Program for 2019. According to Airport management, this can be attributed to inconsistent reporting and a historical misrepresentation of based aircraft. As such, the overall approach to develop forecasts for this Master Plan Update is based on analysis of the FAA National Based Aircraft Inventory Program, existing activity, and identification of trends that will most likely impact aviation activity in the future.

A thorough in-person inventory of based aircraft was conducted by Airport staff in June 2020. The inventory identified 77 non-itinerant aircraft that were stored long term on apron areas utilizing tie-downs or in hangars. 64 of these aircraft were validated as based aircraft, with the remainder found to be registered at other airports, de-registered, or registered to the Airport's over-the-fence tenants. These over-the-fence aircraft were not included in the based aircraft count as it is not anticipated that they will drive airfield facility needs (e.g., apron space, hangars, aviation services). Additionally, these over-the-fence tenants are responsible for maintaining and improving airfield pavements that are exclusively for their use. The FAA National Based Aircraft Inventory Program database was updated in June 2020 to reflect this inventory. Based on this analysis, a baseline estimate of 64 based aircraft was established for forecasting purposes. The Airport's based aircraft during the planning horizon were forecast using several methodologies, culminating in a recommended methodology and forecast. These methodologies and forecasts are detailed in the following sections.

2.7.1. Based Aircraft – Socioeconomic Variable Forecast

Various socioeconomic characteristics, including population, employment, PCPI, and GRP can provide insight into the economic health of a specific locality or region. The forecasts presented in this section assumed that the future number of based aircraft at the Airport would mimic the forecast growth rates of socioeconomic characteristics for the compared geographic areas that were summarized in **Section 1.5.** As previously discussed, the population for the City of Cottonwood was extrapolated based on the City's 2015 Economic Development Strategic Plan, and the socioeconomic characteristics for Yavapai County and the State of

Arizona were sourced from Woods & Poole Economics, Inc. The resultant forecasts for based aircraft according to this methodology are depicted in **Table 2.3**.

Table 2.3 - Based Aircraft: Socioeconomic Variable Forecast

Year	Population			Employment*		PCPI		GRP
	Cotton-wood	Yavapai County	AZ	Yavapai County	AZ	Yavapai County	AZ	Yavapai County
2019	64	64	64	64	64	64	64	64
2024	68	69	69	69	70	68	69	72
2029	72	74	75	75	76	73	74	82
2034	77	80	81	82	83	78	79	92
2039	82	87	87	89	90	84	84	104
AAGR 2019-2039	1.23%	1.52%	1.56%	1.64%	1.72%	1.36%	1.39%	2.46%

Sources:
Woods & Poole Economics, Inc., 2019.
City of Cottonwood Economic Development Plan, 2015.
FAA Form 5010-1, Airport Master Record (effective May 21, 2020).
FAA National Based Aircraft Inventory Program database
Kimley-Horn, 2012.

Notes:
** = Employment status includes population 16 years and over.*
PCPI = Per capita personal income
GRP = Gross regional product
AZ = State of Arizona
AAGR = Average annual growth rate

As shown above, the based aircraft forecasts predicated on socioeconomic projections indicate that based aircraft at the Airport could range from 84 to 104 by 2039. This range reflects AAGRs of 1.39 percent (PCPI for Yavapai County) to 2.46 percent (GRP for Yavapai County) over the planning horizon.

2.7.2. Based Aircraft – Regional Market Share Forecast

The purpose of examining forecasts of neighboring airport activity is to account for variables that may impact the regional airport system and to identify factors that could affect based aircraft trends. The market share forecast compares Cottonwood Municipal Airport's share of based aircraft with that of a larger market. This analysis was developed using TAF projections of based aircraft at NPIAS airports within a 50-mile radius of the Airport: Prescott Ernest A. Love Field (PRC), Sedona (SEZ), Flagstaff Pulliam (FLG), and H.A. Clark Memorial Field (CMR) in Williams.

Shown in **Table 2.4**, Cottonwood Municipal Airport's market share of based aircraft, according to the TAF, has decreased overall between 2009 and 2018, particularly with a significant decrease between 2014 and 2015. As previously noted, this substantial decrease is likely due to inconsistent data reporting and a misrepresentation of historically based aircraft at the Airport between 2009 and 2018. However, as the base year utilizes updated data from the FAA's National Based Aircraft Inventory Program, the Airport's based aircraft 2019 market share is 11.43 percent.

Table 2.4 - Based Aircraft: Historical Market Share

Year	Ernest A. Love Field	Sedona Airport	Flagstaff Pulliam Airport	H.A. Clark Memorial Field	Cottonwood Municipal Airport	Total	% Cottonwood Municipal
2009	242	66	135	16	57	516	11.05%
2010	238	66	134	16	55	509	10.81%
2011	238	66	134	16	50	504	9.92%
2012	232	78	134	12	52	508	10.24%
2013	231	78	134	4	52	499	10.42%
2014	231	65	134	4	52	486	10.70%
2015	207	62	137	3	14	423	3.31%
2016	206	61	139	3	16	425	3.76%
2017	319	54	114	3	15	505	2.97%
2018	314	54	115	3	33	519	6.36%
2019	322	54	117	3	64	560	11.43%
AAGR 2009-2019	**4.04%**	**-1.62%**	**-1.24%**	**-11.67%**	**14.03%**	**1.11%**	**-**

Sources:
FAA Terminal Area Forecast (issued January 2020).
FAA National Based Aircraft Inventory Program.
Kimley-Horn, 2020.

Notes:
AAGR = Average annual growth rate

Table 2.5 presents three growth scenarios that were developed for based aircraft at the Cottonwood Municipal Airport using a market share comparison: low-, medium-, and high-growth scenarios.

The low-growth scenario assumed that the Airport's current market share of based aircraft in the region (11.43 percent) would remain constant throughout the planning horizon. This percentage was applied to TAF forecasts of based aircraft at other airports within the region and resulted in 95 based aircraft at Cottonwood Municipal Airport by 2039, which represents an AAGR of 2.01 percent.

The high-growth scenario assumed that the Airport's based aircraft market share would increase to 13 percent by 2039. This forecast reflects the following factors: 1) Incremental projected growth in the Airport's based aircraft; 2) Increased demand for fuel and new hangars; and 3) Anticipated economic growth within the City of Cottonwood, Yavapai County, and the State of Arizona. These factors support a high-growth methodology that increases the Airport's market share of based aircraft gradually over the 20-year planning horizon. This scenario resulted in 108 based aircraft in 2039, representing an AAGR of 2.67 percent.

The medium-growth scenario was developed by averaging the high- and low-growth scenarios, which resulted in 102 based aircraft in 2039 (12.21 percent market share) and an AAGR of 2.35 percent.

Table 2.5 - Based Aircraft: Regional Market Share Forecast

Year	Total Regional Based Aircraft	Low		Medium		High	
		P52 Based Aircraft	P52 Market Share	P52 Based Aircraft	P52 Market Share	P52 Based Aircraft	P52 Based Aircraft
2019	560	64	11.43%	64	11.43%	64	11.43%
2024	611	70	11.43%	71	11.63%	72	11.82%
2029	679	78	11.43%	80	11.82%	83	12.14%
2034	752	86	11.43%	90	12.02%	95	12.61%
2039	834	95	11.43%	102	12.21%	108	13.00%
AAGR 2019-2039	2.01%	2.01%	-	2.35%	-	2.67%	-

Sources:
FAA Terminal Area Forecast (Issued January 2020).
FAA National Based Aircraft Inventory Program.
Kimley-Horn, 2020.

Notes:
P52 = Cottonwood Municipal Airport FAA location identifier.
AAGR = Average annual growth rate

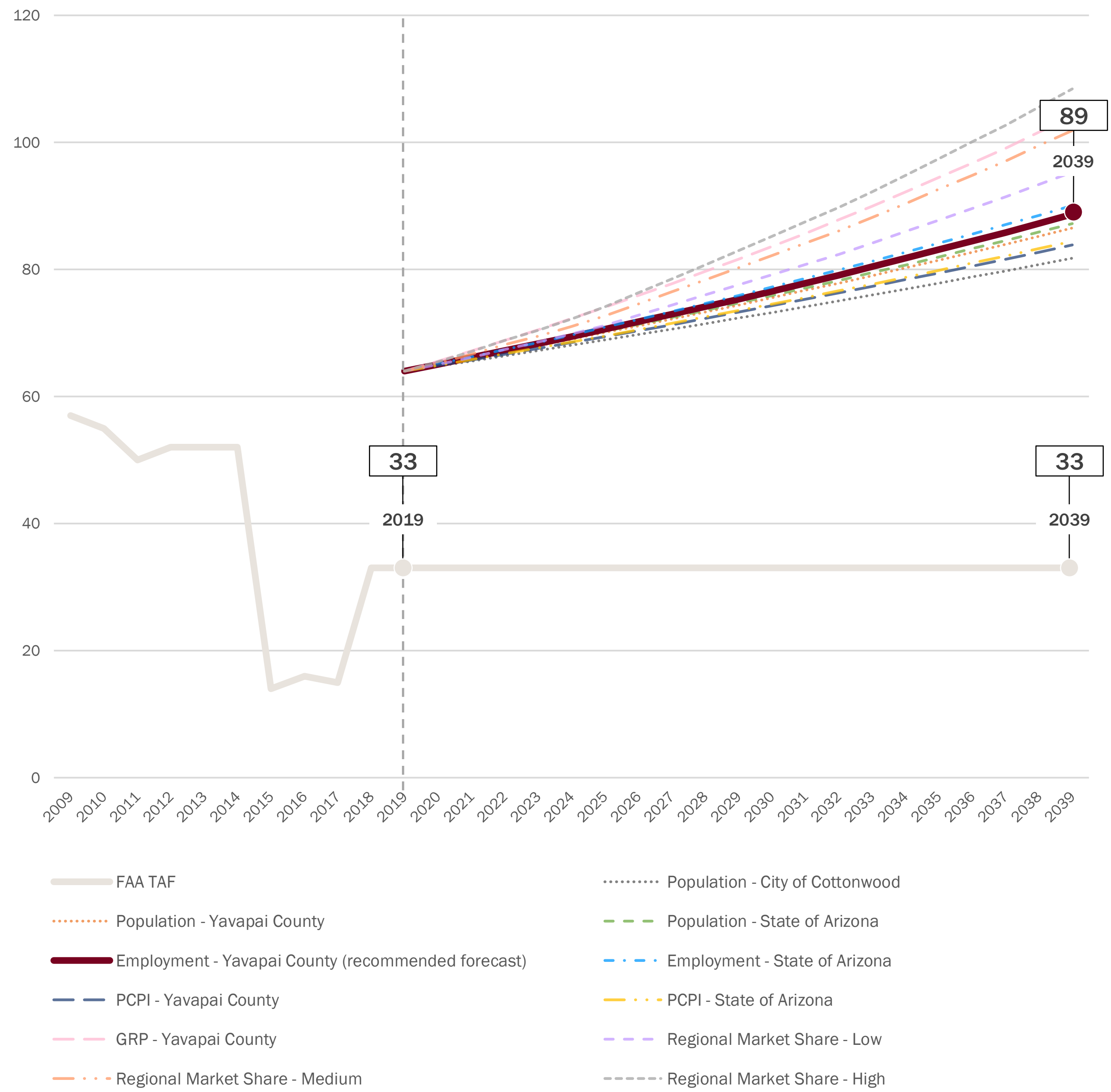
2.7.3. Based Aircraft – Recommended Forecast

Although accurate historical data were limited for these analyses, the Airport's June 2020 inventory of based aircraft confirmed that total based aircraft have increased significantly between 2009 and 2020. This increase can be attributed to population and economic growth within the City of Cottonwood and Yavapai County, increased demand and private investment at the Airport, and an evolution of the Airport's based aircraft and operational fleet mix (described in further detail in the following sections). Overall, the data indicate that the Airport's based aircraft growth is largely driven by the region's strong economy. Since employment is a key indicator of economic health (job opportunities may lead to population increases from outside an area and greater economic output), the recommended forecast for based aircraft at Cottonwood Municipal Airport is the **Yavapai County employment scenario.** This methodology forecast 89 based aircraft by 2039 and an AAGR of 1.64 percent.

While the regional market share forecasts resulted in similar growth rates, these methodologies examined external factors that appear to have less direct impacts on based aircraft at Cottonwood Municipal Airport. For example, based aircraft activity at Ernest A. Love Field in Prescott is largely driven by flight training demand, and based aircraft at Flagstaff Pulliam Airport reflect the area's robust tourism industry. For forecasting purposes, based aircraft trends at airports located close to each other but that generally serve different segments of aviation are not always the best indicators of activity at each individual airport in the region.

A summary of based aircraft forecasts presented in this section is depicted in **Figure 2.1.**

Figure 2.1 - Based Aircraft – Forecast Summary and Recommended Forecast



Sources:
FAA Terminal Area Forecast (issued January 2020).
Woods & Poole Economics, Inc., 2019.
City of Cottonwood Economic Development Plan, 2015.
FAA Form 5010-1, Airport Master Record (effective May 21, 2020).
FAA National Based Aircraft Inventory Program.
Kimley-Horn, 2012.

Notes:
FAA TAF = FAA Terminal Area Forecast
PCPI = Per capita personal income
GRP = Gross regional product

2.7.4. Based Aircraft – Fleet Mix Forecast

An airport's fleet mix impacts facility needs pertaining to size and type of aircraft storage hangars, aircraft tie-downs, aircraft parking apron, pavement strength, and others. Similar to many GA airports, the majority of Cottonwood Municipal Airport's based aircraft are single-engine piston aircraft. According to the FAA's National Based Aircraft Inventory Program, the Airport had 44 single-engine piston aircraft, five multi-engine piston aircraft, two turboprop aircraft, two jet aircraft, and 11 helicopters as of June 2020.

The Airport's fleet mix forecast was informed by industry trends identified in the *FAA Aerospace Forecasts 2020-2040*, input from Airport staff and tenants, and general assumptions regarding existing and future activity. The following trends from the *FAA Aerospace Forecasts 2020-2040* were consulted for this forecast:

- Single-engine piston aircraft are forecast to **decrease** 1 percent annually
- Multi-engine piston aircraft are forecast to **decrease** 0.5 percent annually
- Turboprop aircraft are forecast to **increase** 1.2 percent annually
- Jet aircraft are forecast to **increase** 2.2 percent annually
- Rotorcraft (helicopters) are forecast to **increase** 1.6 percent annually
- "Other" aircraft (e.g., light sport, experimental) are forecast to **increase** 3.4 percent annually

The following information based on Airport activity and local conditions was also used to inform this forecast:

- The Airport maintains a waitlist for its current hangars
- At the time this forecast was being developed, a 10-unit hangar was in the preliminary design phase
- At the time this forecast was being developed, two privately-owned hangars were under construction
- It is anticipated that six small business jets will be based at the Airport within five to ten years
- The City of Cottonwood and Yavapai County are experiencing substantial economic growth

Based on these trends and forecasts, **Table 2.6** depicts the existing and projected based aircraft fleet mix.

Table 2.6 - Based Aircraft: Fleet Mix Forecast

Year	Single-engine Piston	Multi-engine Piston	Turboprop	Jet	Rotorcraft	Other	Total*
2019	44	5	2	2	11	0	64
2024	45	5	2	4	12	1	69
2029	47	6	2	5	13	2	75
2034	48	6	4	6	14	3	82
2039	53	6	5	7	15	3	89
AAGR 2019-2039	0.82%	1.05%	5.99%	7.13%	1.56%	6.72%	1.64%

Sources:
FAA National Based Aircraft Inventory Program.
Federal Aviation Administration Aerospace Forecast 2020-2040.
Kimley-Horn, 2020.

Notes:
AAGR = Average annual growth rate
** = Total based aircraft are based on the preferred forecast (Yavapai County employment scenario).*

2.8. GENERAL AVIATION OPERATIONS FORECASTS

Aircraft operations volume and fleet mix forecasts determine funding and design criteria at airports. Aircraft operations at GA airports comprise nearly all segments of activity (with the exception of commercial air carrier and military operations), including training, corporate aviation, medical operations, and recreational activity. This section presents forecasts of GA operations at the Airport over the 20-year planning horizon.

As a non-towered airport, development of accurate operational estimates is challenging given that there is no comprehensive record of all aircraft operations. The TAF (issued January 2020) estimated a total of 18,800 GA operations at the Airport in 2019, and this number serves as the base-year figure of total GA operations for these forecasts. Several factors impact the volume of airport operations, including the number and type of based aircraft, socioeconomic variables, economic and aviation trends, and capability and condition of facilities. GA operations forecasts were developed using various methodologies, including socioeconomic variable comparisons, regional market share, and operations per based aircraft (OPBA).

2.8.1. GA Operations – Socioeconomic Variable Forecast

Similar to based aircraft forecasts presented in the previous section, forecasts of GA operations were developed using the same socioeconomic methodologies, where the population for the City of Cottonwood was extrapolated based on the City's 2015 Economic Development Strategic Plan and the socioeconomic characteristics for the State of Arizona and Yavapai County (including Yavapai County GRP) were sourced from Woods & Poole Economics, Inc. This methodology assumed that GA operations would change at the same rate as the comparison socioeconomic indicators. As shown in **Table 2.7**, the aircraft operations forecasts based on socioeconomic data resulted in a range of 24,020 to 30,569 annual GA operations by 2039, reflecting AAGRs between 1.23 percent and 2.46 percent over the planning horizon.

Table 2.7 - GA Operations: Socioeconomic Variable Forecast

Year	Population			Employment		PCPI		GRP
	Cotton-wood	Yavapai County	AZ	Yavapai County	AZ	Yavapai County	AZ	Yavapai County
2019	18,800	18,800	18,800	18,800	18,800	18,800	18,800	18,800
2024	20,044	20,351	20,385	20,586	20,653	20,369	20,418	21,438
2029	21,265	21,998	22,077	22,399	22,557	21,898	22,005	24,280
2034	22,660	23,700	23,834	24,212	24,486	23,264	23,407	27,316
2039	24,020	25,416	25,619	26,053	26,455	24,633	24,800	30,569
AAGR 2019-2039	**1.23%**	**1.52%**	**1.56%**	**1.64%**	**1.72%**	**1.36%**	**1.39%**	**2.46%**

Sources:
Woods & Poole Economics, Inc., 2019.
City of Cottonwood Economic Development Plan, 2015.
FAA Terminal Area Forecast (Issued January 2020).
Kimley-Horn, 2012.

Notes:
PCPI = Per capita personal income
GRP = Gross regional product
AZ = State of Arizona
AAGR = Average annual growth rate

2.8.2. GA Operations – Regional Market Share Forecast

The regional market share methodology compares the Airport's market share of aircraft operations to the GA operations at the five airports within a 50-mile radius of the Airport (described in **Section 2.6.2**). Like the regional market share forecast for based aircraft, this methodology compared activity at Cottonwood Municipal Airport with TAF forecasts of GA operations at regional airports. As shown in **Table 2.8**, the Airport possesses a regional market share of GA operations of 5.73 percent in 2019.

Table 2.8 - GA Operations: Historical Market Share

Year	Ernest A. Love Field	Sedona Airport	Flagstaff Pulliam Airport	H.A. Clark Memorial Field	Cottonwood Municipal Airport	Total	% Cottonwood Municipal
2009	253,410	48,000	34,059	8,100	18,700	362,269	5.16%
2010	227,269	48,000	30,424	8,100	18,700	332,493	5.62%
2011	248,580	48,000	34,119	8,100	18,700	357,499	5.23%
2012	244,293	33,600	43,201	6,100	18,700	345,894	5.41%
2013	256,796	33,600	38,881	6,100	18,700	354,077	5.28%
2014	276,482	33,600	40,674	6,100	18,700	375,556	4.98%
2015	273,176	33,600	44,263	6,100	18,800	375,939	5.00%
2016	255,486	33,600	44,127	6,500	18,800	358,513	5.24%
2017	230,007	33,600	39,486	6,500	18,800	328,393	5.72%
2018	241,258	33,600	42,956	6,500	18,800	343,114	5.48%
2019	229,654	33,600	39,282	6,500	18,800	327,836	5.73%
AAGR 2009-2019	**-0.74%**	**-3.00%**	**2.09%**	**-1.81%**	**0.05%**	**-0.84%**	**-**

Sources:
FAA Terminal Area Forecast (Issued January 2020).
Kimley-Horn, 2020.

Note: *AAGR = Average annual growth rate*

Table 2.9 shows three scenarios that were developed for GA operations: low, medium, and high.

The low-growth scenario assumed that the Airport's regional market share of GA operations of 5.73 percent would remain constant throughout the 20-year planning horizon. This figure (5.73 percent) was applied to TAF forecasts of GA operations at airports within the region and resulted in 19,507 GA operations at Cottonwood Municipal Airport in 2039, which represents an AAGR of 0.19 percent.

The high-growth scenario for GA operations assumed that the Airport's market share of operations would increase to 8 percent by 2039. This aggressive forecast is based on: 1) Incremental projected growth in the Airport's based aircraft as previously described **Section 2.6**; 2) Increased demand for fuel and new hangars; 3) Impacts to Airport operations by potential new users and the expansion of existing tenants; 4) Anticipated economic growth within the City of Cottonwood, Yavapai County, and the State of Arizona; and 5) The historical decline of GA operations at regional airports (except for Flagstaff Pulliam and Cottonwood Municipal Airport) as depicted above in **Table 2.8.** The high-growth scenario resulted in 27,213 operations at the Airport in 2039, representing an AARG of 1.87 percent.

The medium-growth scenario was developed by averaging the product of the high- and low-growth scenarios, which resulted in 23,360 GA operations in 2039 and an AAGR of 1.09 percent.

Table 2.9 - GA Operations: Regional Market Share Forecast

Year	Regional GA Operations	Low		Medium		High	
		P52 GA Operations	P52 Market Share	P52 GA Operations	P52 Market Share	P52 GA Operations	P52 Market Share
2019	327,836	18,800	5.73%	18,800	5.73%	18,800	5.73%
2024	327,222	18,765	5.73%	19,691	6.02%	20,618	6.30%
2029	331,462	19,008	5.73%	20,885	6.30%	22,762	6.87%
2034	335,773	19,255	5.73%	22,108	6.58%	24,960	7.43%
2039	340,165	19,507	5.73%	23,360	6.87%	27,213	8.00%
AAGR 2019-2039	**0.19%**	**0.19%**	-	**1.09%**	-	**1.87%**	-

Sources:
FAA Terminal Area Forecast (Issued January 2020).
Kimley-Horn, 2020.

Notes
GA = General Aviation
P52 = FAA location identifier for Cottonwood Municipal Airport
AAGR = Average annual growth rate

2.8.3. GA Operations – FAA Aerospace Forecast Fleet Mix

As previously discussed, the FAA reports aviation trends and forecasts in its annual Aerospace Forecast. Absent of other variables, this forecast methodology assumed that growth rates by aircraft type at Cottonwood Municipal Airport would mimic projections of GA hours flown by aircraft type described in the *FAA Aerospace Forecast 2020-2040*:

- Single-engine piston aircraft operations are forecast to **decrease** 1 percent annually
- Multi-engine piston aircraft operations are forecast to **decrease** 0.3 percent annually
- Turboprop aircraft operations are forecast to **increase** 1.3 percent annually
- Jet aircraft operations are forecast to **increase** 2.6 percent annually
- Rotorcraft (helicopter) operations are forecast to **increase** 2.1 percent annually
- "Other" operations (e.g., light sport, experimental) are forecast to **increase** 4.2 percent annually

As shown in **Table 2.10**, these annual growth rates were applied to base-year operations by aircraft type. It should be noted that base-year operations by aircraft type were not sourced directly from the TFMSC, which is derived from IFR flights and/or traffic that is captured by the FAA's enroute computers, as the data are not representative of all 2019 operations. Rather, to obtain base-year figures that are more representative of actual operations, the following information was applied to this forecast:

- **Jet aircraft:** Interviews with tenants and Airport management revealed that approximately 120 small jet operations occur at the Airport on an annual basis. The majority of these operations are related to Cessna Citation type ratings that operate VFR. Therefore, these operations are not captured by the TFMSC. Based on this information, 120 was used as the base-year figure for jet operations.

- **Turboprop aircraft:** The base-year figure for turboprop aircraft (214) was sourced directly from the TFMSC database as it can be reasonably assumed that these larger aircraft file IFR flight plans and/or can be tracked by the FAA's enroute computers. Turboprop aircraft accounted for more than 54 percent of the Airport's 2019 TFMSC operations.
- **Single-engine piston, multi-engine piston, rotorcraft, and other/experimental aircraft:** Jet and turboprop aircraft made up approximately 64 percent of the Airport's 2019 TFMSC operations. Based on tenant mix, based aircraft, and airfield observations, it cannot be reasonably assumed that this reported fleet mix reflects the Airport's true operations. Additionally, operations by single-engine piston, multi-engine piston, rotorcraft, and other/experimental aircraft are less likely to be captured by the TFMSC database (e.g., VFR flights, operations that remain in the local airspace). Therefore, base-year operations for these aircraft types were deduced by comparing the respective TFMSC percentages of operations to total operations from the TAF.

  For example: of the 395 GA operations at the Airport that were reported by the TFMSC database, 251 were performed by jet or turboprop aircraft. Since operations by jet and turboprop aircraft have already been accounted for based on the aforementioned logic, the remaining 144 TFMSC operations *(395 – 251 = 144)* were used as the base for this sub-analysis. Of the Airport's 144 non-jet and non-turboprop TFMSC operations, 93 (or 64.58 percent) were performed by single-engine piston aircraft. This percentage (64.58 percent) was then compared to the non-jet and non-turboprop 2019 TAF operations (18,466) *(18,800 total GA operations – 334 jet and turboprop operations = 18,466)*. This results in a base-year operations figure for single-engine piston aircraft of 11,926 *(18,466 x 64.58 percent)*. This process was repeated for multi-engine piston aircraft, rotorcraft, and other/experimental aircraft.

Based on nationwide industry trends alone, the results of this forecast show a decline in total GA operations at the Airport over the 20-year planning horizon. The overall AAGR of -0.51 percent is a product of the fact that the vast majority of the Airport's existing operations are performed by single-engine and multi-engine piston aircraft, both of which are forecast to decline in the long term. This forecast methodology, however, does not account for other variables such as new tenants, hangar demand, and regional socioeconomic conditions.

Table 2.10 - GA Operations: FAA Aerospace Fleet Mix

Year	Single-Engine Piston [1]	Multi-Engine Piston [1]	Turboprop [2]	Jet [3]	Rotorcraft [1]	Other/ Experimental [1]	Total
2019	11,926	6,027	214	120	128	385	18,800
2024	11,341	5,937	228	136	142	473	18,258
2029	10,786	5,849	244	155	158	581	17,771
2034	10,257	5,762	260	176	175	713	17,343
2039	9,754	5,676	277	201	194	876	16,978
AAGR 2009-2019	-1.00%	-0.30%	1.30%	2.60%	2.10%	4.20%	-0.51%

Sources:
FAA Traffic Flow Management System Counts database.
FAA Terminal Area Forecast (Issued January 2020).
Kimley-Horn, 2020.

Notes
1 = 2019 operations were calculated by comparing the respective TFMSC percentages of operations (minus jet and turboprop operations) to total TAF operations.
2 = 2019 operations were sourced directly from the TFMSC database as it can be reasonably assumed that these larger aircraft file IFR flight plans and/or can be tracked by the FAA's enroute computers.
3 = Tenant and Airport staff interviews revealed that approximately 120 small jet operations occur at the Airport on an annual basis. Most of these operations are for the purpose of performing local Cessna Citation type ratings that operate VFR. Therefore, these operations are not captured by the TFMSC.
AAGR = Average annual growth rate

2.8.4. GA Operations – Operations per Based Aircraft Forecast

The final methodology to forecast GA operations utilizes a ratio of OPBA to estimate future demand. Because accurate historical based aircraft data were limited, the OPBA methodology assumed that the ratio of GA operations to based aircraft in base year 2019 (294) would remain constant throughout the 20-year forecast horizon. This ratio was applied to the recommended based aircraft forecast described in the previous section. As shown in **Table 2.11**, this methodology resulted in 26,054 GA operations by 2039 and an AAGR of 1.64 percent.

Table 2.11 - GA Operations: Operations per Based Aircraft Forecast

Year	Recommended Forecast – Based Aircraft	Operations per Based Aircraft Forecast	GA Operations
2019	64	294	18,800
2024	69	294	20,398
2029	75	294	22,132
2034	82	294	24,013
2039	89	294	26,054
AAGR 2019 - 2039	1.64%	-	1.64%

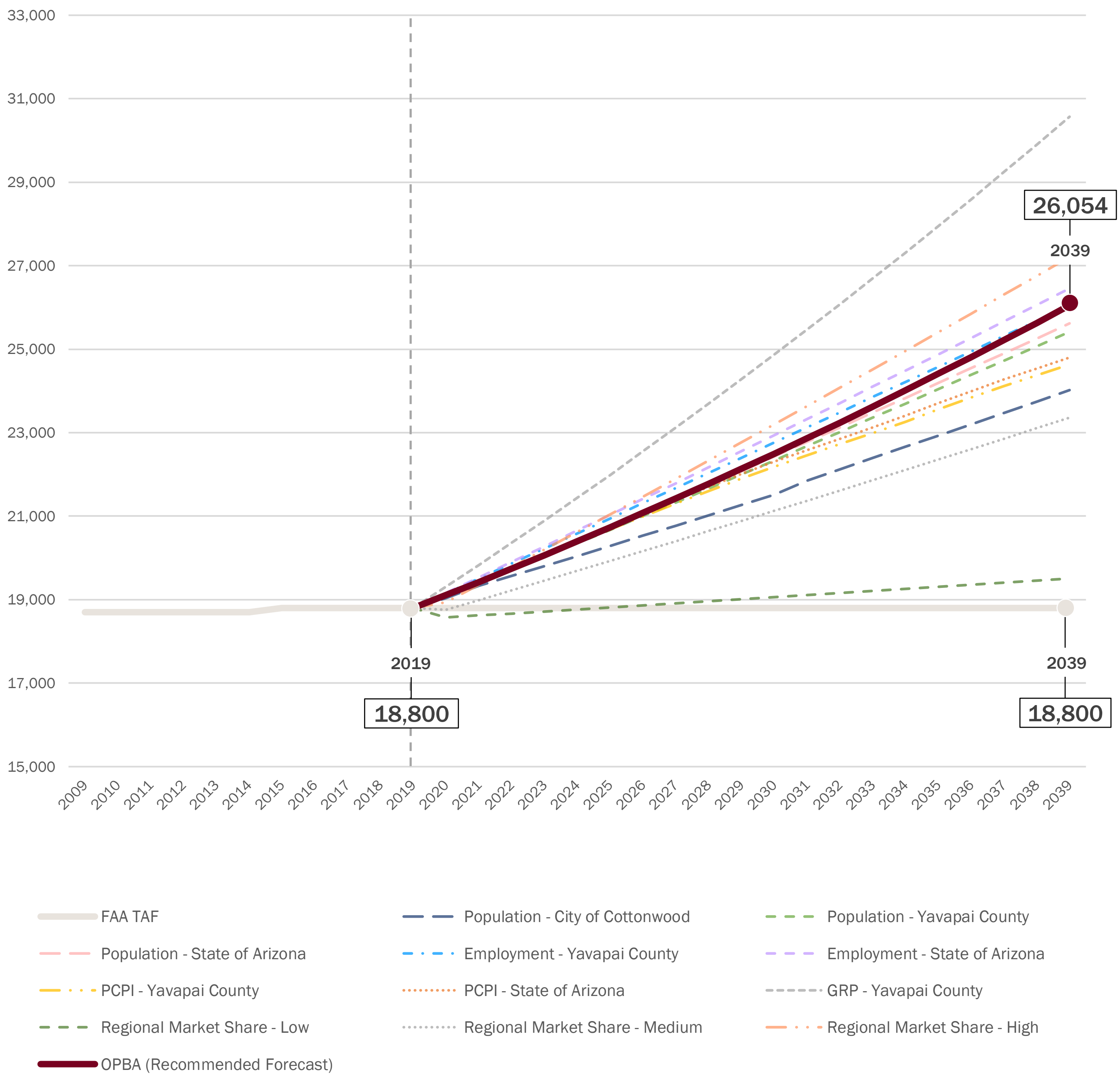
Sources:
FAA National Based Aircraft Inventory Program.
FAA Terminal Area Forecast (Issued January 2020).
Kimley-Horn, 2020.

Notes:
GA = General aviation
AAGR = Average annual growth rate

2.8.5. GA Operations – Recommended Forecast

While GA operations at the Airport are expected to increase with economic growth in the region, there is strong demand for hangar space, fuel, and other airport facilities. The socioeconomic, regional market share, and FAA Aerospace fleet mix forecasts rely solely on single variables to project the Airport's GA operations (e.g., regional growth factors, national industry trends). Alternatively, the OPBA forecast accounts for national industry trends, regional economic growth, and airport-specific anticipated demand by incorporating the recommended based aircraft forecast and operations data from the TAF. Due to strong regional growth and a projected increase in the Airport's based aircraft, **OPBA is the recommended forecast for GA operations at the Cottonwood Municipal Airport.** As previously depicted in **Table 2.10**, this scenario forecast 26,054 operations by 2039 and an AAGR of 1.64 percent. A summary of GA operations forecasts is provided in **Figure 2.2**.

Figure 2.2 - GA Operations – Forecast Summary and Recommended Forecast



Sources:
FAA Terminal Area Forecast (issued January 2020).
Woods & Poole Economics, Inc., 2019.
FAA National Based Aircraft Inventory Program.
Kimley-Horn, 2012.

Notes:
FAA TAF = FAA Terminal Area Forecast
PCPI = Per capita personal income
OPBA = Operations per based aircraft

2.9. OPERATIONS TYPES FORECASTS

This section utilizes the recommended forecast for GA operations (the OPBA forecast), as analyzed in **Section 1.7**, to review additional operational activity at the Airport, including military, local/itinerant, time-of-day, and IFR operations over the 20-year planning horizon.

2.9.1. Military Operations Forecast

As previously noted, Cottonwood Municipal Airport experiences a limited number of military operations. According to the TAF, the Airport averaged 22 military operations per year between 2009 and 2019, or approximately 0.5 percent of annual operations. Military operations at public use airports can be difficult to predict as activity is typically not tied to the same drivers that impact general aviation. As such, the TAF is the preferred methodology for military operations at the Airport, which projects 0 local and 100 itinerant military operations annually between 2019 and 2039.

2.9.2. Local/Itinerant Operations Forecast

Aircraft operations are categorized as local or itinerant. Local operations are flights that depart from the Airport and remain in the Airport's traffic pattern or have a designated practice area within a 20-mile radius of the Airport. Local operations also include touch-and-go and training activity. Itinerant operations are flights that land at the Airport from another airport or depart from the Airport and leave the Airport's immediate area.[54]

In 2019, among Cottonwood Municipal Airport's 18,900 operations approximately 42.33 percent were local and 57.67 percent were itinerant according to the TAF. Based on this data and in consultation with Airport management, it was assumed that these local/itinerant percentages would remain consistent throughout the planning horizon. Local and itinerant operations forecasts are shown in **Table 2.12**.

Table 2.12 - Local/Itinerant Operations Forecast

Year	Total Operations*	Local Operations	% Local	Itinerant Operations	% Itinerant
2019	18,900	8,000	42.33%	10,900	57.67%
2024	20,498	8,677	42.33%	11,821	57.67%
2029	22,232	9,411	42.33%	12,821	57.67%
2034	24,113	10,207	42.33%	13,906	57.67%
2039	26,154	11,071	42.33%	15,083	57.67%
AAGR 2019-2039	**1.64%**	**1.64%**	-	**1.64%**	-

Sources:
FAA Terminal Area Forecast (Issued January 2020).
Kimley-Horn, 2020.

Notes:
AAGR = Average annual growth rate
** = Total operations include all forecast GA and military operations.*

[54] Federal Aviation Administration, Advisory Circular 150/5070-6B, Change 2, *Airport Master Plans*, 2015.

2.9.3. Daytime/Evening Operations Forecast

The FAA defines nighttime operations as those that are conducted between 10:00 pm and 7:00 am. Daytime and evening operations are important elements to include in the planning process because noise impacts created by aircraft arriving or departing at night are greater than during the day. The forecast of daytime and evening operations can also help drive facility requirements such as improvements to airport lighting and NAVAIDs.

According to Airport management, approximately 10 percent of aircraft operations are estimated to occur at nighttime as many operations occur between 6:00 am and 7:00 am. As shown in **Table 2.13**, it is anticipated that the percentage of daytime/evening operations will remain constant throughout the planning horizon.

Table 2.13 - Daytime/Evening Operations Forecast

Year	Total Operations*	Daytime Operations	% Daytime	Nighttime Operations	% Nighttime
2019	18,900	17,010	90.00%	1,890	10.00%
2024	20,498	18,448	90.00%	2,050	10.00%
2029	22,232	20,009	90.00%	2,223	10.00%
2034	24,113	21,702	90.00%	2,411	10.00%
2039	26,154	23,538	90.00%	2,615	10.00%
AAGR 2019-2039	1.64%	1.64%	-	1.64%	-

Sources:
FAA Terminal Area Forecast (Issued January 2020).
Kimley-Horn, 2020.

Notes:
AAGR = Average annual growth rate
** = Total operations include all forecast GA and military operations.*

2.9.4. Instrument Operations Forecast

An instrument operation is a takeoff or landing conducted during IFR conditions or operations aboard aircraft that enter Class A airspace during a flight (18,000 feet MSL). Aircraft that can operate in Class A airspace are typically commercial or corporate-type turbo-props and jets.

Because Cottonwood Municipal Airport is a non-towered airport, the exact number of annual instrument approaches (AIA) cannot be determined. However, the FAA's TFMSC database includes data for IFR flights and those flights captured by the FAA's enroute computers. As described in **Chapter 1 - Inventory of Existing Conditions**, the Airport is served by one SIAP for instrument approaches (an RNAV GPS that is aligned with Runway 32) and one ODP for instrument departures. Aircraft operations that utilize these procedures are reported in the FAA's TFMSC database and can be used to determine the approximate number of IFR flights.

According to the TFMSC database, IFR operations accounted for approximately 2.09 percent of total annual operations at the Airport in 2019. This analysis assumed that this figure (2.09 percent) would remain constant throughout the 20-year planning period. As shown in **Table 2.14**, annual IFR operations were forecast to reach 547 by 2039, which represents an AAGR of 1.64 percent from 2019 to 2039.

Table 2.14 - Instrument Operations Forecast

Year	Total Operations*	Instrument Operations	% Instrument	Visual Operations	% Visual
2019	18,900	395	2.09%	18,505	97.91%
2024	20,498	428	2.09%	20,070	97.91%
2029	22,232	465	2.09%	21,767	97.91%
2034	24,113	504	2.09%	23,609	97.91%
2039	26,154	547	2.09%	25,607	97.91%
AAGR 2019-2039	**1.64%**	**1.64%**	-	**1.64%**	-

Sources:
FAA Terminal Area Forecast (Issued January 2020).
FAA Traffic Flow Management System Counts database.
Kimley-Horn, 2020.

Note:
AAGR = Average annual growth rate
** = Total operations include all forecast GA and military operations.*

2.9.5. Touch-and-Go Operations Forecast

A touch-and-go operation is conducted by an aircraft that lands and departs on a runway without stopping or exiting. This type of operation is typically associated with flight training. Touch-and-go operations forecasts are important to identify because they impact airfield capacity, which is presented in **Chapter 3 - Facility Requirements** of this Master Plan Update.

Based on feedback from Airport Management, it was identified that approximately half of local operations at the Airport are touch and go. This figure was applied to forecast local operations and held constant throughout the projection period. As shown in **Table 2.15**, the Airport is anticipated to experience 5,514 touch-and-go operations by 2039.

Table 2.15 - Touch-and-Go Operations Forecast

Year	Total Operations*	Local Operations	Touch-and-Go Operations
2019	18,900	8,000	4,000
2024	20,498	8,634	4,317
2029	22,232	9,368	4,684
2034	24,113	10,165	5,082
2039	26,154	11,029	5,514
AAGR 2019 - 2039	**1.64%**	**1.62%**	**1.62%**

Sources:
FAA Terminal Area Forecast (Issued January 2020).
Cottonwood Municipal Airport Management
Kimley-Horn, 2020.

Note:
AAGR = Average annual growth rate
** = Total operations include all forecast GA and military operations.*

2.10. PEAK OPERATIONS FORECASTS

Forecasts of peak activity are utilized to identify airfield capacity constraints, itinerant aircraft parking needs, and other facility requirements. Identification of peak periods that occur on a regular basis is essential to ensure that facilities are not underutilized or over-planned. The periods used in the capacity analysis and facility requirements are as follows:

- **Peak Month:** the calendar month when peak activity occurs
- **Peak Month Average Day (PMAD):** daily average activity that occurs in the peak month
- **Peak Hour:** representative hour that best reflects elevated levels of activity that occurs on a regular basis

Peak operations forecasts are displayed in **Table 2.16.** Without ATCT data or physical operations counts, the FAA TFMSC database was consulted to identify peak month forecasts for years 2009 through 2019. Historically, the Airport's peak month fluctuated, but peak-month operations consistently represented approximately 12 percent of annual operations according to the TFMSC database. This figure was applied to total forecast annual operations and held constant through the 20-year planning horizon. Additionally, projections of PMAD were determined by dividing peak-month operations by 30. According to Airport management, peak-hour operations were estimated to account for 15 percent of PMAD operations, which was held constant through the 20-year planning horizon.

Table 2.16 - Peak Operations Forecast

Year	Total Operations [1]	Peak Month Operations [2]	PMAD Operations	Peak Hour Operations [3]
2019	18,900	2,268	76	11
2024	20,498	2,460	82	12
2029	22,232	2,668	89	13
2034	24,113	2,894	96	14
2039	26,154	3,138	105	16
AAGR 2019 - 2039	**1.64%**	**1.64%**	**1.64%**	**1.64%**

Sources:
FAA Traffic Flow Management System Counts database.
Kimley-Horn, 2020.

Notes:
PMAD = Peak month average day
1 = Total operations include all forecast GA and military operations.
2 = Peak month operations represent approximately 12% of annual operations.
3 = Peak hour operations were estimated to account for approximately 15% of PMAD operations.

2.11. CRITICAL AIRCRAFT

Airside facility planning is largely driven by criteria and standards developed by the FAA that emphasize safety and efficiency while protecting federal investment in airport transportation infrastructure. These design criteria and standards are contained within AC 150/5300-13A and cover various airport infrastructure and their functions for a wide range of size and performance characteristics of aircraft that are anticipated to use an airport, including runway and taxiway dimensions, separation distances between aircraft and various objects, airspace protection requirements, and land use controls. Airport sponsors that accept federal AIP grants are required to adhere to the FAA design standards.

As discussed in **Chapter 1 - Inventory of Existing Conditions**, the FAA classifies and groups aircraft with similar approach speeds and sizes into an ARC. Each airport's ARC is representative of the critical aircraft. Defined in AC 150/5300-13A, the critical aircraft is the most demanding aircraft that conducts at least 500 operations per year at an airport, not including touch-and-go operations. This aircraft, or a combination of multiple aircraft, presents the most demand on the airport in terms of operational and physical characteristics.

An airport's ARC is comprised of two components: the AAC and the ADG. The AAC relates to the approach speed of an aircraft and groups aircraft based on final approach speed at the maximum landing weight (MLW). Approach categories, depicted in letters, and corresponding approach-speed thresholds are depicted in **Table 2.17**. As shown in **Table 2.18**, the ADG is represented by a Roman numeral and relates to the physical size of the aircraft, specifically wingspan and tail height. Aircraft dimensional standards affect airfield geometry design including separation criteria for runways, taxiways, and aircraft parking areas.

Table 2.17 - Aircraft Approach Categories

Aircraft Approach Category	Approach Speed
A	Approach speed less than 91 knots
B	Approach speed 91 knots or more but less than 121 knots
C	Approach speed 121 knots or more but less than 141 knots
D	Approach speed 141 knots or more but less than 166 knots
E	Approach speed 166 knots or more

Source: *FAA Advisory Circular 150/5300-13A, Change 1, Airport Design, 2014.*

Table 2.18 - Airplane Design Groups

Airplane Design Group	Tail Height (feet)	Wingspan (feet)
I	< 20	< 49'
II	20' - < 30'	49' - < 79'
III	30' - < 45'	79' - < 118'
IV	45' - < 60'	118' - < 171'
V	60' - < 66'	171' - < 214'

Source: *FAA Advisory Circular 150/5300-13A, Change 1, Airport Design, 2014.*

A lower ARC typically represents smaller, slower aircraft used for recreation and/or training. Higher ARCs usually indicate larger commercial or military aircraft. ARC designations in the middle categories generally include turboprops and corporate jets. It should be noted that an airport's ARC is used for planning and design only and does not limit the aircraft that may be able to operate safely at an airport.

2.11.1. Existing ARC and Critical Aircraft

Cottonwood Municipal Airport's 2006 ALP (the Airport's current ALP at the time of writing) designated the Airport's ARC as B-I with the Cessna Citation I as the critical aircraft. Additionally, both the 2001 Master Plan Update and the ALP recommended the Airport ultimately plan for a future ARC of B-II and use the Beechcraft King Air 300 as the critical aircraft.

With no ATCT or aircraft operations tracking system at the Airport, the exact numbers of annual operations by aircraft type are unknown. However, the FAA's TFMSC database was used to obtain information on IFR operations and operations recorded by the FAA's enroute computers between 2010 and 2019. The TFMSC did not show 500 operations conducted by any single aircraft type or group of aircraft in 2019. According to the database, the aircraft types with the highest number of operations in 2019 included the Beechcraft King Air 90 (B-I; 80 operations), the Piper Malibu Meridian (A-I; 66 operations), the Piper Cheyenne II (B-I; 45 operations), and the Cessna Skyhawk 172/Cutlass (A-I; 41 operations).

Based on FAA criteria, further analysis of the TFMSC data and discussions with Airport management have resulted in an existing ARC designation of A-I (small) with all aircraft within the A-I (small) category making up the Airport's critical aircraft. The FAA defines "small" aircraft as those with an MTOW of 12,500 pounds or less. This determination accounts for the large number of based aircraft with an A-I (small) designation and the limited operational data from the TFMSC.

2.11.2. Future ARC and Critical Aircraft

To identify the Airport's future ARC and critical aircraft, TFMSC data for base year 2019 were examined by aircraft characteristics (AAC/ADG) and type. Additionally, the following information obtained from Airport management and tenants (which is not represented in the TFMSC data but is pertinent to this forecast) was also incorporated into the analysis:

- As part of type-rating training activity, an Airport tenant conducts approximately 104 VFR operations annually with a Cessna Citation I, which has an AAC/ADG of B-I (small). These operations are not accounted for in the TFMSC database since they are conducted under VFR. Therefore, 104 operations were added to total B-I operations for base year 2019 (**Table 2.19**). For purposes of the operations-by-aircraft-type analysis (**Table 2.20**), 104 annual operations were held constant for the Cessna Citation I through 2039 since it is anticipated that the type-rating training activity will remain relatively stable throughout the 20-year planning horizon.

Once base-year figures were established, a linear regression analysis was conducted for the years 2015 through 2019 and projected through 2039. As presented in **Table 2.19**, the AAC/ADG analysis showed that

B-I aircraft would collectively account for more than 500 annual operations by 2029. Furthermore, the analysis based on aircraft type (**Table 2.20**) showed that the Cessna Citation I, Beechcraft King Air 90, and Piper Cheyenne II would conduct the majority of B-I operations at the Airport and would collectively account for 512 operations by 2030. With all three aircraft possessing an AAC/ADG of B-I (small), these aircraft will represent the most demanding group of aircraft that conduct at least 500 operations per year at the Airport. As previously stated, the FAA defines "small" aircraft as those with an MTOW of 12,500 pounds or less. The Cessna Citation I, Beechcraft King Air 90, and the Piper Cheyenne II have MTOWs of 11,850 pounds, 9,300 pounds, and 9,000 pounds, respectively.

Table 2.19 - Critical Aircraft: Operations by Aircraft Approach Category / Airplane Design Group

Year	A-I	A-II	B-I	B-II	C-I
2019	236	18	266	44	0
2024	511	39	375	59	3
2029	727	54	528	88	4
2034	943	69	681	117	5
2039	1,159	84	834	146	6

Sources:
FAA Traffic Flow Management System Counts database.
Kimley-Horn, 2020.

Table 2.20 - Critical Aircraft: Operations by Aircraft Type

Year	Cessna Citation I	Beechcraft King Air 90	Piper Cheyenne II	Total Critical Aircraft [1]	Total B-I+ Operations [2]
2019	104	86	56	246	310
2024	104	153	89	346	418
2029	104	236	144	484	577
2030	104	253	155	512	608
2034	104	319	199	622	736
2039	104	402	254	760	895

Sources:
FAA Traffic Flow Management System Counts database.
Kimley-Horn, 2020.

Notes:
1 = Total critical aircraft include forecast operations by the Cessna Citation I, Beechcraft King Air 90, and Piper Cheyenne II.
2 = Total B-I+ operations include all operations by aircraft with an AAC/ADG of B-I, B-II, C-I, and C-II.

This forecast results in a future ARC of B-I (small). Based on regularly occurring activity and similar aircraft characteristics, **the Airport's future critical aircraft is recommended to be a combination of the Cessna Citation I, Beechcraft King Air 90, and the Piper Cheyenne II.** Physical characteristics of these aircraft are presented in **Table 2.21.** It should be noted that operational activity could trigger this change earlier than 2029 based on existing and potential future tenant demand.

Table 2.21 - Critical Aircraft: Future Critical Aircraft Characteristics

Aircraft Type	2019 Ops.	2039 Ops.[1]	AAC + ADG [2]	Taxiway Design Group	Wingspan (feet)	Tail Height (feet)	Length (feet)	Approach Speed (knots)	MTOW (lbs.)
Cessna Citation I	104	104	B-I (small)	2	47.08	14.4	43.60	107	11,850
Beechcraft King Air 90	80	205	B-I (small)	1A	45.92	14.67	35.50	100	9,300
Piper Cheyenne II	45	386	B-I (small)	1A	42.69	12.75	34.67	98	9,000

Sources:
FAA Traffic Flow Management System Counts database.
FAA Aircraft Characteristics Database.

Notes:
Ops. = Operations
ARC = Airport reference code
MTOW = Maximum certificated takeoff weight
1 = 2039 operations are based on the critical aircraft forecast as presented in Section 2.11.2.
2 = The FAA defines "small" aircraft as those with an MTOW of 12,500 pounds or less.

2.12. FORECAST SUMMARY

Table 2.22 presents a summary of recommended forecasts developed in this chapter. As discussed, the number of based aircraft and GA operations are tied with significant socioeconomic growth in the region as well as demand for existing and new Airport facilities. Therefore, based aircraft are expected to increase commensurate with employment growth of Yavapai County, and GA operations per based aircraft are expected to remain constant throughout the 20-year planning horizon. Although the proportion of single- and multi-engine piston aircraft is anticipated to decrease in relation to the Airport's total number of based aircraft (in line with national aviation industry trends), an increase in turboprop, jet, experimental/light sport, and rotorcraft aircraft is anticipated to greatly contribute to the increase in based aircraft and GA operations through 2039. The forecasts analyzed in this chapter are used to inform facility needs presented in **Chapter 3 – Facility Requirements.**

Table 2.22 - Aviation Activity Forecast Summary

Year	Based Aircraft	GA Operations
2019	64	18,800
2024	69	20,398
2029	75	22,132
2034	82	24,013
2039	89	26,054
AAGR 2019 - 2039	**1.64%**	**1.64%**

Sources:
FAA Terminal Area Forecast (issued January 2020).
FAA Traffic Flow Management System Counts database.
Cottonwood Municipal Airport Management.
Kimley-Horn, 2020.

Note: *AAGR = Average annual growth rate.*

2.13. FAA FORECAST REVIEW AND APPROVAL

FAA Airport District Offices (ADOs) are responsible for forecast approvals. When reviewing a sponsor's forecast, the FAA must ensure that the forecast is based on reasonable planning assumptions, uses current data, and is developed using appropriate forecast methods. Additional discussion on assumptions and methodologies can be found in the FAA Aviation Policy and Plans Office (APO) report, *Forecasting Aviation Activity by Airport*. After a thorough review of the forecast, the FAA then determines if the forecast is consistent with the TAF. For all classes of airports, forecasts are considered consistent with the TAF if they meet the following criterion:

- Forecasts differ by less than 10 percent in the 5-year forecast period
- Forecasts differ by less than 15 percent in the 10-year forecast period

If the forecast is not consistent with the TAF, differences must be resolved if the forecast is to be used in FAA decision making. This may involve revisions to the airport sponsor's submitted forecasts, adjustments to the TAF, or both. If a forecast is inconsistent with the TAF, however, it may still be reviewed by an ADO if:

- Five- and ten-year forecasts do not exceed 200 based aircraft or 200,000 total annual operations, **AND**
- Any related development associated with the forecasts will not require an Environmental Impact Study (EIS) and/or Benefit/Cost Analysis (BCA)

Table 2.24 and **Table 2.25** present the FAA tables that contain a 15-year comparison of recommended forecasts developed in this chapter and forecasts identified in the TAF, issued January 2020. The tables were obtained from Appendix B and Appendix C of "Forecasting Aviation Activity by Airport" prepared by the FAA's Office of Aviation Policy and Plans Statistics and Forecast Branch.

As shown in **Table 2.24**, the forecasts of based aircraft and GA operations exceed the FAA's 10- and 15-percent criteria in the 5- and 10-year forecast periods, respectively. For based aircraft, forecasts are inconsistent with the TAF because base-year data were obtained from an actual aircraft inventory that was uploaded to and validated by the FAA National Based Aircraft Inventory Program rather than data sourced directly from the TAF. For GA operations, TAF data do not represent a complete picture of aviation activity at the Airport since there is no tower to create a comprehensive record of all takeoffs and landings. Most notably, the TAF's forecasts for both based aircraft and GA operations remain constant throughout the planning period, whereas the forecasts presented in this chapter are informed by various market and industry trends. Overall, the TAF's historical and projected data do not incorporate the substantial growth that the Airport and Yavapai County have experienced and are expected to continue to experience throughout the 20-year planning horizon.

It should also be noted that the five- and ten-year forecasts do not exceed 200 based aircraft or 200,000 total annual operations. Additionally, it is anticipated that related development associated with these forecasts will not require an EIS or BCA. Therefore, according to the FAA, these forecasts may still be reviewed by the ADO despite the fact that they are inconsistent with current TAF data.

Table 2.23 - FAA Template for Comparing Airport Planning and TAF Forecasts

Year		P52 Forecast	TAF	P52 / TAF % Difference
Based Aircraft				
Base Year	2019	64	33	93.9%
Base Year + 5 Years	2024	69	33	110.4%
Base Year + 10 Years	2029	75	33	128.3%
Base Year + 15 Years	2034	82	33	147.7%
Base Year + 20 Years	2039	89	33	168.8%
Itinerant GA Operations				
Base Year	2019	10,800	10,800	0.0%
Base Year + 5 Years	2024	11,721	10,800	8.5%
Base Year + 10 Years	2029	12,721	10,800	17.8%
Base Year + 15 Years	2034	13,806	10,800	27.8%
Base Year + 20 Years	2039	14,983	10,800	38.7%
Local GA Operations				
Base Year	2019	8,000	8,000	0.0%
Base Year + 5 Years	2024	8,677	8,000	8.5%
Base Year + 10 Years	2029	9,411	8,000	17.6%
Base Year + 15 Years	2034	10,207	8,000	27.6%
Base Year + 20 Years	2039	11,071	8,000	38.4%
Total GA Operations				
Base Year	2019	18,800	18,800	0.0%
Base Year + 5 Years	2024	20,398	18,800	8.5%
Base Year + 10 Years	2029	22,132	18,800	17.7%
Base Year + 15 Years	2034	24,013	18,800	27.7%
Base Year + 20 Years	2039	26,054	18,800	38.6%
Total Operations				
Base Year	2019	18,900	18,900	0.0%
Base Year + 5 Years	2024	20,498	18,900	8.5%
Base Year + 10 Years	2029	22,232	18,900	17.6%
Base Year + 15 Years	2034	24,113	18,900	27.6%
Base Year + 20 Years	2039	26,154	18,900	38.4%

Sources:
FAA Terminal Area Forecast (issued January 2020).
Kimley-Horn, 2020.

Notes:
P52 = Cottonwood Municipal Airport FAA location identifier
TAF = FAA Terminal Area Forecast
TAF data is on a U.S. government fiscal year basis (October through September).
Table is developed from Appendix C in the FAA Report "Forecasting Aviation Activity by Airport."

Table 2.24 - Template for Summarizing and Documenting Airport Planning Forecasts

A. Forecast Levels and Growth Rates							
	Base Year (2019)	Base Year + 5 Years (2024)	Base Year + 10 Years (2029)	Base Year + 15 Years (2034)	Base Year to +5 Years (2024)	Base Year to +10 Years (2029)	Base Year to +15 Years (2034)
	Operations				Average Annual Growth Rates		
Itinerant							
GA	10,800	11,721	12,721	13,806	1.7%	1.7%	1.7%
Military	100	100	100	100	-	-	-
Local							
GA	8,000	8,677	9,411	10,207	1.6%	1.6%	1.6%
Military	0	0	0	0	-	-	-
Total Ops.	**18,900**	**20,498**	**22,232**	**24,113**	**1.6%**	**1.6%**	**1.6%**
Instrument and Peak Hour Operations							
Instrument Ops.	395	428	465	504	1.6%	1.6%	1.6%
Peak Hour Ops.	11	12	13	14	1.6%	1.6%	1.6%
Based Aircraft							
Single Engine (Nonjet)	44	45	47	48	0.7%	0.7%	0.6%
Multi Engine (Nonjet)	5	5	6	6	-0.5%	1.8%	1.2%
Tubroprop	2	2	2	4	0.7%	0.0%	4.7%
Jet Engine	2	4	5	6	N/A	N/A	N/A
Helicopter	11	12	13	14	1.6%	1.7%	1.6%
Other	0	1	2	3	100.0%	100.0%	100.0%
Total Based Aircraft	**64**	**69**	**75**	**82**	**1.6%**	**1.6%**	**1.6%**

B. Operational Factors				
	Base Year (2019)	Base Year + 5 Years (2024)	Base Year + 10 Years (2029)	Base Year + 15 Years (2034)
GA Operations per Based Aircraft	294	294	294	294

Sources:
FAA Terminal Area Forecast (issued January 2020).
FAA Traffic Flow Management System Counts database.
FAA Aircraft Characteristics Database.
Kimley-Horn, 2020.

Notes:
GA = General aviation
OPBA = Operations per based aircraft
Table is developed from Appendix B in the FAA Report "Forecasting Aviation Activity by Airport."

CHAPTER 3: FACILITY REQUIREMENTS

3.1. CHAPTER INTRODUCTION

To accommodate growth in based aircraft and GA operations at the Airport, this chapter presents an analysis of airport demand and capacity, and identifies infrastructure needs for airside, landside, and support facilities based on FAA design standards and forecast demand over the 20-year planning horizon. Facility requirements were developed for the base year (2019), near-term (2024), mid-term (2029), and long-term (2039) timeframes. While planning milestones will allow the Airport to make informed decisions regarding the timing of development, facility needs may be adjusted to reflect deviations in forecast demand.

Demand, capacity, design standards, and overall Airport facility requirements were evaluated using guidance sourced from several FAA publications, including AC 150/5060-5, *Airport Capacity and Delay*; AC 150/5300-13A, *Airport Design*; AC 150/5325-4B, *Runway Length Requirements for Airport Design*; AC 150/5360-13, *Planning and Design Guidelines for Airport Terminal Facilities*; Federal Aviation Regulation (FAR) Part 77, Objects Affecting Navigable Airspace; and Order 5090.5 Formulation of the NPIAS and ACIP.

Table 3.1 presents a summary of based aircraft and total operations forecasts at Cottonwood Municipal Airport, approved by the FAA in November 2020. The recommendations provided in this chapter incorporate operational data and forecasts documented in **Chapter 2 - Aviation Forecasts** as well as feedback from Airport management, tenants, the Master Plan Advisory Committee, and other stakeholders. It should be noted that forecasts were submitted to the FAA in September 2020 and approved in December 2020. The Airport installed operational monitoring equipment in November 2020 that identified actual activity averaged approximately 109 daily operations between the months of November 2020 and February 2021. Extrapolated to a 12-month period, existing annual operations were estimated to be approximately 39,900. This figure is utilized as appropriate for facility needs, though the increase in operational activity is not expected to have any significant impact to airfield capacity enhancements or other facility requirements.

Table 3.1 - Forecast Summary

Year	Based Aircraft	Total Operations[1]	Peak Month Operations[2]
2019	64	18,900	2,268
2024	69	20,498	2,460
2029	75	22,232	2,668
2034	82	24,113	2,894
2039	89	26,154	3,138
AAGR 2019 - 2039	**1.64%**	**1.64%**	**1.64%**

Sources:
FAA Traffic Flow Management System Counts database.
FAA Terminal Area Forecast (Issued January 2020).
Kimley-Horn, 2022.

Notes:
GA = General aviation
AAGR = Average annual growth rate
1 = Total operations include all forecast GA and military operations.
2 = Peak month operations represent approximately 12% of annual operations.

3.2. AIRFIELD DEMAND AND CAPACITY

The analysis presented in this section reflects the Airport's ability to accommodate projected levels of activity and demand, as presented in **Chapter 2 - Aviation Forecasts**, without incurring adverse levels of aircraft delay. The methodologies used to determine capacity and potential delays are described in FAA Advisory Circular 150/5060-5, *Airport Capacity and Delay* (AC 150/5060-5).

3.2.1. Airfield Capacity

Airfield capacity, or throughput capacity, is a measure of the maximum number of aircraft operations that can be accommodated on an airfield in a specified time period (e.g., hourly or annually) without incurring substantial delays.[55] Delay may occur at an airport if the volume of activity approaches or exceeds the capacity of the airfield. This section presents an analysis that examines the capability of the airfield system at Cottonwood Municipal Airport to accommodate existing levels of activity and projected future levels of demand without incurring adverse levels of aircraft delay. Additionally, specific recommendations intended to address any deficiencies identified in this analysis are provided. Optimizing the airfield configuration to enhance traffic flow efficiency can help reduce the overall amount of aircraft delay. This evaluation will be used to help justify capacity-related airfield improvements that may be needed over the planning horizon.

The estimated airfield capacity and delay at the Airport can be expressed in the following measurements:

- **Hourly Capacity:** The maximum number of aircraft operations the airfield can safely accommodate under continuous demand in a one-hour period.
- **Annual Service Volume (ASV):** The maximum number of aircraft operations the airfield can accommodate in a one-year period without excessive delay.
- **Delay:** The time difference between an unconstrained operation (no interference from other aircraft) and the actual amount of time required to conduct an operation. Delay is typically presented in terms of minutes.

Airfield Capacity Calculation Factors

An airport's airfield characteristics and operational procedures greatly impact airfield capacity. Such characteristics include runway configuration and usage, location of exit taxiways, meteorological conditions, percentage of touch-and-go operations, and operational fleet mix. Due to their significance, these factors are considered when calculating airfield capacity and delay. Evaluations of these factors as they relate to Cottonwood Municipal Airport are provided below.

Runway Configuration and Usage

An airfield's capacity is directly related to the number and orientation of runways available during various operating conditions. An airfield may have multiple operating configurations dependent on weather conditions, time of day, and/or the type of approach procedures available. Cottonwood Municipal Airport has one runway, configured in a northwest/southeast orientation with a designation of Runway 14-32. The runway is 4,252 feet long by 75 feet wide with 10-foot unpaved shoulders and is operational for daytime and

[55] Federal Aviation Administration, Advisory Circular 150/5060-5, *Airport Capacity and Delay*, 1983.

nighttime activity. Airport management has indicated that the runway predominantly operates in a northwest flow due to heavy residential land uses immediately south of the Runway 32 end.

Runway 14-32 must accommodate all aircraft as the Airport's sole runway. However, as described in **Chapter 1 - Inventory of Existing Conditions**, the runway's pavement strength is insufficient to regularly handle some heavier aircraft that operate at the Airport. A detailed discussion of airfield pavement and associated recommendations is included in **Section 3.4** of this chapter.

Location of Exit Taxiways

Key to the capacity of an airfield is the ability to move aircraft to and from the runway system quickly and efficiently. The number and location of exit taxiways directly influences runway occupancy time and overall airfield capacity. Runway capacities are highest when the runways are complimented with full-length, parallel taxiways, ample runway exit taxiways, and no active runway crossings. These components reduce the amount of time an aircraft remains on the runway.

At Cottonwood Municipal Airport, Runway 14-32 is equipped with one partial parallel taxiway (Taxiway A) and four runway entrance/exit taxiways (Taxiways B, C, D, and E). Taxiways B and C also serve as ramp connectors between the runway and the aircraft parking apron. In addition to connecting Taxiway A with Runway 32, Taxiway E also provides airfield access to the over-the-fence taxilane and private hangars located on the southeast portion of Airport property. For the purpose of the ASV analysis, Taxiway A was considered a full-length parallel taxiway as it runs alongside approximately 90 percent of the total length of Runway 14-32. Furthermore, two taxiways were considered as potential exit taxiways for Runway 14 and two were considered exit taxiway options for Runway 32.

Meteorological Conditions

Meteorological conditions influence the utilization of an airport's runway. Variations in the weather that result in reduced visibility minimums typically reduce airfield capacity. Additionally, airfield capacity can be diminished when visibility and cloud ceilings are lower, as aircraft spacing increases under poor conditions. As noted in **Chapter 1 - Inventory of Existing Conditions**, the Airport was in the process of installing a new AWOS in late 2020/early 2021. The former AWOS did not report consistent weather data and was effectively inoperable at the time of this analysis. Therefore, weather data were collected from Sedona Airport's AWOS III P/T, located approximately 16 miles northwest of Cottonwood Municipal Airport, and Prescott Regional Airport's ASOS approximately 23 miles southwest of the Airport. The data indicate that VFR conditions occur more than 99 percent of the time, with IFR conditions occurring less than one percent of the time. During IFR conditions, only Runway 32 is equipped with the appropriate instrumentation and published approach procedures to allow operations.

Percentage of Touch-and-Go Operations

A touch-and-go operation is conducted by an aircraft that lands and departs on a runway without stopping or exiting the runway. This type of operation is typically associated with flight training. While each touch-and-go operation accounts for two runway operations (one landing and one takeoff), this procedure typically takes less time to complete than separate arrivals or departures. Therefore, airports with a high percentage of touch-and-go operations have greater airfield capacities than airports with less training activity.

Due to significant training activity associated with Embry Riddle Aeronautical University based at nearby Prescott Regional Airport, management at Cottonwood Municipal Airport has estimated that approximately 60 percent of total operations are touch and go. Since the ratio of local operations to total operations is projected to remain relatively constant over the 20-year planning horizon, touch-and-go operations are anticipated to continue to account for 60 percent of the Airport's total operations through 2039.

Aircraft Fleet Mix

Due to differing performance characteristics, the size of aircraft operating at an airport has a significant impact on an airfield's capacity. This is because heavier aircraft generate wake turbulence that requires increased spacing between large and small aircraft. The FAA has designated four categories of aircraft for capacity determinations, which are based on maximum takeoff weight (MTOW), the number of engines, and wake turbulence classifications:

- **Class A:** 12,500 lbs. or less, single engine
- **Class B:** 12,500 lbs. or less, multi-engine
- **Class C:** 12,500 to 300,000 lbs., multi-engine
- **Class D:** over 300,000 lbs., multi-engine

The aircraft fleet mix index is a ratio of the various classes of aircraft operating at an airport. For the purposes of a demand-capacity analysis, mix index is calculated by adding the percentage of class C aircraft to three-times the percentage of class D aircraft (expressed as C+3D). While the majority of the Airport's operations are conducted by Class A and B aircraft (both under 12,500 pounds), these aircraft are not considered to significantly affect airfield capacity because the wake turbulence generated by these smaller aircraft is not an issue. It should be noted that pavements at the Airport cannot accommodate Class D operations.

Data for aircraft operations by weight class were collected from the Airport's monitoring system, which was installed in November 2020. Operations between November 20, 2020 and February 24, 2021 were sampled: Existing and forecast fleet mix indices are presented below in **Table 3.2**.

Forecast operations are based on the Airport's projected rate of IFR operations (which is reflective of Class C activity). The IFR operations forecast presented in the previous chapter used the current ratio of IFR to total operations for 2019 (2.09 percent) and assumed that this ratio would remain constant over the 20-year planning period. Therefore, the percentage of Class C operations are expected to remain constant through 2039.

Table 3.2 - Aircraft Fleet Mix Demand-Capacity Analysis

Aircraft Class	2019 (Existing)	2024	2029	2034	2039
Class A and B	99.7%	99.7%	99.7%	99.7%	99.%
Class C	0.3%	0.3%	0.3%	0.3%	0.3%
Class D	0.00%	0.00%	0.00%	0.00%	0.00%
Total	100.00%	100.00%	100.00%	100.00%	100.00%
Mix Index (C+3D)	0	0	0	0	0

Sources:
Airport Operations Monitoring Data November 20, 2020-February 24, 2021.
FAA Advisory Circular 150/5060-5, Airport Capacity and Delay.
Kimley-Horn, 2022.

Percent Arrivals

The percentage of aircraft arrivals is the ratio of landing operations to total operations at an airport. Typically, a lower percentage of arrivals increases hourly airfield capacity since arriving aircraft must slow down to utilize exit taxiways whereas departing aircraft are generally prepared for takeoff once they enter an active runway. For the purposes of the demand/capacity analysis, it was assumed that arrivals accounted for 50 percent of total operations.

3.2.2. Airfield Capacity Analysis

In accordance with the methodologies and guidance reported in AC 150/5060-5, the preceding airfield characteristics were used to determine the Airport's hourly capacity and ASV. Peak hour capacity is determined for both VFR and IFR conditions and is a measurement of the maximum number of operations that an airfield can accommodate in a one-hour period. ASV reflects total annual operations that an airfield configuration can accommodate (accounting for the factors identified in the previous section) without incurring significant delay on a regular basis.

Hourly capacity and ASV determinations first require a selection of the appropriate airfield configuration depicted in Figure 3-2 of AC 150/5060-5. The configuration (Drawing No. 1) and the fleet mix index for the Airport as described above (0 to 20) results in an unconstrained VFR hourly capacity of 98 operations, an IFR hourly capacity of 59, and an ASV of 230,000 operations. These values are then adjusted based on factors identified above to calculate airfield capacity for a specific airport. The following assumptions were incorporated into the hourly capacities and annual service volume calculations:

- For calculation purposes, northwest flow was set at 90 percent of all operations and southwest flow at 10 percent, utilizing Runways 32 and 14 respectively.
- Each runway configuration allows for 100 percent of maximum capacity for each configuration as there are no factors that would significantly impede traffic.
- Exit Factor (E) is based on a single taxiway on each runway end given the criteria specified in AC 150/5060-5: Taxiway C for Runway 32 and Taxiway E for Runway 14. A Mix Index of 0 percent only incorporates taxiways 2000 to 4000 feet from the runway arrival threshold in the exit factor determination.

- The current ratios of VFR and IFR compared to total operations does not change over the forecast period; they are 97.91 percent and 2.09 percent, respectively
- The touch-and-go factors (T) of 1.20 for VFR and 1.00 for IFR operations remain constant over the forecast period. Through this time span, touch-and-go flights are anticipated to be 60 percent of total operations.

The values used in the airfield capacity analysis, including the ASV, are summarized below in **Table 3.3.** As shown, the Annual Service Volume of the Airport is projected to decline from 172,151 in 2019 to 163,779 in 2039.

Table 3.3 - Airfield Capacity Summary

Item	2019 (existing)	2024	2029	2034	2039
Annual Operations*	18,900	20,498	22,232	24,113	26,154
Peak Month Average Day Operations	76	82	89	96	105
Peak Hour Operations	11	12	13	14	16
Touch-and-go Factor (T)	1.20	1.20	1.20	1.20	1.20
VFR Taxiway Exit Factor (E)	0.86	0.86	0.86	0.86	0.86
IFR Taxiway Exit Factor (E)	0.95	0.95	0.95	0.95	0.95
Annual Demand/Average Daily Demand Ratio (D)	248.68	249.98	249.80	251.18	249.09
Average Daily Demand/Design Hour Demand Ratio (H)	6.91	6.83	6.85	6.86	6.56
Adjusted Hourly VFR Capacity	101.14	101.4	101.4	101.4	101.4
Adjusted Hourly IFR Capacity	56.05	56.05	56.05	56.05	56.05
Weighted Hourly Capacity (Cw)	100	100	100	100	100
Annual Service Volume (Cw x D x H)	172,151	171,148	171,347	172,569	163,779

Sources:
FAA Advisory Circular 150/5060-5, Airport Capacity and Delay.
Kimley-Horn, 2022.

Note: ** = Annual operations are derived from forecast total operations which include all GA and military operations.*

3.2.3. Aircraft Delay

Generally, as an airport's level of annual operations increases, so does the frequency of which the airfield experiences periods of delay. If aircraft delay is significant, capacity-enhancing improvements may be needed. FAA AC 150/5060-5 provides guidance to calculate annual aircraft delay in terms of minutes per aircraft operation. Delay is calculated based on the ratio of existing and forecast operations to ASV. This value is then applied to both the actual and forecast annual operational demand to calculate the total hours of annual delay for the airport. **Table 3.4** below represents the relationship between the ratio of annual demand to ASV and the subsequent average minutes of delay per aircraft operations. Forecast annual operations, expected average aircraft delay (minutes per operation), and total annual aircraft delay (hours) are depicted in Table 3.5. By 2039, it is anticipated that the Airport will incur approximately 0.06 minutes (3.6 seconds) of aircraft delay per operation and 26.1 hours of total annual aircraft delay.

Table 3.4 - Annual Service Volume and Aircraft Delay

Ratio of Annual Operations to ASV	Average Annual Aircraft Delay (Minutes per Operation)
10%	--
20%	0.1
30%	0.2
40%	0.3
50%	0.4
60%	0.5
70%	0.7
80%	0.9
90%	1.4
100%	2.6

Sources:
FAA Advisory Circular 150/5060-5, Airport Capacity and Delay.
Kimley-Horn, 2022.

Note: ASV = Annual service volume

Table 3.5 - Annual Service Volume, Capacity, and Annual Aircraft Delay

Year	Annual Operations*	ASV	Ratio of Operations to ASV	Delay per Aircraft Operation (minutes)	Total Annual Delay (hours)
2019	18,800	172,151	0.11	0.01	3.1
2024	20,398	171,148	0.12	0.02	6.8
2029	22,132	171,347	0.13	0.03	11.1
2034	24,013	172,569	0.14	0.04	16.0
2039	26,054	163,779	0.16	0.06	26.1

Sources:
FAA Advisory Circular 150/5060-5, Airport Capacity and Delay.
Kimley-Horn, 2022.

Notes:
** = For purposes of this analysis, annual operations only include GA operations. Military operations are not included, which are forecast to account for 100 operations per year.*
ASV = Annual service volume

3.2.4. Airfield Demand-Capacity Summary

Airfield demand that exceeds the ASV will likely result in significant delays. The FAA recommends that an Airport should begin planning for airfield capacity enhancements (such as additional exit taxiways, runways, etc.) when the ratio of annual demand to ASV reaches 60 percent and the implementation of such improvements should occur when the ratio reaches 80 percent. As shown above in **Table 3.5**, it is not anticipated that the Airport will reach the 60-percent threshold within the 20-year planning horizon. Therefore, it is expected the Airport will not require planning for or implementation of capacity-enhancing measures through 2039.

As noted previously, the Airport installed operational monitoring equipment in November 2020 and an analysis of activity from November 20, 2020 through February 24, 2021 identified average daily operations were approximately 109, which translates to approximately 39,900 annual operations. Applying this figure would result in an existing ratio of operations to ASV of 0.23 and total annual aircraft delay of 66.5 hours. If the 39,900 existing annual operations estimate increased at the same growth rate as the FAA-approved recommended operations forecast, that would translate to 55,300 operations by 2039, representing a 0.34 ratio of operations to ASV and 221.2 hours of aircraft delay. If the Airport does achieve this level of activity by 2039, it would still not likely require any capacity enhancements to the airfield.

3.3. FAA DESIGN STANDARDS

As discussed in **Chapter 1 - Inventory of Existing Conditions**, the FAA has established design criteria and guidance for airport facility planning based on the operational and physical characteristics of aircraft that operate at an airport. These design criteria and standards are contained within AC 150/5300-13A and address various airport infrastructure and their functions, including runway and taxiway dimensions, separation distances between aircraft and various objects, airspace protection requirements, and land use controls. This section presents a recap of the applicable design standards to which the Airport's facility recommendations will be based.

3.3.1. Airport Reference Code

Design standards are determined by an airport's designated critical design aircraft and ARC. The critical design aircraft is the most demanding aircraft that conducts at least 500 operations per year at an airport, excluding touch-and-go activity. This aircraft, or a combination of multiple aircraft that share similar physical and operational characteristics, is reflective of the demand that will regularly be placed on airport facilities and services. Additionally, ARC is based on the airport's critical design aircraft and is comprised of two components: the AAC and the ADG. The AAC is related to an aircraft's approach speed and the ADG is correlated to the aircraft's wingspan and tail height.

As presented in **Chapter 2 - Aviation Forecasts**, operational data obtained from the FAA TFMSC database and a linear regression analysis showed that a combination of the Cessna Citation I, Beechcraft King Air A90 and the Piper Cheyenne II represent the Airport's future critical design aircraft. All three aircraft possess an ARC of B-I (small), with the "small" designation referring to aircraft with an MTOW of 12,500 pounds or less. Therefore, for purposes of this Master Plan Update, the analyses and design standards in this chapter will utilize a future ARC of B-I (small) and the Cessna Citation I, Beechcraft King Air A90 and Piper Cheyenne II as the future critical design aircraft for Cottonwood Municipal Airport.

3.3.2. Runway Design Code and Design Standards

AC 150/5300-13A introduced RDC to expand upon the ARC. While the ARC is used to relate overall airport design criteria to the operational and physical characteristics of the aircraft types that will operate at an airport, RDC provides information needed to determine design standards that apply to a particular runway. These standards provide basic guidelines for a safe and efficient airport system and are based on the most demanding aircraft expected to use the runway. As described in **Chapter 1 - Inventory of Existing Conditions**, the ARC is comprised of two components: the aircraft approach category (AAC) and the airplane design group (ADG). AAC and ADG are also two components of an Airport's RDC, along with approach visibility. As shown in **Table 3.6**, approach visibility refers to a runway's visibility minimums expressed by runway visual range (RVR) in terms of feet.

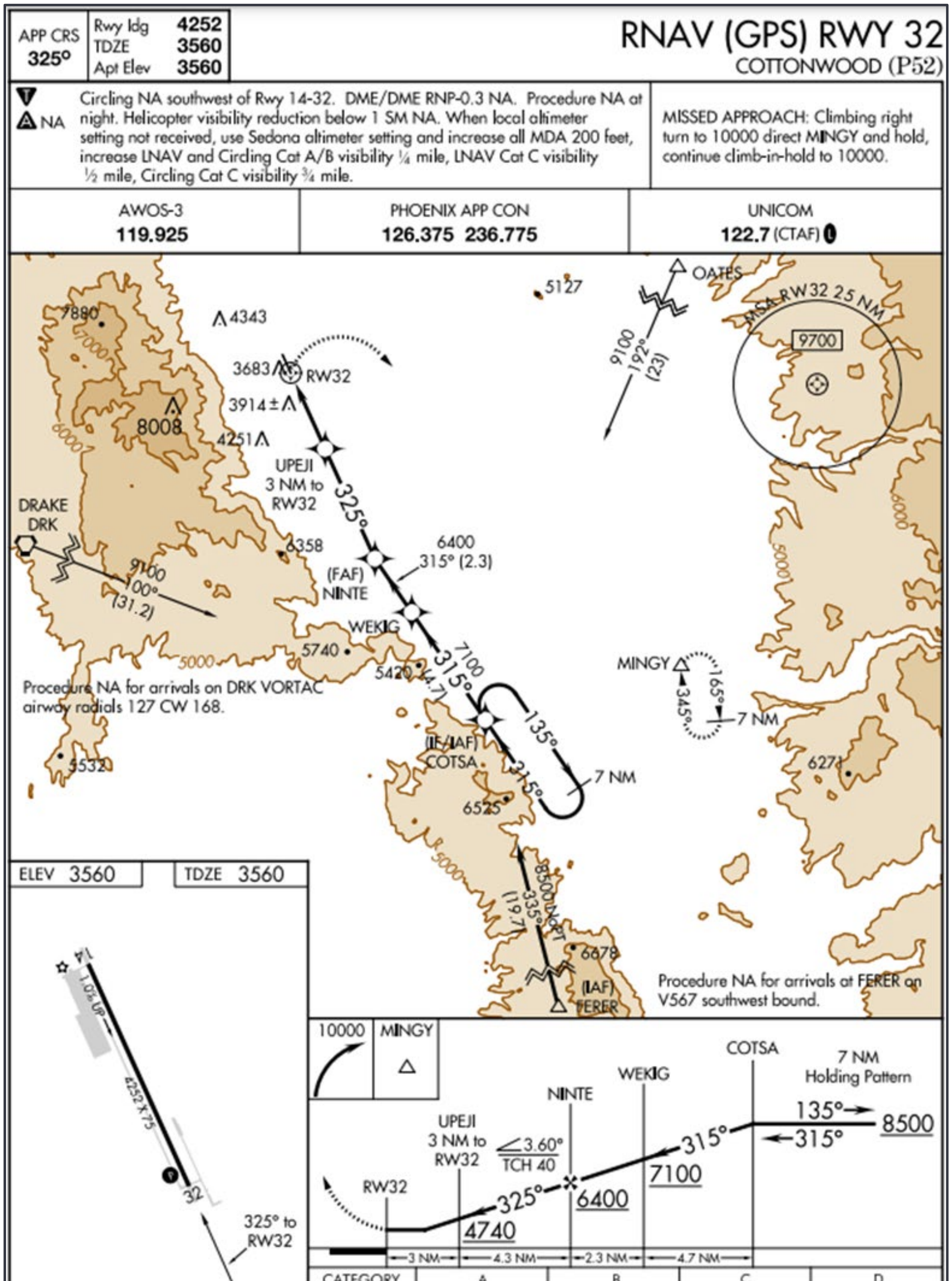
Table 3.6 - Runway Visual Range

Runway Visual Range (feet)	Approach Speed
VIS	Visual approach only
5,000	Not lower than 1 mile
4,000	Lower than 1 mile but not lower than 3/4 mile
2,400	Lower than 3/4 mile but not lower than 1/2 mile (CAT-I PA)
1,600	Lower than 1/2 mile but not lower than 1/4 mile (CAT-II PA)

Source: *FAA Advisory Circular 150/5300-13A, Change 1, Airport Design, 2014.*

The Airport has a published approach procedure for Runway 32 with a visibility minimum of 1 mile (see **Figure 3.1**); this is congruent with category 5,000 RVR. Therefore, Runway 32 has a future RDC of B-I-5000. As Runway 14 only accommodates visual approaches, the future RDC of this runway is B-I-VIS.

Figure 3.1 - Runway 32 RNAV (GPS) Approach



CATEGORY	A	B	C	D
LNAV MDA	4260-1	700 (700-1)	4260-2 700 (700-2)	NA
CIRCLING	4260-1	700 (700-1)	4260-2 700 (700-2)	NA

COTTONWOOD, ARIZONA
Orig 26MAY16
34°44'N-112°02'W
COTTONWOOD (P52)
RNAV (GPS) RWY 32

Source: www.airnav.com

Table 3.7 below compares existing conditions of Runway 14-32 with design and separation standards based the Airport's future ARC as described in **Section 3.3.1.**

Table 3.7 - FAA Runway Design and Separation Standards

Design Criteria		Runway 14-32	
		Existing Conditions	B-I (small) Standards
Runway Design			
Runway Width		75 feet[1]	60 feet
Shoulder Width		10 feet (unpaved)	10 feet
Blast Pad Width		75 feet	80 feet
Blast Pad Length		300 feet	100 feet
Runway Protection			
Runway Safety Area	Length Beyond Runway 14 Departure End	240 feet	240 feet
	Length Beyond Runway 32 Departure End	240 feet	240 feet
	Length Prior to Runway 14 Threshold[1]	374.5 feet	240 feet
	Length Prior to Runway 32 Threshold[1]	540 feet	240 feet
	Width	120 feet	120 feet
Runway Object Free Area	Length Beyond Runway 14 Departure End	240 feet	240 feet
	Length Beyond Runway 32 Departure End	240 feet	240 feet
	Length Prior to Runway 14 Threshold	374.5 feet	240 feet
	Length Prior to Runway 32 Threshold	540 feet	240 feet
	Width	250 feet	250 feet
Runway Obstacle Free Zone	Length Beyond Runway End	200 feet	200 feet
	Width	250 feet	250 feet
Approach Runway Protection Zone	Length	1,000 feet	1,000 feet
	Inner Width	250 feet	250 feet
	Outer Width	450 feet	450 feet
	Acres	8,035 feet	8,035 feet
Departure Runway Protection Zone	Length	1,000 feet	1,000 feet
	Inner Width	250 feet	250 feet
	Outer Width	450 feet	450 feet
	Acres	8,035 feet	8,035 feet
Runway Separation *(measured from runway centerline)*			
Holding Position		125 feet	125 feet
Parallel Taxiway Centerline		150 feet	150 feet
Aircraft Parking Area		240 feet	125 feet

Sources:
FAA Advisory Circular 150/5300-13A, Change 1, Airport Design, 2014.
Cottonwood Municipal Airport FAA-Approved Airport Layout Plan, 2006.
Kimley-Horn, 2022.

Notes:
Red text = Nonstandard condition
Black text = Standard condition
1 = While the runway width exceeds standards and does not create a nonstandard condition, the FAA may only fund the portion of the runway within design standards (i.e., 60 feet wide). The City may elect to preserve a runway width of 75 feet, however local funding may be required to maintain excess pavement beyond the 60-foot runway width standard.

3.3.3. Taxiway Design Group and Design Standards

FAA taxiway design standards are based on a combination of the ADG and the Taxiway Design Group (TDG) of the critical design aircraft. TDG is a classification applied to aircraft based on outer-to-outer main gear width (MGW) and cockpit to main gear (CMG) distance. This differs from ADG which is based on aircraft wingspan and tail height. As noted, the future critical design aircraft at the Airport is a combination of a Cessna Citation I, Beechcraft King Air A90, and the Piper Cheyenne II. The King Air A90 and Piper Cheyenne models have a TDG of 1A, and the Citation has a TDG of 2. Because the Citation requires access to various services and facilities throughout the airfield, it is recommended that the future taxiway system and applicable separations satisfy TDG 2 standards to enhance Airport safety.

Chapter 1 identified the widths of the Airport's taxiway system. It should be noted that the standard width of a TDG 2 taxiway is 35 feet. All taxiways at the Airport either exceed or do not meet this standard. It is recommended that taxiways be designed to meet the 35-foot standard at the point in time when reconstruction is required.

3.4. AIRSIDE FACILITIES

For the purposes of this Master Plan Update, airside facilities are defined as including the runway and taxiway system, safety areas, and associated equipment like airfield lighting, visual aids, and navigational aids (NAVAIDs). Aircraft aprons and storage hangars are analyzed as a landside element due to their interface with the vehicle parking facilities. The following subsections examine the ability of the present airside facilities to accommodate existing and future traffic, and the facilities required through the year 2039.

3.4.1. Runway Requirements

The existing runway system was described in **Chapter 1 - Inventory of Existing Conditions** and applicable design standards were defined in previous sections of this chapter. This section defines the runway requirements needed to satisfy forecast demand in terms of runway characteristics, pavement strength, crosswind coverage, and safety areas.

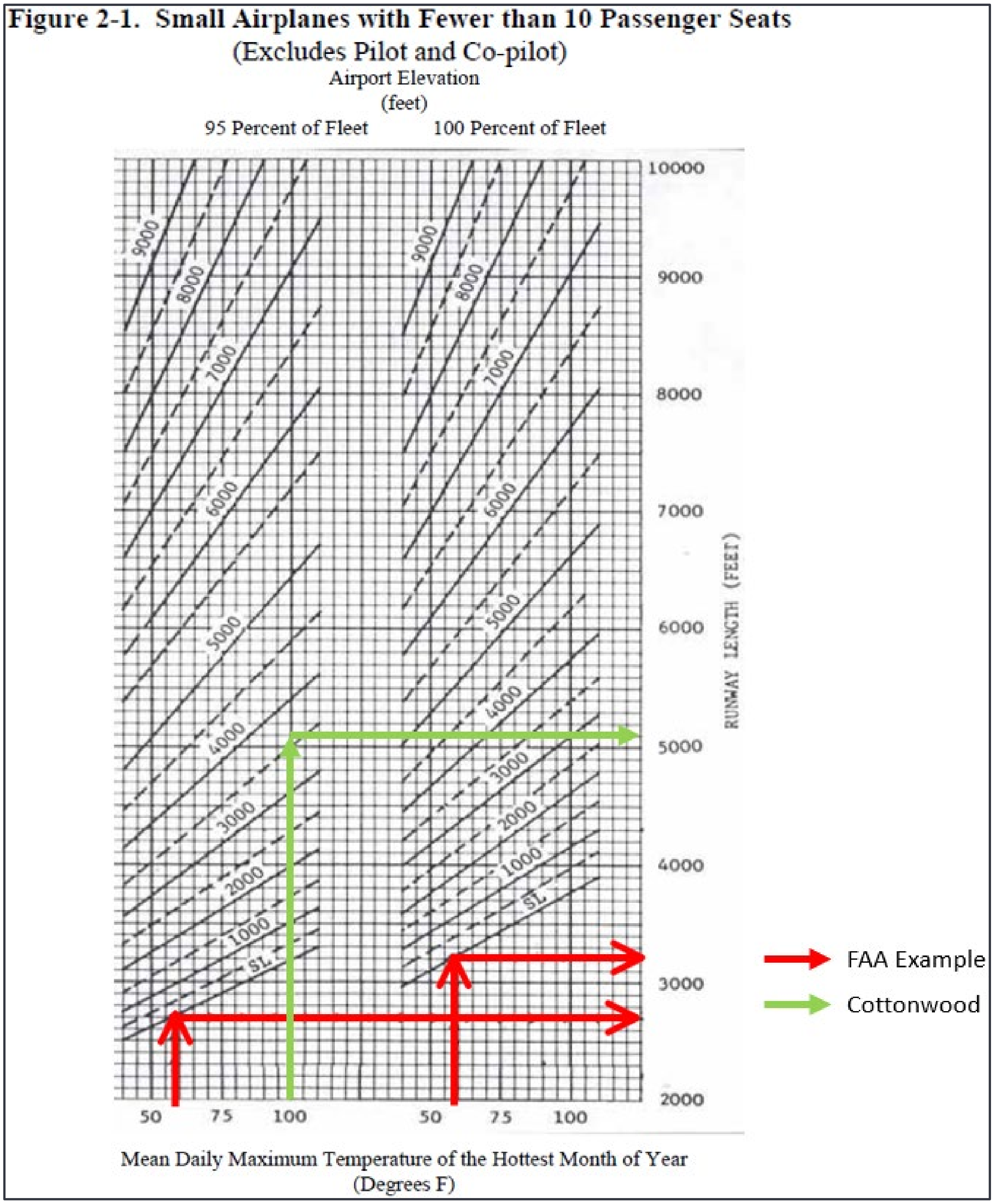
Runway Length

Runway length requirements are based on several factors including elevation, aircraft seat capacity, aircraft weight of the operational fleet, and mean daily maximum temperature of the hottest month of the year at an airport. Runway length requirements are published in FAA AC 150/5325-4B, Runway Length Requirements for Airport Design. Runway length requirements for Cottonwood Municipal Airport were determined using guidance provided in Chapter 2 of that document, which determines runway lengths for small airplanes with maximum certified takeoff weights of 12,500 pounds of less.

Figure 2-1 of AC 150/5325-4B categorizes small airplanes with less than 10 passenger seats (excludes pilot and co-pilot) into two family groupings according to "percent of fleet," namely, 95 and 100 percent of the fleet. The 95 percent category applies to airports that are primarily intended to serve medium size population communities with a diversity of usage and a greater potential for increased aviation activities. Also included in this category are those airports that are primarily intended to serve low-activity locations, small population communities, and remote recreational areas. Their inclusion recognizes that these airports in many cases develop into airports with higher levels of aviation activities. The 100 percent of fleet category includes airports that are primarily intended to serve communities located on the fringe of a metropolitan area or a relatively large population remote from a metropolitan area. Based on these criteria, the 95 percent of fleet category was utilized for the runway length determination for Cottonwood Municipal Airport.

The runway length analysis assumed a mean maximum temperature during the hottest month of 98.4 degrees Fahrenheit and an airport elevation of 3,650 feet MSL. As shown in Figure 3.2, the recommended runway length at the Airport under these conditions is 5,100 feet, which is 848 feet longer than Runway 14-32. Development alternatives for a runway extension are presented in the following Chapter.

Figure 3.2 - Runway Length Analysis



Sources:
FAA AC 150/5325-4B.
Kimley-Horn, 2020.

Runway Width

Standard runway width is defined in AC 150/5300-13A and is based on RDC, the approach visibility minimums of the runway, and the Airport's ARC relating to the critical design aircraft. The Airport's existing ARC was determined in **Chapter 2 - Aviation Forecasts** to be A-I (small), with the critical design aircraft encompassing all aircraft within the A-I (small) category. The ARC is forecast to be B-I (small) with a combination of the Cessna Citation I, Beechcraft King Air 90, and the Piper Cheyenne II representing the Airport's future critical design aircraft.

The existing width of Runway 14-32 (75 feet) can accommodate aircraft with an AAC/ADG of up to B-II per FAA design standards. While aircraft with an AAC/ADG greater than B-I (small) are not expected to breach the 500 annual operations threshold throughout the planning period, it is anticipated that B-II aircraft will continue to operate at the Airport. Operations should be monitored for deviations to the forecasts as more frequent operations by aircraft with AACs/ADGs greater than B-II may justify the existing runway width.

Runway 14-32 has an ARC of A-I (small) and its runway width is currently 75 feet, which exceeds the FAA standard width of 60 feet for this ARC. The runway has a future ARC of B-I (small), which also requires a standard runway width of 60 feet. As the current runway width exceeds the FAA standard, Runway 14-32 may need to be narrowed to meet standards, or, if the runway remains at its existing width, the portion that exceeds standard may not be eligible for FAA Airport Improvement Program (AIP) funding.

Runway Shoulders

Runway shoulders provide resistance to soil erosion and reduce the chance of engine ingestion of foreign object debris (FOD). They also accommodate the passage of maintenance and emergency equipment as well as the occasional passage of an aircraft veering from the runway. Per AC 150/5300-13A, paved shoulders are only recommended for runways that accommodate ADG-III aircraft and are required for runways that accommodate aircraft with ADGs of IV and higher. For runways that accommodate aircraft with ADGs of I and II (like Runway 14-32 at Cottonwood Municipal Airport), turf, aggregate-turf, soil cement, lime, or bituminous stabilized soil are recommended to be placed adjacent to paved runway surfaces. Like design standards for runway width, runway shoulder width is based on ARC.

The existing shoulders of Runway 14-32 are 10 feet wide and unpaved, which meets FAA standards for the current and future ARC of A-I (small) and B-I (small), respectively. If Runway 14-32 is narrowed, modifications to the shoulder areas may be needed.

Runway Blast Pads

A blast pad is defined in AC 150/5300-13A as a surface adjacent to the ends of runways provided to reduce the erosive effect of jet blast and propeller wash. Centered on the extended runway centerline, standard blast pad dimensions are 80 feet wide by 60 feet long for both A-I (small) and B-I (small) ARCs. Blast pad pavement must meet pavement strength requirements as described in AC 150/5320-6, *Airport Pavement Design and* Evaluation, which states that a blast pad may be designed according to the same procedures as for paved airfield shoulders.

Cottonwood Municipal Airport has blast pads at both ends of Runway 14-32, each constructed of asphalt concrete and measuring 300 feet long by 75 feet wide. The blast pad widths do not meet design standards, though they exceed the standard for blast pad length. While ADOT maintains an online database with pavement condition details for the Airport, the pavement conditions of the blast pads have not been evaluated. The Airport, in partnership with ADOT, should continue to evaluate the blast pads to ensure the pavement condition is compliant with FAA guidelines. Additionally, blast pad dimensions should be modified to meet FAA blast pad design standards of 80 feet wide by 60 feet long for both A-I (small) and B-I (small) ARCs. Alternatives to address the nonstandard blast pads are presented in **Chapter 4 - Alternatives.**

Runway Orientation

Runways are meant to be oriented such that aircraft can take off and land in the same direction as the prevailing wind (into the wind). The FAA recommends that a particular runway's orientation should provide at least 95 percent wind coverage for aircraft that regularly use the airport. If 95 percent wind coverage is not provided, reorienting the existing runway or constructing a new crosswind runway may be advisable.

With a future ARC of B-I (small), the runway orientation at Cottonwood Municipal Airport should provide availability of at least 95 percent on the basis of the crosswind component not exceeding 10.5 knots. AWOS data from an airport is typically used to determine a runway's wind coverage but, as previously noted, this data was not consistently available from the Airport due to an inoperative AWOS. However, historical wind data from the ASOS at the nearby Ernest A. Love Field (PRC) in Prescott was referenced to determine the wind coverage availability of Runway 14-32. As discussed in **Chapter 1 - Inventory of Existing Conditions**, runway headings represent the magnetic heading of a runway when it is created (Runway 14-32 represents the magnetic headings of 140 degrees and 320 degrees). The Earth's magnetic lines slowly drift over time, causing the true runway headings to shift while the runway's name remains. Therefore, the wind coverage analysis for existing conditions uses the Airport's true runway headings of 155 and 335 degrees.

As shown below in **Table 3.8**, Runway 14-32 does not provide the recommended 95 percent coverage for any category (VFR, IFR, and all weather) given a 10.5 knot maximum allowable crosswind component for the true runway headings of 155 and 335 degrees. **Table 3.8** also presents data to determine what runway alignments would obtain 95 percent coverage for VFR, IFR, and all-weather wind coverages for the crosswind component of 10.5 knots. The results of this analysis show that neither a clockwise nor counterclockwise rotation of five to 25 degrees would provide the recommended 95 percent wind coverage for VFR, IFR, and all-weather conditions. Providing the greatest wind coverage for VFR, IFR, and all-weather conditions for the crosswind component of 10.5 knots, a runway orientation of 4-22 (a 65-degree clockwise rotation) represents the optimal runway alignment at the Airport. This alignment would provide at least 95 percent wind coverage for VFR and all-weather conditions but falls short of the 95-percent threshold.

Table 3.8 - Runway 14-32 Wind Analysis (10.5-knot Crosswind Component)

Runway Headings (degrees)	VFR	IFR	All Weather
13-31	89.92%	87.78%	89.85%
14-32	90.55%	87.81%	90.46%
15-33	91.60%	88.11%	91.48%
155-335*	92.21%	88.45%	92.08%
16-34	92.84%	88.89%	92.71%
17-35	93.99%	89.84%	93.85%
0-18	94.84%	90.74%	94.71%
1-19	95.47%	91.53%	95.34%
2-20	95.93%	92.53%	95.82%
3-21	96.14%	93.57%	96.06%
4-22**	95.94%	94.10%	95.88%
5-23	95.28%	94.08%	95.25%
6-24	94.27%	93.72%	94.26%

Sources:
FAA Wind Rose Generator 2019 (true runway headings of 155°, 335°).
NOAA National Climate Data Center (2010-2019) (244,441 total observations at SEZ; 89,448 total observations at PRC).
Kimley-Horn, 2022.

Notes:
VFR = Visual Flight Rules
IFR = Instrument Flight Rules
Black text = wind coverage meets or exceeds the FAA's 95 percent recommendation
Yellow text = wind coverage falls between 94 percent and 95 percent
Red text = wind coverage does not meet the FAA's 95 percent recommendation
** = Existing Runway 14-32 true runway heading*
*** = Runway 4-22 represents the optimal runway orientation*
Due to an inoperable Automated Weather Observing System (AWOS) at Cottonwood Municipal Airport during the development of this Master Plan Update, data for this analysis were sourced from the Automated Surface Observing System (ASOS) at Ernest A. Love Field in Prescott, AZ. As of December 2020, a new AWOS is in the design phase at the Airport and is expected to come online in early 2021. It is recommended the Airport evaluate short- and long-term data from the new AWOS to determine the suitability of its runway orientation.

No runway orientation provides at least 95 percent coverage for VFR, IFR, and all-weather conditions for the crosswind component of 10.5 knots. According to wind data from the PRC ASOS, IFR conditions represent less than one percent of recorded weather observations.[56] This low percentage of IFR conditions, coupled with the fact that, generally, smaller aircraft that are susceptible to low crosswind components will not be operating in IFR conditions, suggests that a major realignment of the runway will likely not be beneficial. Additionally, a runway realignment would greatly impact both on- and off-Airport facilities and land uses. Therefore, while a 65-degree clockwise rotation provides optimal runway alignment, it is not likely feasible nor necessary.

As previously noted, a new AWOS is expected to be functional by early 2022. It is recommended the Airport evaluate data from the new AWOS to determine the effectiveness of the existing runway orientation. In the long term, the Airport should evaluate its AWOS data over several consecutive years (typically 10 for a standard forecast) to determine the suitability of the existing runway orientation. Reorientation of Runway

[56] IFR conditions occur when the cloud ceiling is less than 1,000 feet above ground level and/or the visibility is less than 3 statute miles. Only properly trained and equipped pilots operating aircraft using navigational systems that provide lateral and/or vertical path guidance based on specific meteorological conditions are permitted to fly under IFR conditions.

14-32 or the addition of a crosswind runway is not recommended at this time, as either action would be constrained by existing development and topography as well as incur significant, expensive off-Airport impacts.

Runway Hold Lines

Runway hold lines, also known as runway holding positions, denote the location on a taxiway where a pilot is to stop before proceeding onto or across a runway. At airports with an operating ATCT, pilots require ATC authorization before entering or crossing a runway. Alternatively, at airports without an operating ATCT, pilots should ensure they have adequate separation from other aircraft before proceeding onto or crossing a runway. Design standards for runway hold lines are listed in AC 150/5300-13A and are measured in terms of distance from the runway centerline in feet. These standards assume perpendicular distance from a runway centerline to an intersecting taxiway centerline and increase if the taxiway intersects the runway at an acute angle.

As shown in Table 3.7, the Airport's runway-centerline-to-holding-position is 125 feet for all runway hold lines. Therefore, all hold lines meet FAA requirements for the current and future ARC of A-I (small) and B-I (small), respectively, and no changes are anticipated through the planning horizon. The Airport should verify the condition and placement of the Taxiway E runway hold line on the east side of Runway 14-32 to ensure it satisfies the 125-foot from runway centerline location requirement.

Runway Safety Areas

The RSA is a two-dimensional surface on the ground surrounding a runway that is designated to mitigate the risk of damage to an aircraft in the event of an overshoot, undershoot, or excursion from the runway. This area also provides greater access to firefighting and rescue equipment in emergency situations. RSAs must be graded and cleared without any hazardous surface variations and be free of all objects except those that are needed for aircraft ground maneuvering and air navigation. Despite the intent to prevent objects in RSAs, some NAVAIDs may be located in this area if critical for their functioning—this would require NAVAIDS to have a "fixed-by-function" designation. Table 6.1 in AC 150/5300-13A provides a list of fixed-by-function NAVAIDS. Additionally, NAVAIDs present within the RSA must also be frangible. As defined by the FAA, "frangible" refers to an object that breaks, distorts, or yields when faced with a large impact, minimizing the hazard to the aircraft. RSA design standards cannot be modified via the modification of standards process (MOS).

The RSA design standard for an A-I (small) and B-I (small) ARC is 120 feet wide and extends 240 feet beyond the runway ends. The dimensions of the Runway 14-32 RSA are compliant with FAA design standards. Additionally, all objects within the RSA—including runway edge lighting, directional signage, and REIL lights at both ends of the runway—are classified as fixed-by-function. The Airport should ensure that all existing and future objects within the RSA meet frangibility requirements as delineated in AC 150/5220-23A.

Runway Gradient

Requirements for the longitudinal and traverse gradients of a runway are based on AAC and become more stringent as the AAC increases. Grading requirements are described in FAA AC 150/5300-13A, which notes that the maximum allowable longitudinal gradient for runway s is 2.0 percent. Runway 14-32 slopes from south to north and has a gradient of approximately 0.94 percent, which meets grading requirements.

Runway Obstacle Free Zones

The ROFZ is defined as a volume of airspace centered above the runway centerline, above a surface whose elevation at any point is the same as the elevation of the nearest point on the runway centerline. Its length is defined in AC 150/5300-13A as extending 200 feet beyond each runway end and its width varies based on the critical design aircraft. At Cottonwood Municipal Airport whose future critical design aircraft is classified as “small” with approach speeds of 50 knots or more, the design width is 250 feet. Similar to the RSA, this area should be kept clear with the exception of fixed-by-function NAVAIDs, lighting, and directional signage that meet frangibility requirements.

Permissible objects in the ROFZ include directional signage, runway edge lighting, a PAPI 2L system on each Runway end, and both sets of REIL lights including the associated flasher light power unit off the Runway 14 end (individual control cabinet). The Airport should ensure that any objects located in the ROFZ now and in the future are frangible. Impermissible objects include the power control units (PCU) for the PAPIs, which are not fixed-by-function and must be relocated outside of the safety area. Any additional associated equipment for the REILs beyond its flasher light power units would also need to be moved outside the area as well. Potential options are shown in **Chapter 4 - Alternatives**.

Runway Object Free Areas

The ROFA is centered about the runway centerline and is an area that must be clear of above-ground objects that protrude above the nearest point of the RSA. This includes agricultural operations, parked aircraft, and other fixed objects. Like the RSA, the ROFA may include objects with fixed-by-function designations (those objects necessary for air navigation or aircraft ground navigation) and must meet frangibility requirements. Aircraft may also taxi and hold in the ROFA. The dimensions of the ROFA are determined by the ARC and are listed in AC 150/5300-13A.

For both the current and future ARCs of A-I (small) and B-I (small), the ROFA is 250 feet wide and extends 240 feet beyond the runway end. The dimensions of the Runway 14-32 ROFA are compliant with FAA design standards. Multiple objects with fixed-by-function designations are present within the ROFA, including directional signage, runway edge lighting, a PAPI 2L system on each runway end, and REIL lights on each runway end including the associated flasher light power unit off of the Runway 14 end (individual control cabinet). It would be beneficial for the Airport to ensure that all existing and future objects allowed within the ROFA meet frangibility requirements. Additionally, there are PCUs for the PAPIs, which are not classified as fixed-by-function and need to be relocated outside the ROFA. Options to address the nonstandard ROFA and mitigate non-fixed-by-function objects are presented in **Chapter 4 - Alternatives.**

Runway Protection Zones

RPZs are intended to enhance the protection of people and property on the ground. Centered about the extended runway centerline, RPZs are trapezoidal in shape and are made up of a central portion and a controlled activity area. The central portion is rectangular in shape and is defined by an extension of the ROFA to the outer edge of the RPZ. The area outside of the central portion of the RPZ is the controlled activity area. These two areas differ in that the central portion is meant to be free and clear of all objects, while limited exceptions may be permissible in the controlled activity area. In 2012, the FAA published a memorandum identifying Interim Guidance on Land Uses Within a Runway Protection Zone. The Memorandum, which is still valid, recommends that airports own, acquire, or have land use control of areas within RPZs and implement mitigation strategies to keep these areas clear of incompatible land uses. **Table 3.9** provides examples of compatible and incompatible land use within RPZs.

Table 3.9 - RPZ Land Use Compatibility

Compatible Land Uses*	Incompatible Land Uses
Irrigation channels that meet the requirements of FAA AC 150/5200-33 and FAA/USDA manual Wildlife Hazard Management at Airports	Fuel storage facilities (above and below ground)
Underground facilities as long as they meet other design criteria, such as RSA requirements, as applicable	Wastewater treatment facilities
Unstaffed NAVAIDs and facilities, such as equipment for airports that are considered fixed-by-function in regard to the RPZ	Recreational land use (examples include, but are not limited to, sports fields, golf courses, amusement parks, or other places of public assembly, etc.)
Farming that meets airport design standards	Hazardous material storage (above and below ground)
Airport service roads as long as they are not public roads and are directly controlled by the Airport operator	Above ground utility infrastructure (i.e., electrical substations) including any type of solar panel installations
	Transportation facilities (examples include, but are not limited to, public roads/highways, vehicular parking facilities, rail facilities, etc.)
	Buildings and structures (examples include, but are not limited to, residences, schools, churches, hospitals or other medical care facilities, commercial/industrial buildings, etc.)

Sources:
FAA AC 150/5300-13A.
FAA, Interim Guidance on Land Uses Within a Runway Protection Zone, 2012.

Notes:
USDA = U.S. Department of Agriculture
RSA = Runway safety area
NAVAID = Navigational aid
RPZ = Runway protection zone
**Compatible land uses noted are those that are permissible without further evaluation*

Runway ends have two RPZs: an approach RPZ and a departure RPZ. At Cottonwood Municipal Airport, where there are no published declared distances, both the approach and departure RPZs are collocated at each runway end. For both the existing and future ARCs of A-I (small) and B-I (small), the RPZs have an inner width of 250 feet, an outer width of 450 feet, a length of 1,000 feet, and encompass approximately 8.04 acres. The approach and departure RPZs have the same dimensions and are located entirely within the Airport's property boundary.

While Mingus Avenue intersects the Runway 14 end RPZ, FAA design standards allow for a preexisting condition like Mingus Avenue to remain within the RPZ. Any major modification or roadwork on this street would require coordination with the Airport and FAA. Additionally, a gravel road that connects South Willard Street to a City-owned water well facility immediately south of the Airport intersects the RPZ south of Runway 32. Since this private service road is a preexisting condition and has minimal traffic, it is permissible without further evaluation.

3.4.2. Taxiway Requirements

Presented in this section are taxiway requirements for Cottonwood Municipal Airport, including safety areas and separation standards, and a review of the existing taxiway layout against current taxiway design guidelines found in AC 150/5300-13A.

Parallel Taxiway Separation

The partial parallel taxiway for Runway 14-32 is Taxiway A, which extends from Taxiway E to Taxiway C. Taxiway A is 40 feet wide and has a parallel taxiway centerline to runway centerline distance of 150 feet. This meets FAA separation design standards for the current and future ARC of A-I (small) and B-I (small) respectively, meaning that no changes are anticipated over the planning period. The Airport should continue to assess traffic compared to the forecast, as a larger ARC would require at least 75 additional feet of separation between the Runway centerline and parallel taxiway centerline. It is recommended that Taxiway A be reconstructed to a full-length parallel taxiway to increase operational efficiency and safety. Potential options are shown in Chapter 4 – Alternatives.

Taxiway and Taxilane Safety Areas

A taxiway/taxilane safety area (TSA) is a defined surface along a taxiway or taxilane that is designed or able to reduce the risk of damage to an aircraft that deviates from the taxiway/taxilane. It is also meant to provide room for firefighting and rescue operations. Centered on the taxiway/taxilane centerline, the TSA width is defined in AC 150-5300-13A as equivalent to the maximum wingspan of the ADG and other dimensional standards are shown in Table 4-1 of AC. The TSA surface must be cleared, graded, and without surface variations like ruts and depressions that could be hazardous. It must be graded or drained by storm sewers to prevent water accumulation. Under dry conditions, the TSA needs to be able to allow the occasional passage of aircraft without causing structural damage to the aircraft. Overall, the TSA should be free of objects except those that must be located in this area because of their function. Such objects should be constructed at grade and if not, they must be mounted on frangible mounted structures.

Both the current, A-I (small), and future, B-I (small), ADGs for the Airport are included in the ARC. Thus, the TSA standard for the Airport is 49 feet wide, centered on the centerline of each taxiway/taxilane. Taxiway and taxilane safety areas share the same dimensions.

A review of the taxiways and taxilanes at the Airport using topographic modeling and aerial imagery shows that there are no penetrations to the TSAs. No nonstandard conditions are present, though the Airport should continue to evaluate these areas to keep them in accordance with design standards. Such areas of consideration include the TSA surface condition, ensuring the areas are clear of non-frangible objects, and reevaluating adjusted TSA areas that may result from the correction of the nonstandard conditions relating to taxilane separation standards and direct runway access from the Airport's main apron (see **Table 1.9** in **Chapter 1 - Inventory of Existing Conditions**).

Taxiway and Taxilane Object Free Areas

Similar to TSAs, Taxiway Object Free Areas (TOFA) are centered on the centerlines of taxiways and taxilanes though Taxilane Object Free Areas (TLOFA) are slightly smaller in size due to the lower speeds of aircraft. As mentioned previously, the ARC for the Airport is A-I (small) and is forecast as B-I (small) over the planning period. Therefore, according to Table 4-1 in AC 150/5300-13A, the Airport TOFA and TLOFA widths are 89 feet and 79 feet respectively.

Through the use of topographic mapping and aerial imagery, the TOFAs at the Airport were determined not to have any objects inside most of their boundaries that would constitute a nonstandard condition. Objects present include taxiway lighting, PAPI-2, runway lighting, and aircraft directional signage, all of which are permissible but should be confirmed to be within height and frangibility design standards. However, there is some vegetation present at the northwest edge of the TOFA intersection of Taxiway A and D, and the helicopter operating area is also inside the TOFA.

The TLOFAs were evaluated in the same way as the TOFAs. Permissible objects in the TLOFAs include taxi lighting and aircraft directional signage, which should be verified by the airport as meeting FAA standards of frangibility and height. As discussed in Table 1.9 in **Chapter 1 - Inventory of Existing Conditions** with the taxilane centerline to fixed or movable object nonstandard condition, multiple taxilanes in the main apron have TLOFAs that are breached by multiple aircraft tie-down positions and by the marked helicopter parking position on the south end. Additionally, the TLOFA on Taxiway E parallel to the Runway on the private apron side is penetrated by vegetation and hangars. These conditions should be removed or corrected to keep the TLOFA clear of objects. This situation should be rectified to bring these taxilanes in compliance with FAA design standards. Potential options are shown in **Chapter 4 - Alternatives.**

Taxiway Geometry and Runway Incursion Mitigation

FAA Advisory Circular AC 150/5300-13A consolidates a variety of recent research findings related to airfield safety and this information is supplemented by other FAA documentation. In the past, several airfield safety enhancement bulletins had been published in FAA orders and engineering briefs and many of these remain relevant as does documentation associated with the FAA's national runway incursion program office. The research correlates existing design geometries with incursion history as well as the future potential for an incursion to take place. The FAA determined that there are specific characteristics in airfield geometry that can contribute to the potential for both surface incidents and runway incursions and considerations to address these characteristics. The FAA analyzed over six years of data to determine the most effective runway incursion mitigation techniques. Some key design principles described in AC 150/5300-13A are:

- **Indirect Access:** Taxiways should not lead directly to the runway from an apron area. An ideal scenario would be one in which a pilot exiting the apron would turn parallel with the runway, taxi to the runway end, turn perpendicular to the runway, and then make another 90-degree turn to enter the runway before initiating a takeoff.
- **Avoid 'High Energy' Intersections:** The high energy portion of the runway is the middle third of the runway in which pilots taking off or landing are least able to maneuver to avoid a collision. Therefore, runway crossings in this middle third of the runway should be avoided.
- **Standard Intersection Angles:** Turns should be designed to be 90 degrees wherever possible. Preferred intersection angles are: 30, 45, 60, 90, 120, 135, and 150 degrees.
- **Avoid 'Dual Purpose' Pavements:** Confusion can result from runways that are also used as taxiways, and vice versa. Runways should always be solely used as runways.
- **Increase Visibility:** The best visibility at an intersection between taxiways, and between taxiways and runways, is provided by right angle intersections. Runway entrances or crossing points should not be located on acute angled taxiways.
- **Three-Node Concept:** Taxiway intersections should be designed so that a pilot is only presented with three options. Ideally, these options would be left, right, and straight.
- **Limit Runway Crossings:** Minimizing runway crossings minimizes opportunities for human error.
- **Avoid Wide Expanses of Pavement:** Wide expanses of pavement involved with the taxiway to runway interface is not recommended. In such a scenario, signs are placed far from a pilot's vision and other visual cues are similarly reduced.

As part of this Master Plan Update, a review of the existing airfield layout against the guidance described above was performed. For Cottonwood Municipal Airport, Taxiways B and C provide direct access from the main apron to Runway 14-32 with no turn required. Potential options to resolve this nonstandard condition are explored in **Chapter 4 – Alternatives**.

3.4.3. Lighting and NAVAID Requirements

Airport lighting allows pilots and ground vehicles to move about the airfield more safely at night or in low lighting. NAVAIDs support instrument capabilities and desired approach minimums. Runway 14-32 is currently equipped with PAPI 2L systems on both ends. Other NAVAIDs currently present at the Airport are an AWOS (being updated to AWOS III and relocated at the time of writing), and a Segmented Circle with a Lighted Wind Indicator, in good condition. Design standards for PAPIs are presented in FAA Order 6850.2B. Important to the Airport is the requirement that the PAPI be positioned such that no obstacles penetrate its obstacle clearance surface, which begins 300 feet in front of the PAPI and extends to the approach zone. Additionally, the PAPI must be at least 50 feet from the closest runway edge and each lamp house assembly (LHA) must be 20-30 feet apart. Currently, the PAPI at the Airport meets all of these standards and requires no changes through the forecast period, though the Airport should verify the Runway and LHA spacing requirements.

The Airport's rotating beacon is located immediately north of the terminal building and is mounted on a standalone tower. To enhance energy efficiency and reduce long-term maintenance, the Airport has expressed interest in updating the existing beacon to an LED light and relocating the beacon or modernizing the tower structure. The Airport is operational at night and is equipped with runway lights. Therefore, if improvements are desired, the Airport's beacon is eligible for AIP funding.[57]

Runway 14-32 is equipped with REILs on each runway end. REILs consist of two synchronized flashing lights positioned on each corner of the runway and provide pilots with identification of the end of the landing threshold. REILs are generally positioned in line with the runway threshold lights and at least 40 feet from the edge of the runway.[58] At Cottonwood Municipal Airport, the REILs on the Runway 14 end are positioned 40 feet from the edge of the runway. On the Runway 32 end, however, the western REIL is positioned approximately 82 feet from the runway edge while the eastern REIL is positioned approximately 74 feet from the runway edge. It is recommended that these REILs be relocated so that they are 40 feet from the edge of the runway and consistent with the Runway 14 REILs. REILs are fixed-by-function and allowable within the RSA and ROFA at the Airport, although the associated PCUs would need to be relocated from these two safety areas in order to bring the RSA and ROFA into compliance with FAA design standards.

Runway 14-32 is also equipped with MIRLs to help pilots identify the edge of usable runway pavement. MIRLs are fixed-by-function and are allowable within the RSA and ROFA. Currently, the MIRLs at the Airport meet FAA design standards. The Airport is not equipped with taxiway lighting but does have taxiway reflectors installed on portions of the airfield. Airport Management has noted that installation of taxiway lighting is a high priority due to the increasing volume of nighttime operations. It is recommended that all taxiways be equipped with LED medium intensity taxiway lighting (MITL), and consideration should be given to solar-powered fixtures if eligible for FAA funding.

[57] Federal Aviation Administration, FAA Order 5100.38D, Change 1, *Airport Improvement Program Handbook*, 2019,
[58] Federal Aviation Administration, Advisory Circular 150/5300-13A, Change 1, *Airport Design*, 2014.

3.4.4. Helicopter Operating Areas

Helicopter activity at the Airport has increased significantly in recent years, driven by medical evacuation and tour operators. A helicopter operating area is located beyond the airfield fence and is used by tenants of the adjacent private hangar. A helicopter parking area is located on the southeast portion of the apron. As previously noted, the location of the helicopter parking area does not satisfy the 39.5-foot separation standard from the Taxilane OFA. It is recommended that the aircraft parking apron be reconfigured to satisfy this design standard or a different location for a helicopter parking area be identified. It is also recommended that the helicopter parking area is equipped with standard lighting to assist with nighttime operations.

3.4.5. Airfield Pavement

As presented in **Chapter 1 - Inventory of Existing Conditions**, the last pavement inspection at the Airport occurred in 2017. The pavement condition index (PCI) report indicated that Runway 14-32 was in good condition, however, the Runway's published weight bearing capacity is 4,000 pounds for aircraft equipped with a single-wheel configuration. An examination of the FAA's TFMSC database, and data available in the Airport's operational monitoring system indicates that aircraft heavier than 4,000 pounds regularly operate at the Airport. Additionally, Airport Management has indicated that the published weight bearing capacity has resulted in potential operators of corporate aircraft to avoid landing at Cottonwood Airport. It is recommended that the Airport conduct a pavement strength analysis to determine the actual weight bearing capacity of Runway 14-32 and present the results to the FAA. If the weight bearing capacity is determined to be deficient compared to the weights of regularly operating aircraft at the Airport, it is recommended that Runway 14-32 be strengthened to a minimum of 12,500 lbs. to accommodate FAA-designated "small" aircraft.

Parallel Taxiway A had an identified PCI of 55, indicating a "poor" condition. The Taxiway has cracking and generates FOD. It is recommended that Taxiway A be rehabilitated or reconstructed to accommodate appropriate pavement strength based on results of a weight bearing capacity analysis of Runway 14-32.

The aircraft parking apron and associated taxilanes were evaluated in three segments as part of the 2017 pavement inspection. The northern segment of the apron received a PCI score of 100 in 2017. The central section received a score of 50, and the southern section received a score of 46. It is recommended that the central and southern segments be rehabilitated or reconstructed. It should also be noted that portions of the apron may require reconfiguration to better accommodate forecast critical design aircraft and improve operational flow of taxiing aircraft. Options for apron configurations are presented in **Chapter 4** of this Master Plan Update.

3.4.6. Airfield Drainage

In 2021, the City of Cottonwood conducted a flood study for the Railroad Wash, which runs under the Airport via a culvert and flows east until its intersection with the Verde River. This study identified inadequacies in the culvert's ability to accommodate stormwater during the 100-year flood, causing access water to be diverted through the Airport (adjacent to the runway) and northwest into the Del Monte Wash. To mitigate this deficiency, it is recommended that a drainage study be incorporated into the environmental analysis and project design of the preferred runway alternative, identified and described in **Chapter 4** of this Master Plan Update.

3.5. AIRSPACE REQUIREMENTS

This section identifies existing obstructions to airspace. Part 77 surfaces analysis offers a basic screening for potential airspace threats. Terminal Instrument Procedures (TERPS) and Obstacle Clearance Requirements from FAA AC 150/5300-13A provide an additional level of screening. These additional screenings are stricter in that they allow less tolerance for potential airspace obstructions.

Data from aerial surveys (from Quantum Spatial, Inc. dated July 2020) were used to analyze potential obstructions to airspace at the Airport. The analysis considered FAR Part 77 Surfaces, TERPS, and FAA AC 150/5300-13A Obstacle Clearance Requirements.

It is recommended that obstacles be removed, lighted, or mitigated to the extent practicable, especially obstacles that penetrate approach and departure surfaces. Detailed graphical representations of airspace surfaces and obstacles are presented in the ALP drawing set.

3.5.1. Part 77 Requirements

FAR Part 77 establishes imaginary surfaces around an airfield to identify potential hazards to air navigation. These standards promote compatible land use and limit the height of objects on and near an airport. The surfaces can vary in shape, size, and slope depending on the available approach procedures to the runway ends. The Part 77 Surfaces are depicted in **Figure 3.3** and described as follows:

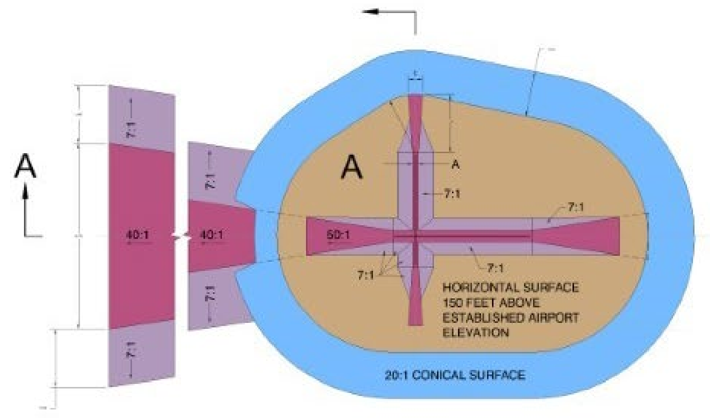
- **Primary Surface:** The surface is longitudinally centered on the runway. The elevation of any point on the surface is the same as the elevation of the nearest point on the runway centerline. Because Runway 32 is equipped with a non-precision instrument approach, the Primary Surface is 500 feet wide and extends 200 feet beyond the ends of each runway.
- **Approach Surface:** The surface is longitudinally centered on the extended runway centerline and extends outward and upward from the end of the Primary Surface. The Approach Surfaces at the Airport have the following characteristics:
  - **Runway 14:** Inner width = 500 feet, Outer width = 1,500 feet, Length = 5,000 feet, Slope = 20:1
  - **Runway 32:** inner width = 500 feet, outer width = 3,500 feet, length = 10,000 feet, slope = 34:1
- **Horizontal Surface:** The surface is a horizontal plane, 150 feet above the established Airport elevation. The Horizontal Surface extends 5,000 feet from the end of the Primary Surface of Runway 14 and 10,000 feet from the ends of the Primary Surface of Runway 32.
- **Conical Surface:** The surface extends outward and upward from the periphery of the Horizontal Surface. The Conical Surface extends at a slope of 20:1 for a horizontal distance of 4,000 feet.

- **Transitional Surface:** This surface extends outward and upward at a right angle to the runway centerline and the runway centerline extended at a slope of 7:1 from the sides of the primary surface and from the sides of the approach surfaces. Transitional extend a distance of 5,000 feet measured horizontally from the edge of the approach surface and at right angles to the runway centerline.

Penetrations to these imaginary surfaces, either natural or manmade, are identified as obstructions and must be evaluated by the FAA. If not removable, obstacles can be mitigated through appropriate marking and/or lighting. If not mitigated appropriately, obstacles may adversely impact approach and departure minimums and/or operational procedures.

At Cottonwood Municipal Airport, analysis reveals a total of 8,619 obstructions to Part 77 surfaces. These obstructions include trees, terrain, fencing, light poles, and Airport NAVAIDs. Additionally, several structures penetrate various Part 77 surfaces, with one hangar (the southernmost hangar on the southeast apron) penetrating the Runway 32 Part 77 Approach Surface. **Figure 3.4** shows all obstructions to Part 77 surfaces at the Airport. The ALP drawing set provides plan-view and profile-view obstruction analyses for existing and ultimate runway configurations as well as a detailed summary of all obstructions to Part 77 imaginary surfaces with recommended dispositions to address areas of concern.

Figure 3.3 - Part 77 Imaginary Surfaces Diagram

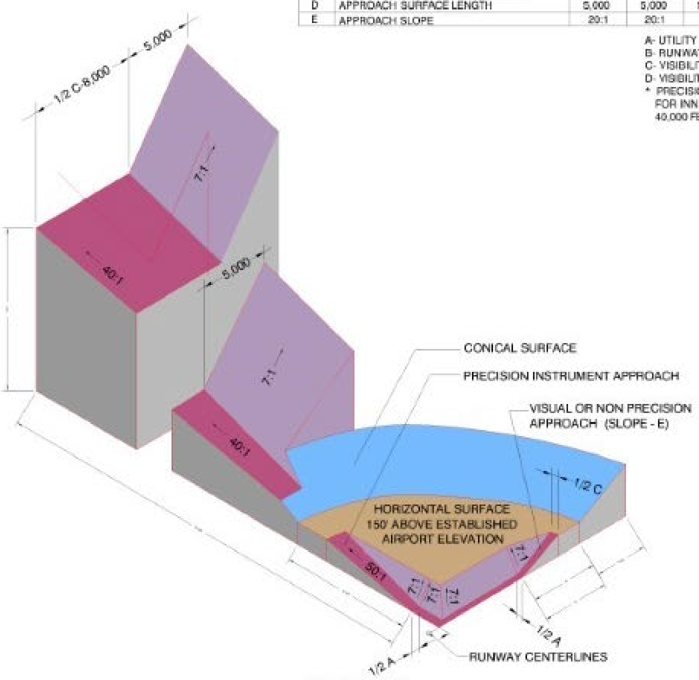


PLAN

AIRPORT AIRSPACE PLAN VIEW

DIM	ITEM	DIMENSIONAL STANDARDS (FEET)					
		VISUAL RUNWAY		NON-PRECISION INSTRUMENT RUNWAY			PRECISION INSTRUMENT RUNWAY
		A	B	A	B		
					C	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	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

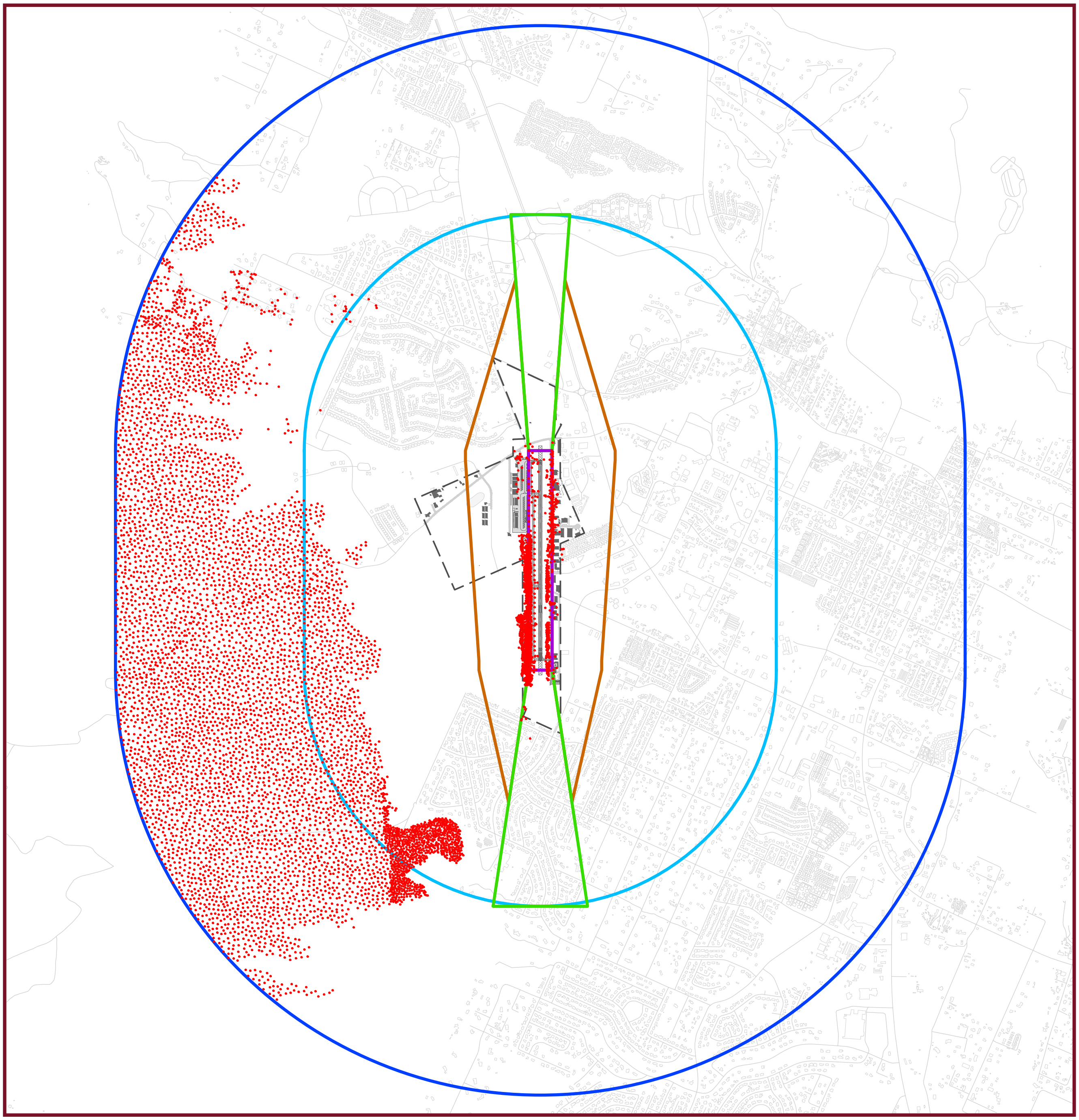


SECTION A-A

PART 77 ISOMETRIC

Sources:
14 CFR Part 77 Safe Efficient Use and Preservation of Navigable Airspace, 2015.
Kimley-Horn, 2020.

Figure 3.4 - Part 77 Imaginary Surfaces and Obstructions



Part 77 Obstruction
Part 77 Primary Surface
Part 77 Approach Surface
Part 77 Transitional Surface
Part 77 Horizontal Surface
Part 77 Conical Surface
Airport Property Boundary
Roadways
NORTH
0 825 1,650 3,300 ft.

Sources:
AGIS Survey, conducted by Quantum Spatial, July 2020.
14 C.F.R. § 77.
Kimley-Horn, 2022.

3.5.2. Terminal Instrument Procedures

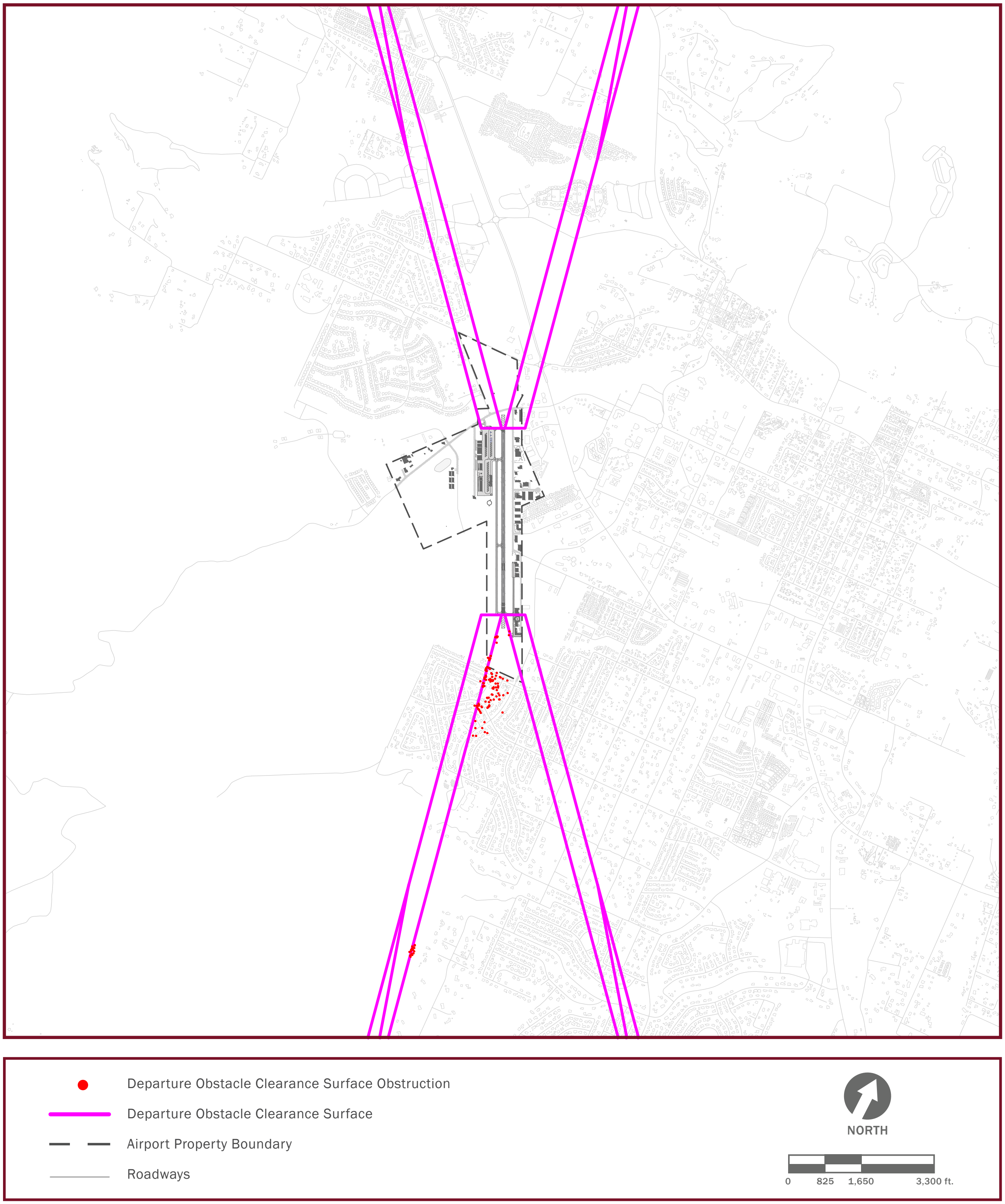
Terminal Instrument Procedures (TERPS) criteria specify the minimum measure of obstacle clearance that is considered by the FAA to provide a satisfactory level of vertical protection from obstructions. TERPS are based on normal aircraft operations. As outlined in the TERPS, the FAA has established surfaces used in the design and approval of instrument flight procedures. These procedures are intended to provide obstacle-free paths for aircraft descending on a glide path to landing or climbing in a departure or missed approach. The basic TERPS surfaces are also referenced in FAA AC 150/5300-13A, Airport Design, and are used to establish landing threshold and departure end of runway locations. Like the FAR Part 77 Surfaces, these surfaces can vary in shape, size, and slope based on the approach capability of each specific runway end.

Departure Obstacle Clearance Surface

The Departure Obstacle Clearance Surface (OCS), or departure surface, is an imaginary trapezoid that begins at the end of the runway. Since Runway 32 has an instrument approach, both Runway 14 and Runway 32 have departure surfaces, each with an inner width of 1,000 feet, an outer width of 7,512 feet, a length of 12,152 feet, and a slope of 40:1. The FAA's Engineering Brief No. 99A prescribes dimensional standards for the departure surface.

Departure surfaces, when clear, allow pilots to follow standard departure procedures with standard rates of climb. According to FAA AC 150/5300-13A, obstacles frequently penetrate departure surfaces. Known penetrations to these surfaces are identified in the FAA's flight procedure publications used by pilots for flight planning. If penetrations are substantial enough, the FAA may require nonstandard rates of climb, higher departure minimums, or reduction in runway length available for takeoff. As shown in Figure 3.5, 123 obstacles penetrate the Runway 32 departure surface and no penetrations are identified in the Runway 14 departure surface.

Figure 3.5 - Departure Obstacle Clearance Surfaces and Obstructions



Sources:
AGIS Survey, conducted by Quantum Spatial, July 2020.
Kimley-Horn, 2022.

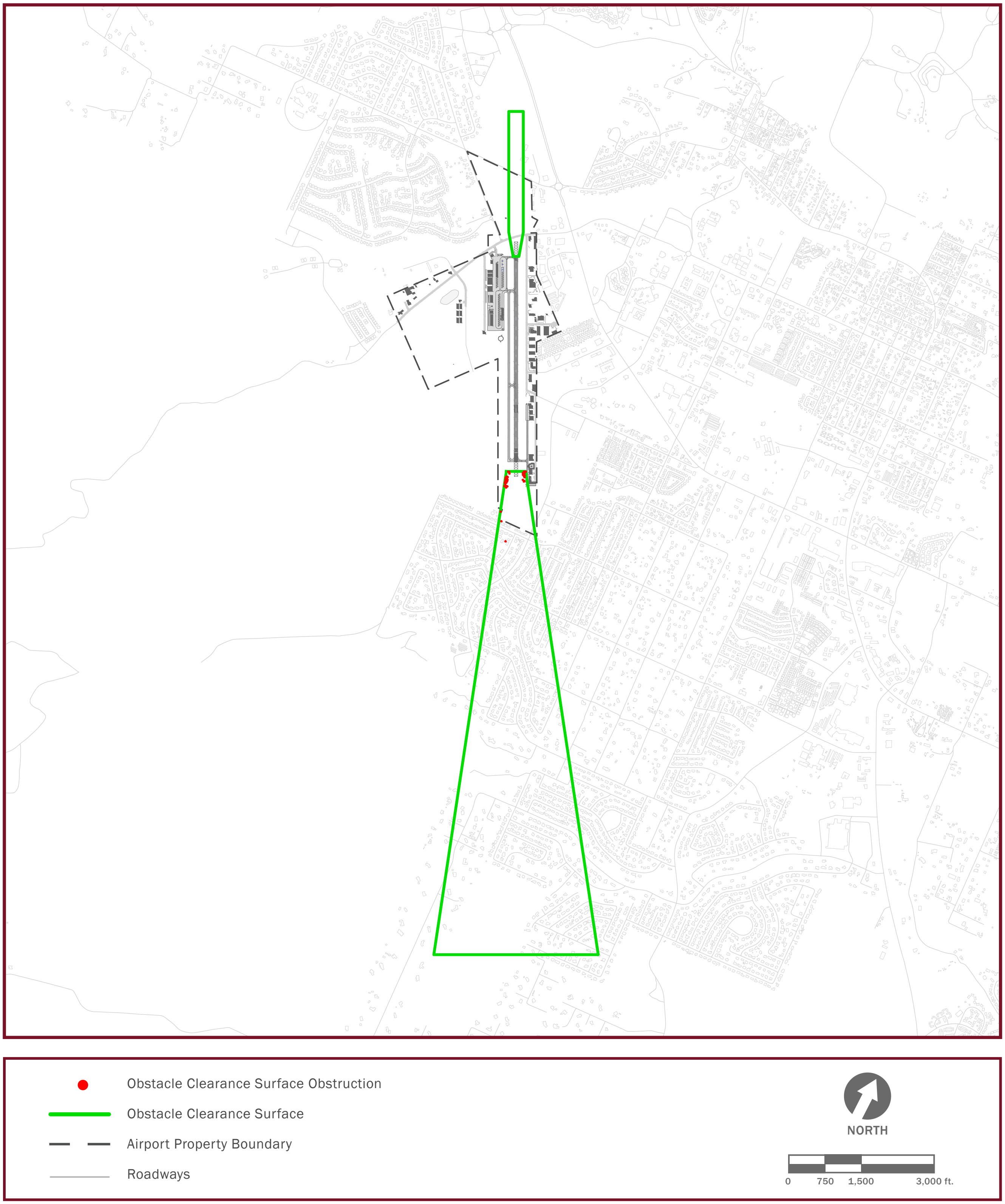
Obstacle Clearance Requirements

Dimensional standards for Obstacle Clearance Requirements have been updated to reflect recent changes identified in Engineering Brief No. 99. These obstacle clearance surfaces, also known as threshold siting surfaces, are designed to protect the use of the runway in both visual and instrument meteorological conditions near an airport. Per Engineering Brief No. 99, the surfaces at the Airport have the following characteristics:

- **Runway 14:** Approach type = 2 (accommodates visual approaches for that serve small airplanes with approach speeds of 50 knots or more), inner width = 250 feet, outer width = 700 feet, start beyond runway threshold = 0 feet, total length = 5,000 feet, slope = 20:1.
- **Runway 32:** Approach type = 4 (accommodates instrument approaches having visibility greater or equal to ¾ statute mile), inner width = 400 feet, outer width = 3,400 feet, start beyond runway threshold = 200 feet, total length = 10,000 feet, slope = 20:1.

These surfaces and the identified obstructions to these surfaces are illustrated in **Figure 3.6**. As noted above, the Airport has an RNAV (GPS) instrument approach procedure for Runway 32. However, the FAA has included a note in the procedure that states, "Procedure N/A at night." This note indicates that the Runway 32 RNAV (GPS) approach procedure is not authorized for nighttime operations. FAA-H-8083-16B, Instrument Flying Handbook (2017) states that instrument approach procedures may not be authorized at night when there is an unmarked or unlit obstacle penetration of the obstacle clearance surface. As shown in **Figure 3.6**, 49 obstacles penetrate the Runway 32 obstacle clearance surface, including trees, scrub bushes, a fence, and the ground itself. It is recommended the Airport trim or clear penetrating vegetation and grade where necessary to clear the Runway 32 threshold siting surface of penetrations and permit nighttime instrument approach procedures. A detailed analysis of obstacles, penetrations, and recommended dispositions are provided in the ALP.

Figure 3.6 - Obstacle Clearance Surfaces and Obstructions



Sources:
AGIS Survey, conducted by Quantum Spatial, July 2020.
Kimley-Horn, 2022.

3.6. LANDSIDE REQUIREMENTS

Landside facilities are considered those that are outside of the active airfield operating area. This section includes evaluations of aircraft parking aprons, aircraft storage hangars, and vehicle access and parking.

3.6.1. Aircraft Storage Hangar and Parking Apron Requirements

The requirements for aircraft storage hangar and aircraft parking apron space vary by aircraft type, numbers of based and itinerant aircraft, and the users of these aircraft. Spatial needs required per aircraft were calculated as follows:

- **Conventional hangar storage:** Based on the dimensions of a common aircraft for each type (single-engine piston, multi-engine piston, turboprop, jet, rotorcraft, other) and adding additional space for general hangar uses.
- **T-hangar storage:** Assumed to be 20 percent smaller in size than an equivalent conventional hangar.
- **Apron parking:** Determined by adding a factor of 75 percent to the conventional hangar space value to account for taxilane and movement areas.

Storage requirements by aircraft type are shown below in **Table 3.10.**

Table 3.10 - Storage Space Requirements by Aircraft Type (Square Feet)

Aircraft Type	Conventional Hangar	T-Hangar	Apron
Single-Engine Piston	1,200	960	2,100
Multi-Engine Piston	2,000	--	3,500
Turboprop	2,000	--	3,500
Jet	2,500	2,000	4,375
Rotorcraft	800	640	1,400
Other/Experimental	1,200	960	2,100

Sources:
FAA Aircraft Characteristics Database.
Kimley-Horn, 2022.

Notes:
T-hangar values were derived by reducing conventional hangar storage space values by a factor of 20 percent.
Apron values were derived by adding a factor of 75 percent to conventional hangar storage values to account for taxilane and movement areas associated with apron parking.
Jets and Turboprop aircraft are not anticipated to be stored in T-hangars.

Annual based aircraft and peak hour itinerant aircraft requiring storage by type are shown in **Table 3.11** below. These numbers are referenced throughout the following subsections.

Table 3.11 - Number of Based and Itinerant Aircraft Requiring Storage

Year	Single-Engine Piston		Multi-Engine Piston		Turboprop		Jet		Rotorcraft		Other		Total	
	BAC	ITIN	BAC	ITIN	BAC	ITIN	BAC	ITIN	BAC	ITIN	BAC	ITIN	BAC	ITIN
2019	44	8	5	1	2	0	2	0	11	2	0	0	64	11
2024	45	8	5	1	2	0	4	1	12	2	1	0	69	12
2029	47	8	6	1	2	1	5	1	13	2	2	0	75	13
2034	48	8	6	1	4	1	6	1	14	2	3	1	82	14
2039	53	9	6	1	5	1	7	1	15	+	3	0	89	15
Change 2019-2039	+9	+1	+1	0	+3	+1	+5	+1	+4	+1	+3	0	+25	+4

Sources:
FAA Form 5010-1, Airport Master Record (effective May 21, 2020).
FAA National Based Aircraft Inventory Program database
FAA Traffic Flow Management System Counts database.
Kimley-Horn, 2022.
Notes:
BAC – Based Aircraft, ITIN – Itinerant Aircraft

Separate calculations were performed for the number of aircraft requiring storage and parking, by aircraft and storage type, for based and itinerant aircraft.

Existing Based Aircraft Storage

Existing based aircraft demand and their fleet mix were derived from **Chapter 2 - Aviation Forecasts.**

In order to identify the split between conventional hangar, T-hangar, and apron parking for each aircraft type, assumptions were made based on existing tenant leases and discussions with Airport Management. The resulting based aircraft parking assumptions include:

- 95 percent of existing based aircraft stored on the apron are single-engine piston aircraft
- 5 percent of based aircraft currently stored on the apron are multi-engine piston aircraft
- Based aircraft not stored on the apron are stored in an existing hangar space
- Aircraft storage trends will remain constant over the planning horizon
- Existing hangars at the Airport are fully occupied

Future Based Aircraft Storage Requirements

Future based aircraft demand and fleet mix were derived from **Chapter 2 - Aviation Forecasts.**

In order to identify the split between conventional hangar, T-hangar, and apron parking for each aircraft type, assumptions were made based on input from Airport Management and ongoing hangar development, which include:

- Future hangar demand will require new construction (Airport hangar storage is at capacity)
- Storage trends will remain constant over the planning horizon
- 100 percent of jet aircraft will be stored in a conventional hangar

- For multi-engine piston aircraft, 50 percent will be stored in a conventional hangar and 30 percent will be stored in a T-hangar.
- 40 percent of single-engine piston aircraft will be stored in a conventional hangar and 40 percent will be stored in a T-hangar
- 100 percent of turboprop aircraft will be stored in a conventional hangar
- 100 percent of rotorcraft will be stored in a conventional hangar
- 40 percent of "other" type aircraft will be stored in conventional hangars and 40 percent in T-hangars
- Remaining aircraft will be stored on the apron

These assumptions determined the number of each aircraft requiring storage, which was multiplied by the spatial requirements in **Table 3.10** to calculate the overall apron and hangar area requirements to meet future based aircraft demand as shown in **Table 3.12**.

Itinerant Aircraft Storage Requirements

The number of itinerant aircraft requiring storage was presented in **Table 3.11**. During typical peak periods (accounting for overnight activity), approximately 11 itinerant aircraft require storage, which was forecast to increase to 15 by 2039. It was assumed that 95 percent of itinerant aircraft would be stored on the apron and the remaining 5 percent would be stored in a conventional hangar (such as an FBO). Typically, itinerant aircraft at the Airport dwell for a relatively short period of time to refuel, though itinerant aircraft that do remain at the Airport longer have a typical dwell time of approximately two days.

Total apron and hangar storage requirements for based and itinerant aircraft are shown in **Table 3.12** on the following page.

Table 3.12 - Based and Itinerant Aircraft Storage Requirements

	Number of Aircraft	SF Required
Conventional Hangar		
Based Aircraft	18	29,700
Itinerant Aircraft	1	1,200
Total	**19**	**30,900**
T-Hangar		
Based Aircraft	5	4,800
Itinerant Aircraft	0	0
Total	**5**	**4,800**
Apron		
Based Aircraft	23	53,900
Itinerant Aircraft	14	34,475
Total	**38**	**88,375**

Sources:
Kimley-Horn, 2022.

Notes:
T-hangar values were derived by reducing conventional hangar storage space values by a factor of 20 percent.
Apron values were derived by adding a factor of 75 percent to conventional hangar storage values to account for taxilane and movement areas associated with apron parking.

Comparison to Existing Facilities

Currently, there are two T-hangars on the south end of the main apron area of the Airport, one with six units and the other with ten units. The twelve covered tie-downs on the north end of the apron were counted as open apron tie-downs/apron space for this analysis. Additionally, there are six conventional hangars on the main apron area of the Airport including the FBO, and five additional private hangars on the southeast portion of the airfield. The main apron serves the northwest side of the Airport and is 210,500 square feet on its north end and 263,500 square feet on its south end, or 474,000 square feet in total. On the southeast side of the Airport, two private aprons serve the private facilities and are 22,400 square feet on the north end and 17,000 square feet on the south end. For the purpose of this analysis, the two private aprons were excluded. Overall, existing aircraft storage space includes the following, approximately:

- 144,479 square feet of conventional hangar storage
- 19,944 square feet of T-hangar storage
- 474,000 square feet of apron area

Based on forecast storage requirements and existing storage space, the existing apron area at the Airport is adequate to meet forecast demand for apron area over the next 20 years.

Based on forecast demand, by 2039 it is expected that there will be a 30,900-square-foot deficit for conventional hangar space and a 4,800-square-foot deficit for T-hangar space. Potential locations of hangars and storage facilities are presented in **Chapter 4 – Alternatives.**

3.6.2. Surface Transportation

The following subsections summarize landside access to the Airport and vehicle parking requirements.

Airport Access Roadways

Primary access to the terminal/administration building is provided by Mingus Avenue. Hangars and tenant areas on the western portion of the Airport are accessed by a secure entrance road from Mingus Avenue to the former Red Rock Skydiving building. Access to private hangars outside of the airfield fence on the southeast side of the Airport is provided by Airpark Road.

The current roadways are adequate to serve existing needs for vehicle access to the Airport. However, as the Airport moves forward with plans to build out the western side of its property, a southern extension to the secured Airport access road will likely be required to access new aircraft hangars and other development south of the existing apron. Additionally, the AOA fence on the west side of the roadway and the associated access gate off of Mingus Avenue should be removed to allow public access to existing and future hangars. AOA fencing is present on the east side of the existing Airport access roadway and thus would need to be extended south to accommodate new development, as needed. The Airport should continue to evaluate future needs and development to ensure adequate roadway access is provided.

Vehicle Parking

The amount of vehicle parking spaces and area needed to meet aviation demand varies by the amount and types of facilities at the Airport. Based on requirements from the City of Cottonwood, a standard parking space can be no less than 9 feet wide and 20 feet deep, with an area of 180 square feet. Existing Airport vehicle parking consists of:

- Eight standard marked parking spaces at the terminal/administration building, including one handicapped space
- Approximately 50 paved parking spaces along the Airport access road
- Various unpaved overflow parking areas

Future vehicle parking demand was calculated according to Exhibit 5-48 of the Airport Cooperative Research Program's (ACRP) *Guidebook on General Aviation Facility Planning,* summarized below:

- Conventional hangar storage: One vehicle parking space per 1,000 square feet of hangar floor space.
- T-hangar storage: One vehicle parking space for 50 percent of units.
- FBO building: Two and a half vehicle parking spaces per peak-hour operation.
- Aircraft apron: One vehicle parking space for every two based aircraft tie-down spaces.

Applying the above calculations to anticipated 2039 demand results in a projected need of an additional 45 vehicle spaces and 8,100 square feet of space. Although vehicle parking may be developed concurrent with private hangar development, it is recommended that the Airport preserve areas for parking. A summary of existing conditions and future needs is shown in **Table 3.13**.

Table 3.13 - Vehicle Parking Requirements

	# of Spaces	Space Required (SF)
Vehicle Parking		
Total Need by 2039	103	18,540
Existing Paved Spaces	58	10,440
Additional Spaces Required	**45**	**8,100**

Sources:
ACRP Guidebook on General Aviation Facility Planning (2014)
Kimley-Horn, 2022.

Note:
The City of Cottonwood has set a standard parking space to be 9 feet wide by 20 feet deep, or 180 square feet

3.7. SUPPORT FACILITIES

Support facilities and services are those that provide direct assistance to the functionality and security of the Airport. This section addresses FBO, aircraft fueling, Airport maintenance, utilities, fencing and security, and terminal/administration building facilities.

3.7.1. FBO Facilities

The FBO occupies office space inside the terminal/administration building, and also leases an approximately 1,800 square-foot conventional hangar immediately south of that building. Based on forecast growth in itinerant activity, it is anticipated that the FBO will likely expand existing hangars or acquire additional hangars. Discussions with Airport Management indicate that the FBO has seen a rise in fuel sales and temporary aircraft services since opening in 2019.

Although FBO expansion will be funded privately, the Airport should plan to preserve logical areas that accommodate anticipated growth in FBO services and facilities.

3.7.2. Aircraft Fueling Facilities

There are two aircraft fuel facilities at the Airport. The main facility is located on the south portion of the aircraft parking apron in between the six-unit t-hangar and a conventional hangar. This aboveground fuel storage and dispensing facility consists of two 10,000-gallon tanks: one contains 100LL AvGas and is owned by the City of Cottonwood; the second contains Jet A fuel and is privately owned but is periodically made available for public use. As noted in **Chapter 1 - Inventory of Existing Conditions**, the privately-owned fuel tank was out of compliance and was in the process of being removed.

Because the location of the main fuel tanks is constricted by nearby hangars and taxilanes, it is recommended that the facility be relocated. Based on increased fuel sales in recent years, it is recommended that relocated facilities offer self-service and contain a minimum of one 12,000-gallon tank of Jet A fuel, and one 12,000-gallon tank of 100LL fuel.

3.7.3. Airport Maintenance

As noted in **Chapter 1 - Inventory of Existing Conditions**, the Airport does not have a dedicated maintenance facility however, the City's public works facility is located approximately one quarter of a mile southwest of the Airport on Mingus Avenue. Routine maintenance is addressed in a timely fashion and a dedicated on-Airport facility is not considered a need within the 20-year planning horizon.

3.7.4. Utility Infrastructure

Utility providers for water, sanitary sewer, electric, and natural gas were identified in **Chapter 1 - Inventory of Existing Conditions**. Although Airport Management has not identified any specific utility deficiencies, it should be noted that utility extensions will likely be required for future development on currently unoccupied portions of the airfield.

3.7.5. Airfield Fencing and Security

The airfield is completely enclosed by a chain link fence that varies in height from four to six feet. There are six gates along the fence's perimeter, including one security gate southwest of the terminal/administration building that provides access to the Airport's hangars, one security gate northeast of the terminal/administration building that provides vehicle access to the main apron, and four security gates on the southeast portion of the Airport that provide runway access to the private hangars outside of the AOA fence. While existing fencing has been historically adequate for airfield protection, recent weather events and subsequent ground erosion at the base of the fence line have created openings in which wildlife have entered. It is recommended the Airport considers the addition of wildlife fencing with anti-dig skirting to ensure the safety of both wildlife and all Airport users.

As previously noted, a secure airfield fence is present on the southeast side of the Airport near the private hangars. This fence restricts access between the eastern apron areas and Runway 14-32. Additionally, a portion of the fence is currently penetrating the Runway 32 obstacle clearance surface, as described in **Section 3.5.2.2**. It is recommended that the fence is shortened or relocated to mitigate the surface penetration. Additional existing perimeter fencing located between Airpark Road and the parallel taxilane can provide safety and security for hangar tenants, other Airport users, and pedestrians.

3.7.6. Terminal/Administration Building

The Airport's terminal/administration building encompasses 1,600 square feet and has areas for office space, flight planning, restrooms, and other GA services. The size of the building is typical for an airport with similar levels of activity and tenant base as Cottonwood Municipal Airport. The size and location of the terminal/administration building is anticipated to satisfy forecast demand through the 20-year planning horizon; however, routine building upkeep and improvements should be addressed as needed.

Airport Management has identified that a restaurant would be desirable at the Airport. It is recommended that an area adjacent to the terminal/administration building with public roadway access be preserved for such a facility.

3.8. SUMMARY OF FACILITY REQUIREMENTS

Based on the findings presented in this chapter, a summary of recommended facility needs is presented in **Table 3.14**.

Table 3.14 - Facility Requirements Summary

Facility Type	Recommendation
Airside Facilities	
Runway 14-32 Length	Extend Runway 14-32 to 5,100 feet
Runway 14-32 Width*	Standard runway width for ADG II is 60'. The FAA indicated that a benefit-cost analysis may be performed to determine the financial feasibility of maintaining a 75' runway.
Runway 14-32 Orientation	Airport AWOS is being replaced. Airport should monitor wind data to identify if re-orienting Runway 14-32 or addition of a crosswind runway is justifiable.
Runway 14-32 Pavement Strength	Runway strength analysis should be conducted to determine existing weight bearing capacity. Runway strengthening will be required If analysis results in less than 12,500 lbs.
Runway 14-32 Blast Pads	Modify blast pad dimensions to meet FAA design standards (from 75' wide by 300' long to 80' wide by 100' long)
Runway PAPI PCUs	Relocate PAPI power control units outside of ROFA (PAPI PCUs are not fixed-by-function)
Runway 32 REILs	Relocate Runway 32 REILs to be located 40' from runway edge
Taxiway Lighting	Replace taxiway reflectors with LED taxiway lighting (solar powered if FAA-funding eligible)
Taxiway System	Reconstruct taxiways to meet TDG 2 standard width of 35'
Taxiway A	Reconstruct parallel Taxiway A to appropriate strength, and full-length of Runway 14-32
Mitigate penetrations to Taxiway and Taxilane OFAs	Includes vegetation, helicopter operating area, and structures on eastern taxilane
Aircraft Parking Apron	Reconfigure apron to accommodate ADG II aircraft taxiing, eliminate direct runway access, and mitigate nonstandard separations (e.g., aircraft tiedowns, helicopter parking area)
Aircraft Parking Apron	Rehabilitate or reconstruct central and southern portions of apron
Helicopter Operating Area	Standardize markings and install standard lighting on helicopter operating area
Airspace Obstacles	Mitigate airspace obstacles, including vegetation, fencing, and structures
Landside Facilities	
Conventional Hangars	Construct additional 30,900 square feet of conventional hangars; preserve additional space for aircraft taxiing and maneuvering
T-Hangars	Construct additional 4,800 square feet of t-hangars (5 units); preserve additional space for aircraft taxiing and maneuvering
Support Facilities	
Airport Access	Extend Airport access roadway to new development as needed; remove AOA fence on west side of Airport access road and associated access gate off of Mingus Avenue
Vehicle Parking	Construct 45 vehicle parking spaces (8,100 square feet) adjacent to various facilities
Utilities	Extend utilities to new development as needed
Air Operations Fence	Upgrade existing fencing to prevent wildlife intrusions on airfield
Stormwater Management	Conduct stormwater management/drainage study

Source:
Kimley-Horn, 2022.

Notes:
ADG = Airplane Design Group
AWOS = Automated Weather Observing System
PAPI = Precision Approach Path Indicator
REIL = Runway End Identifier Lights
ROFA = Runway Object Free Area
TDG = Taxiway Design Group
OFA = Object Free Area
** = Standard runway width for ADG II is 60 feet. The future condition exhibits within this Master Plan Update depict a standard 60-foot-wide runway. However, the FAA has indicated that a benefit-cost analysis may be performed to determine the financial feasibility of narrowing the Airport's runway from an existing width of 75 feet to 60 feet. Overall, the ultimate width of Runway 14-32 is dependent upon the results of the benefit-cost analysis.*

CHAPTER 4: ALTERNATIVES

4.1. CHAPTER INTRODUCTION

This chapter presents development alternatives for various facilities and functional areas at Cottonwood Municipal Airport. These alternatives are intended to accommodate aviation demand forecasts and facility requirements developed and presented in **Chapter 2** and **Chapter 3** of this Master Plan Update, respectively. Feedback from the City, the FAA, the Master Plan's Planning Advisory Committee (PAC), various other stakeholders, and members of the public was also incorporated. The recommended alternative for each facility and functional area as well as the Airport's overall recommended development and land use plans are included in this chapter and in the ALP.

4.2. SUMMARY OF FACILITY REQUIREMENTS

Chapter 3 – Facility Requirements presents the facilities needed to accommodate forecast demand at the Airport over a 20-year planning horizon. **Table 4.1** on the following page provides a summary of these facility needs.

Table 4.1 - Summary of Facility Requirements

Facility Type	Recommendation
Airside Facilities	
Runway 14-32 Length	Extend Runway 14-32 to 5,100 feet
Runway 14-32 Width	Standard runway width for ADG II is 60'. The FAA indicated that a benefit-cost analysis may be performed to determine the financial feasibility of maintaining a 75' runway.
Runway 14-32 Orientation	Airport AWOS is being replaced. Airport should monitor wind data to identify if re-orienting Runway 14-32 or addition of a crosswind runway is justifiable.
Runway 14-32 Pavement Strength	Runway strength analysis should be conducted to determine existing weight bearing capacity. Runway strengthening will be required If analysis results in less than 12,500 lbs.
Runway 14-32 Blast Pads	Modify blast pad dimensions to meet FAA design standards (from 75' wide by 300' long to 80' wide by 60' long)
Runway PAPI PCUs	Relocate PAPI PCUs outside of ROFA (PAPI PCUs are not fixed-by-function)
Runway 32 REILs	Relocate Runway 32 REILs to be located 40' from runway edge
Taxiway Lighting	Replace taxiway reflectors with LED taxiway lighting (solar powered if FAA-funding eligible)
Taxiway System	Reconstruct taxiways to meet TDG 2 standard width of 35'
Taxiway A	Reconstruct parallel Taxiway A to appropriate strength, and full-length of Runway 14-32
Mitigate penetrations to Taxiway and Taxilane OFAs	Includes vegetation, helicopter operating area, and structures on eastern taxilane
Aircraft Parking Apron	Reconfigure apron to accommodate ADG II aircraft taxiing, eliminate direct runway access, and mitigate nonstandard separations (e.g., aircraft tiedowns, helicopter parking area)
Aircraft Parking Apron	Rehabilitate or reconstruct central and southern portions of apron
Helicopter Operating Area	Standardize markings and install standard lighting on helicopter operating area
Airspace Obstacles	Mitigate airspace obstacles, including vegetation, fencing, and structures
Landside Facilities	
Conventional Hangars	Construct additional 30,900 square feet of conventional hangars; preserve additional space for aircraft taxiing and maneuvering
T-Hangars	Construct additional 4,800 square feet of t-hangars (5 units); preserve additional space for aircraft taxiing and maneuvering
Support Facilities	
Airport Access	Extend Airport access roadway to new development as needed; remove AOA fence on west side of Airport access road and associated access gate off of Mingus Avenue
Vehicle Parking	Construct 45 vehicle parking spaces (8,100 square feet) adjacent to various facilities
Utilities	Extend utilities to new development as needed
Air Operations Fence	Upgrade existing fencing to prevent wildlife intrusions on airfield
Stormwater Management	Conduct stormwater management/drainage study

Source:
Kimley-Horn, 2022.

Notes:
ADG = Airplane Design Group
AWOS = Automated Weather Observing System
PAPI = Precision Approach Path Indicator
REIL = Runway End Identifier Lights
ROFA = Runway Object Free Area
TDG = Taxiway Design Group
OFA = Object Free Area

4.3. EVALUATION CRITERIA

Based on facility requirements and stakeholder input, the evaluation criteria described below were established to assess and compare development alternatives in a consistent manner. The development alternatives presented within this chapter were rated on a scale of 0 to 4 for each evaluation criteria, with each rating representing the following:

- 0 = Negatively impacts existing condition
- 1 = Little-to-no impact on existing condition
- 2 = Slightly improves existing condition
- 3 = Improves existing condition
- 4 = Significantly improves existing condition

This evaluation is based on each alternative's ability to satisfy the criteria listed below. The sums of the ratings were then used to determine the recommended development alternatives for the Airport.

- **Enhances operational safety:** Development alternatives should aim to maintain or enhance Airport safety to the extent practical. Operational safety is considered for the safe and efficient flow of aircraft on the ground and in the air as well as the protection of pedestrians and property on and around the Airport.
- **Satisfies forecast demand:** Development alternatives should accommodate future demand volumes and aircraft fleet mix as analyzed and presented in **Chapter 2 – Aviation Forecasts**. Forecast demand must be accommodated while also adhering to FAA design standards—a critical factor when obtaining federal funding for airport improvement projects.
- **Minimizes off-airport impacts:** Development alternatives should minimize off-airport impacts such as the need for extensive land acquisition, the introduction of safety area penetrations, substantial increases in airport-related noise, and other adverse impacts to the community and natural environment.
- **Minimizes on-airport impacts:** Development alternatives should be compatible with existing and planned airside and landside facilities. Alternatives should also minimize the need for modifications to FAA design standards.
- **Feasible and cost effective:** Development alternatives should be feasible and cost effective in implementation. Alternatives should consider costs associated with design, environmental documentation, construction, ongoing maintenance and upkeep, and costs associated with potential off-airport impacts such as land acquisition or the relocation of existing infrastructure.

4.4. NO-DEVELOPMENT ALTERNATIVES

No-development alternatives were identified to establish a baseline of impacts that may occur as a result of inaction regarding the construction of needed facilities at the Airport. These evaluations consider whether facility improvements should occur at the Airport, or if another option would better serve existing and potential future tenants and users.

4.4.1. No-Build Alternative

The no-build alternative considers no additional landside, airside, or support facilities constructed at the Airport. No additional physical enhancements would be implemented, though routine maintenance would still be conducted to maintain the existing operational functionality of the Airport. This alternative does not satisfy projected levels of aviation demand identified in Chapter 2 and thus does not satisfy the subsequent facility requirements presented in Chapter 3. Additionally, the airfield (including critical safety areas) would not conform to the design standards of the future ARC of B-I (small), which limits the Airport's ability to provide appropriate separation clearances. Therefore, the no-build alternative is not recommended as a viable development strategy.

4.4.2. Relocation or Transfer of Aviation Activities

Another alternative examined is the transfer or relocation of specific or all aviation activities at Cottonwood Municipal Airport to another airport. Previous chapters of this Master Plan Update described the mix of tenants and users at the Airport, including flight schools, tour and medivac operators, and small corporate jet traffic. Relocation of these tenants is seen as an undesirable option. Additionally, several GA airports located near the City of Cottonwood are either at capacity or possess their own unique restraints that limit the ability to relocate services and/or tenants currently based at Cottonwood Municipal Airport. In addition to the direct economic benefits provided by users and tenants, the Airport acts as an economic driver within the community and provides a valuable service as a GA facility. Therefore, the relocation or transfer of aviation activities is not recommended as a viable option.

4.4.3. Construction of New Airport

In rare situations, a new airport may be constructed to alleviate congestion, enhance operational safety, or provide a lower cost option in the event of costly redevelopment at an existing airport. The availability of developable land combined with projected levels of activity mean that construction of a new airport is not recommended as a viable development alternative for the Airport. However, given feedback from previous public meetings about a consolidated airport to service GA traffic across multiple constrained airports in the area, this option is explored below.

Three GA airports are located near Cottonwood Municipal Airport, each possessing their own unique advantages and constraints: Sedona Airport (SEZ), Prescott Regional Airport (PRC), and Montezuma Airport (19AZ). This alternative would create a consolidated airport in the region that would satisfy each individual airport's demand while eliminating their unique constraints. Brief descriptions of the advantages and constraints of the aforementioned airports are as follows:

Sedona Airport (SEZ)

- *Advantage:* This airport is located in an optimal location for GA flights to Sedona and is well-equipped with facilities and services to accommodate high-end business jet traffic.
- *Constraint:* Major turbulence is encountered near this airport due to its location on a 500-foot-high mesa, the surrounding area is noise sensitive, and birds/wildlife are specifically noted on and around the airport.

Prescott Regional Airport (PRC)

- *Advantage:* This airport is the third busiest airport in Arizona and the 23rd busiest airport in the United States in calendar year 2021 primarily due to Embry-Riddle Aeronautical University's flight training activity being based at PRC. Its three runways allow the airport to accommodate this capacity in addition to two commercial airline destinations.
- *Constraint:* Current demand for hangar space and covered tie-downs exceeds available supply, and a paid waitlist is active for these aircraft storage spaces.

Montezuma Airport (19AZ)

- *Advantage:* This private airport is a "fly-in" community, with each residence equipped with an aircraft hangar. Airport facilities are well-maintained and the community is regarded by its residents as being a nice place to live.
- *Constraint:* This airport is designated as private use and permission is required prior to landing at the airport. There is no transient parking available and aircraft may only park if they are an invited guest of a resident.

The constraints of these airports, combined with the general location of Cottonwood Municipal Airport with respect to adjacent residential development, have spurred discussions of a regional airport or a training airstrip intended to serve the Verde Valley. Although such a facility may be seen by area residents as desirable, a new airport would require a detailed siting analysis and environmental impact statement. These studies are costly and would require local investment as FAA Airport Improvement Program (AIP) funds may not be available to supplement the overall cost. It is not a recommendation of this Master Plan Update that a new airport be constructed. However, if the City of Cottonwood desires to explore the feasibility of these studies, it should work with nearby communities to determine if financial support may be available.

4.5. NO-ANALYSIS ALTERNATIVES

Generally, facility improvements may be categorized as those that require in-depth alternatives analyses and those that do not. For the purposes of this Master Plan Update, improvements that do not require in-depth analyses are primarily focused on upgrading existing Airport infrastructure and/or standardizing conditions per FAA guidance. These improvements typically do not offer alternatives as certain conditions are required be met and there are no other options to achieving the infrastructure improvements. Such recommended improvements at Cottonwood Municipal Airport are listed below and depicted in the Recommended Development Plan (RDP) (**Figure 4.20**).

- Extension of Taxiway A to provide a full parallel taxiway
- Addition of an aircraft runup area
- Standardization of taxiway fillets
- Standardization of blast pads
- Removal of nonstandard or unused airfield pavements
- Rehabilitation/strengthening of airfield pavement, as needed
- Mitigation of natural airspace obstacles (e.g., trees, shrubs)
- Relocation of PAPI PCUs outside of the ROFA (PAPI PCUs are not fixed-by-function)
- Relocation of Runway 32 REILs to be positioned 40 feet from the runway edge (consistent with Runway 14 REILs)
- Relocation of segmented circle with lighted wind indicator
- Standardization of markings and installation of standard lighting for the helicopter parking area
- Designation and preservation of apron space for future electric aircraft charging stations
- Installation of new airfield signage and LED lighting
- Extension of Airport access roadway and vehicle parking to new development, as needed
- Extension of utilities to new development, as needed
- Extension of AOA fence to new development, as needed
- Upgrading of existing AOA fence to prevent wildlife intrusions onto the airfield
- Removal of AOA fence on west side of access road and associated access gate off of Mingus Avenue
- Relocation of AOA fence on east side of Airport to mitigate airspace obstruction to Runway 32 20:1 obstacle clearing surface

4.6. RUNWAY 14-32 ALTERNATIVES

At Cottonwood Municipal Airport, future airside development and improvements are dependent upon the recommended runway alternative. Therefore, this section presents several alternatives for Runway 14-32, each of which incorporates the following no-analysis alternatives (introduced in **Section 4.5**) related to the Airport's airside facilities:

- Extension of Taxiway A to provide a full parallel taxiway
- Standardization of taxiway fillets
- Standardization of blast pads
- Removal of nonstandard or unused airfield pavements
- Addition of an aircraft runup area
- Rehabilitation/strengthening of airfield pavement, as needed
- Mitigation of airspace obstacles, including fence obstruction to 20:1 OCS
- Relocation of PAPI PCUs outside of the ROFA (PAPI PCUs are not fixed-by-function)
- Relocation of Runway 32 REILs to be positioned 40 feet from the runway edge (consistent with Runway 14 REILs)
- Installation of new airfield signage and LED lighting

As analyzed and presented in **Chapter 3 – Facility Requirements**, it is recommended that Runway 14-32 be extended to 5,100 feet in length to accommodate the Airport's forecast operational fleet. The Airport's future ARC of B-I (small) has a standard runway width of 60 feet. Although the current runway width is 75 feet, the FAA has indicated that a benefit-cost analysis should be conducted to determine the financial feasibility of narrowing Runway 14-32 to 60 feet wide. The ultimate runway width and subsequent funding for pavement maintenance are dependent upon the results of a future benefit-cost analysis.

Constraints considered during the development of these runway alternatives include the Airport's existing property boundary and the on- and off-airport land uses. Mingus Avenue intersects the Airport's boundary immediately north of the Runway 32 departure end and the Silver Springs Wash runs immediately south of the Runway 14 departure end. Additionally, residential land uses located to the north and south of the Airport present further constrains on runway extension and overall Airport expansion.

Five alternatives were developed and evaluated for Runway 14-32. These alternatives, along with the benefits and constraints of each, are described below and a recommended alternative is presented at the end of this section.

Runway Alternative 1: Base Alternative

Runway Alternative 1 represents the utilization of existing pavement and the application of the no-analysis alternatives listed above to meet FAA runway design standards. Shown in **Figure 4.1**, this alternative establishes Mingus Avenue to the north and the Silver Springs Wash to the south as the RSA controlling surfaces from which future runway ends may be determined. In other words, future runway ends are determined by measuring 240 feet from each controlling surface, per B-I (small) design standards. This results in the future Runway 14 approach end located approximately 112 feet north from its existing location and the Runway 32 departure end located approximately 38 feet south of its existing location. As part of this alternative, the Airport's blast pads are standardized, Taxiway A is extended to create a full parallel taxiway, existing taxiway fillets are standardized, unused blast pad and taxiway pavement are removed, and an aircraft runup area is proposed to be constructed south of the main aircraft parking apron near the Runway 32 approach end.

The proposed runway ends described within this alternative provides a base for Runway Alternatives 2 through 5. Runway Alternative 1 on its own, however, only yields an additional 150 feet of usable runway length for a total runway length of 4,402 feet, 698 feet short of the recommended 5,100 feet. The advantages and disadvantage of Runway Alternative 1 are summarized below.

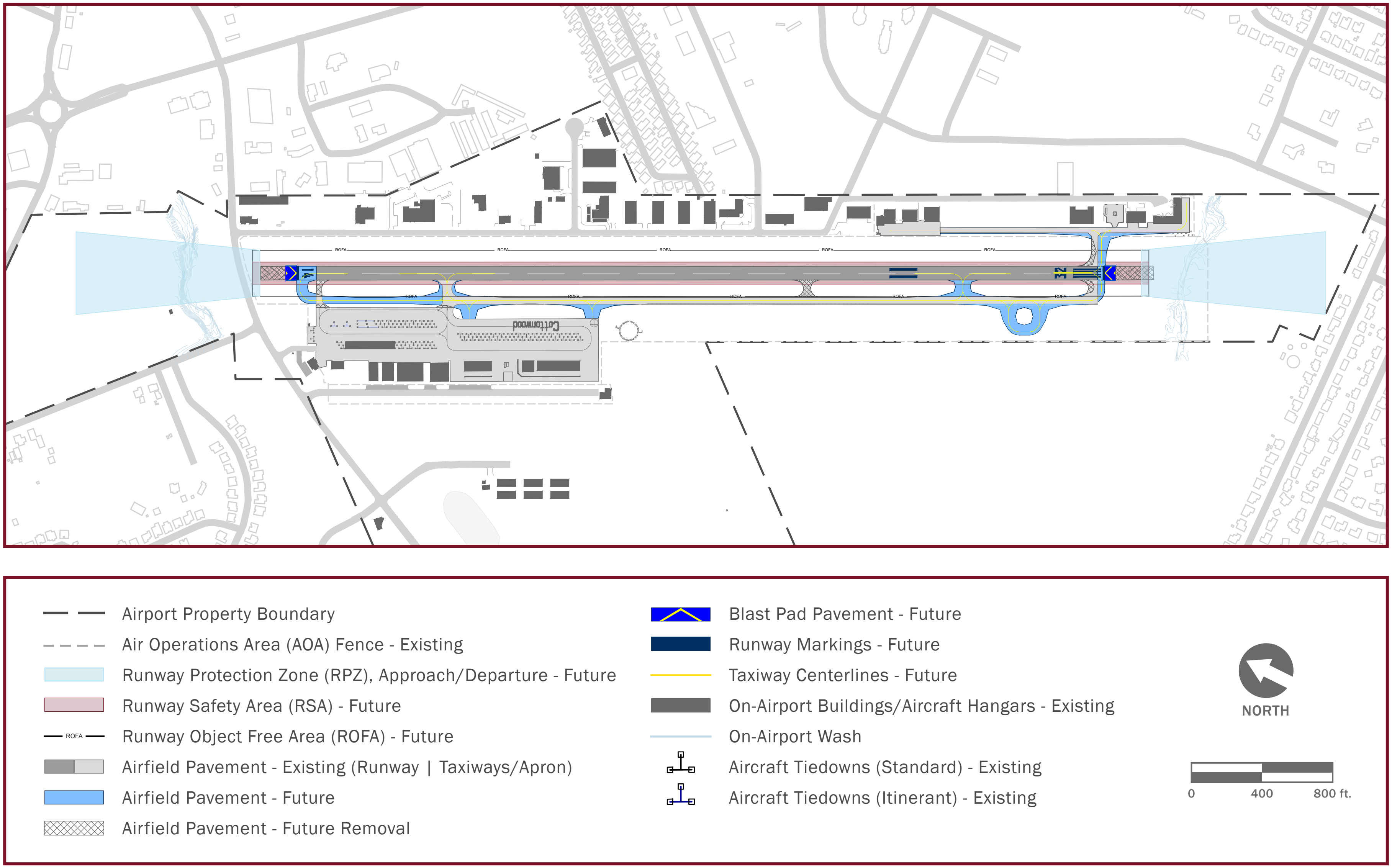
Advantages:

- Pending a pavement strength analysis, existing pavement is utilized for runway extension and standard blast pads.
- Cost effective when compared with Runway Alternatives 2 through 5.
- Minimal on- and off-Airport impacts

Disadvantage:

- Proposed runway length of 4,402 feet does not accommodate forecast aircraft fleet.

Figure 4.1 - Runway Alternative 1: Base Alternative



Source: Kimley-Horn, 2022.

Note: Standard runway width for ADG II is 60 feet. The FAA indicated that a benefit-cost analysis may be performed to determine the financial feasibility of maintaining a 75-foot runway.

Runway Alternative 2: Northern Extension

Runway Alternative 2, presented in **Figure 4.2**, utilizes the base alternative's Runway 32 approach end (approximately 38 feet south of the existing location) and proposes a northern runway extension of approximately 810 feet to achieve the recommended runway length of 5,100 feet.

Due to the northern runway extension and the associated extension of Taxiway A, this alternative requires the relocation, tunneling, or closure of Mingus Avenue and significant grading to address elevation changes north of the existing Runway 14 approach end. Additionally, as the Del Monte Wash runs north of the Airport, this alternative requires construction of a culvert to accommodate the extended runway, a costly and complex project with great structural and environmental constraints. An avigation easement is also required for the portion of the Runway 14 approach/departure RPZ that extends beyond the Airport's property boundary.

Although the future location of the Runway 14 approach end will allow aircraft taking off from Runway 14 to reach higher altitudes over the residential communities south of the Airport, the extended runway end introduces additional noise impacts to the land uses north of the Airport, including residential communities within the City of Cottonwood and the Town of Clarkdale.

The advantages and disadvantages of Runway Alternative 2 are summarized below.

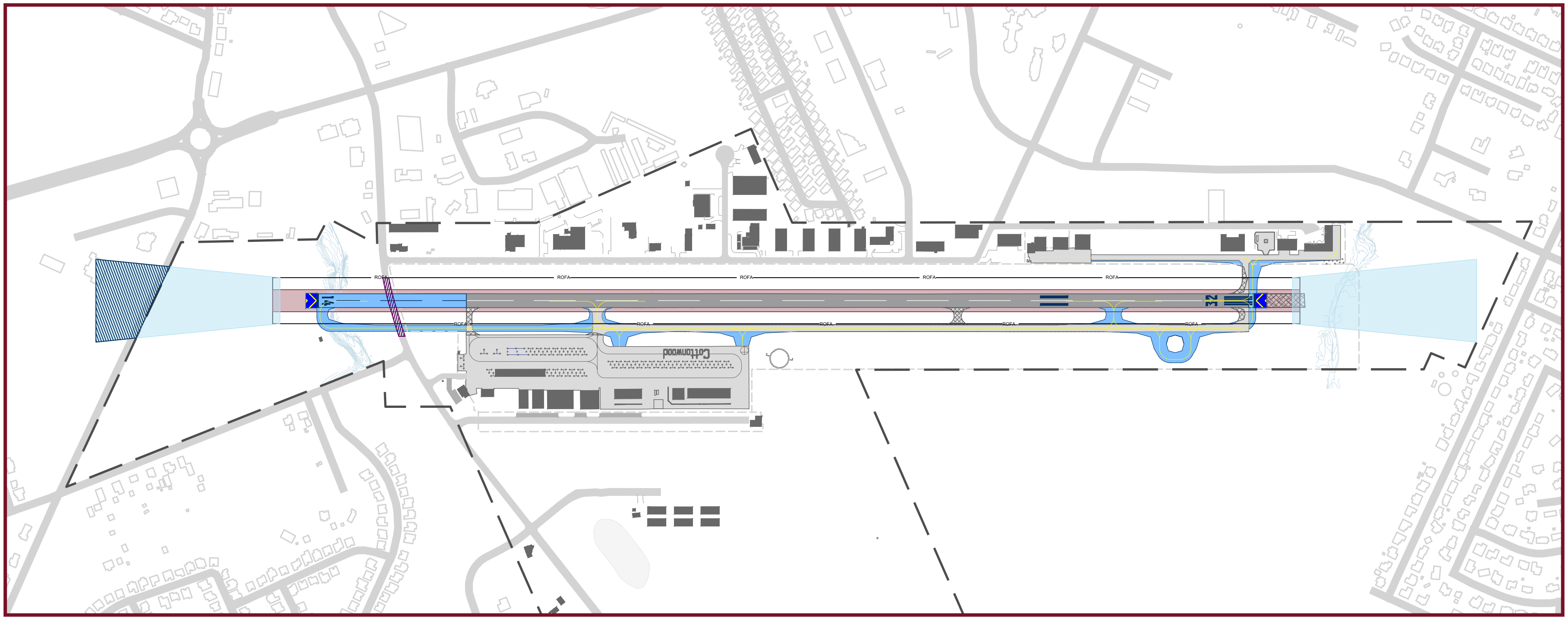
Advantages:

- Proposed runway length of 5,100 feet accommodates forecast aircraft fleet.
- Aircraft taking off from Runway 14 (i.e., southern operations) may reach higher altitudes over the residential communities south of the Airport.
- Proposed construction remains entirely on-Airport property.

Disadvantages:

- Proposed runway extension requires the rerouting, tunneling, or closure of Mingus Avenue and significant grading north of Runway 14.
- Proposed runway extension requires a culvert over the Del Monte Wash north of the Airport.
- Avigation easement required for portions of the Runway 14 RPZ due to its extension beyond the Airport's northern property boundary.
- Proposed Runway 14 approach end introduces additional noise impacts to residential community north of Airport.
- Aircraft landing on Runway 14 (i.e., southern operations) will reach lower altitudes over the residential communities north of the Airport.

Figure 4.2 - Runway Alternative 2: Northern Extension



- Airport Property Boundary
- Air Operations Area (AOA) Fence - Existing
- Runway Protection Zone (RPZ), Approach/Departure - Future
- Runway Safety Area (RSA) - Future
- Runway Object Free Area (ROFA) - Future
- Airfield Pavement - Existing (Runway | Taxiways/Apron)
- Airfield Pavement - Future
- Airfield Pavement - Future Removal
- Blast Pad Pavement - Future
- Runway Markings - Future
- Taxiway Centerlines - Future
- On-Airport Buildings/Aircraft Hangars - Existing
- On-Airport Wash
- Aircraft Tiedowns (Standard) - Existing
- Aircraft Tiedowns (Itinerant) - Existing
- Land Acquisition/Easement Required

NORTH

0 450 900 ft.

Source: Kimley-Horn, 2022.

Note: Standard runway width for ADG II is 60 feet. The FAA indicated that a benefit-cost analysis may be performed to determine the financial feasibility of maintaining a 75-foot runway.

Runway Alternative 3: Southern Extension

Representing the reverse scenario of Runway Alternative 2, Runway Alternative 3 utilizes the base alternative's Runway 14 approach end (approximately 112 feet north of the existing location) and proposes a southern runway extension of approximately 736 feet to achieve the recommended runway length of 5,100 feet.

Due to the southern runway extension and associated extension of Taxiway A, this alternative requires construction of a culvert over the Silver Springs Wash. A previously noted, construction of a culvert to accommodate a runway, taxiway, and associated infrastructure is a costly and complex project with great structural and environmental constraints. This alternative also introduces residential land uses within the future Runway 32 approach/departure RPZ. RPZs are meant to enhance the protection of people and property on the ground, and according to the FAA, residential land uses are considered to be major incompatible land uses that conflict with safe operations at an airport and the safety of adjacent residents. Therefore, property acquisition and the rerouting or closure of residential roadways are required for the portion of the Runway 32 approach/departure RPZ that extends beyond the Airport's property boundary.

Although the future location of the Runway 32 approach end will allow aircraft taking off from Runway 32 to reach higher altitudes over the residential communities north of the Airport, the extended runway end introduces additional noise impacts to the residential communities south of the Airport.

Runway Alternative 3 is illustrated in **Figure 4.3**, and its advantages and disadvantages are summarized below.

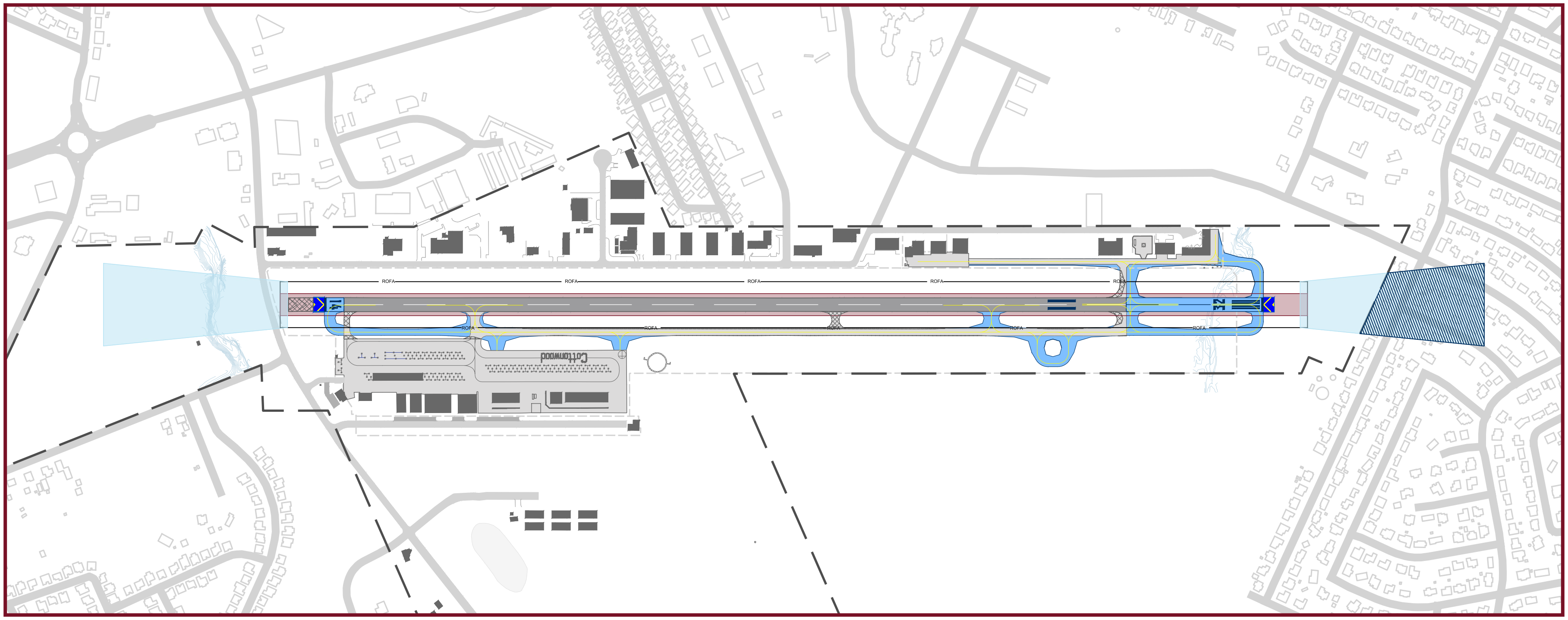
Advantages:

- Proposed runway length of 5,100 feet accommodates forecast aircraft fleet.
- Aircraft taking off from Runway 32 (i.e., northern operations) may reach higher altitudes over the residential communities north of the Airport.
- Proposed construction remains entirely on-Airport property.

Disadvantages:

- Proposed runway extension requires a culvert over the Silver Springs Wash south of the existing Runway 32 approach end.
- Property acquisition required for portions of the Runway 32 RPZ due to its extension beyond the Airport's south property boundary.
- Proposed Runway 32 approach end introduces additional noise impacts to residential community south of Airport.
- Aircraft landing on Runway 32 (i.e., northern operations) will reach lower altitudes over the residential communities south of the Airport.

Figure 4.3 - Runway Alternative 3: Southern Extension



- Airport Property Boundary
- Air Operations Area (AOA) Fence - Existing
- Runway Protection Zone (RPZ), Approach/Departure - Future
- Runway Safety Area (RSA) - Future
- ROFA — Runway Object Free Area (ROFA) - Future
- Airfield Pavement - Existing (Runway | Taxiways/Apron)
- Airfield Pavement - Future
- Airfield Pavement - Future Removal
- Blast Pad Pavement - Future
- Runway Markings - Future
- Taxiway Centerlines - Future
- On-Airport Buildings/Aircraft Hangars - Existing
- On-Airport Wash
- Aircraft Tiedowns (Standard) - Existing
- Aircraft Tiedowns (Itinerant) - Existing
- Land Acquisition/Easement Required

NORTH

0 450 900 ft.

Source: Kimley-Horn, 2022.

Note: Standard runway width for ADG II is 60 feet. The FAA indicated that a benefit-cost analysis may be performed to determine the financial feasibility of maintaining a 75-foot runway.

Runway Alternative 4: Southern Extension with Declared Distances

Runway Alternatives 4 and 5 differ from the first three runway alternatives in that they utilize declared distances to maximize usable runway length. Declared distances are published by the FAA to denote the usable length of runway available for aircraft takeoff and landings. Declared distances may be used to alter the length of the usable runway without physical improvements (e.g., pavement removal) to meet airport design standards, including RSAs, ROFAs, and ROFZs. Declared distances consist of the following components:

- **Take Off Run Available (TORA):** Declared length of a runway suitable for the ground run of an aircraft taking off. The TORA is measured from the start of the takeoff point to 200 feet from the beginning of the departure RPZ.
- **Take Off Distance Available (TODA):** Includes the declared length of the TORA and additional remaining clearway or runway beyond the end of the TORA (Cottonwood Municipal Airport is not equipped with clearways).
- **Accelerated Stop Distance Available (ASDA):** Declared runway length required for an aircraft to accelerate to a certain speed, and in case of engine failure, be able to come to a safe stop on the runway.
- **Landing Distance Available (LDA):** Declared length suitable for the ground run of an aircraft landing.

As shown in **Figure 4.4**, Runway Alternative 4 applies declared distances to the configuration presented in Runway Alternative 3. While utilizing the base alternative's Runway 14 approach end (approximately 112 feet north of the existing location) and a proposed a southern runway extension of approximately 736 feet to achieve the recommended runway length of 5,100 feet, Runway Alternative 4 implements declared distances to keep the Runway 32 approach/departure RPZ on Airport property and to avoid the need for land acquisition of the residential properties south of the Airport. The declared distances proposed in this runway alternative are shown in **Table 4.2**.

Table 4.2 - Runway Alternative 4 Declared Distances

Declared Distances	Runway 14	Runway 32
Take Off Run Available (TORA)	4,402 feet	5,100 feet
Take Off Distance Available (TODA)	5,100 feet	5,100 feet
Accelerate Stop Distance Available (ASDA)	5,100 feet	5,100 feet
Landing Distance Available (LDA)	5,100 feet	4,402 feet

Source: Kimley-Horn, 2022.

In this configuration, 5,100 feet of usable runway length is available for takeoff operations to the north (from Runway 32). However, the Runway 32 landing threshold remains in the base alternative's proposed location (approximately 38 feet south of the existing location), providing an LDA and TORA of 4,402 feet for Runway 32 landing and Runway 14 takeoff operations, respectively (i.e., northern operations). Airport management and members of the PAC have indicated that the majority of takeoff and landing operations occur on Runway 32, so the additional length available for Runway 32 operations would be considered a great benefit according to Airport stakeholders.

The future location of the Runway 32 approach end will also allow aircraft taking off from Runway 32 to reach higher altitudes over the residential communities north of the Airport, potentially decreasing noise impacts associated with takeoff operations to the north. Like Runway Alternative 3, however, Runway Alternative 4 requires the construction of a culvert over the Silver Springs Wash. As previously noted, the construction of a culvert for a runway extension and associated infrastructure (e.g., parallel taxiways, taxiway connectors, lighting, and signage) can be costly and complex with great structural and environmental constraints. Additionally, although the Runway 32 RPZ does not extend beyond the Airport's boundary in this alternative, the future runway end introduces increased noise impacts as it is located significantly closer to the residential community south of the Airport. The advantages and disadvantages of Runway Alternative 4 are summarized below.

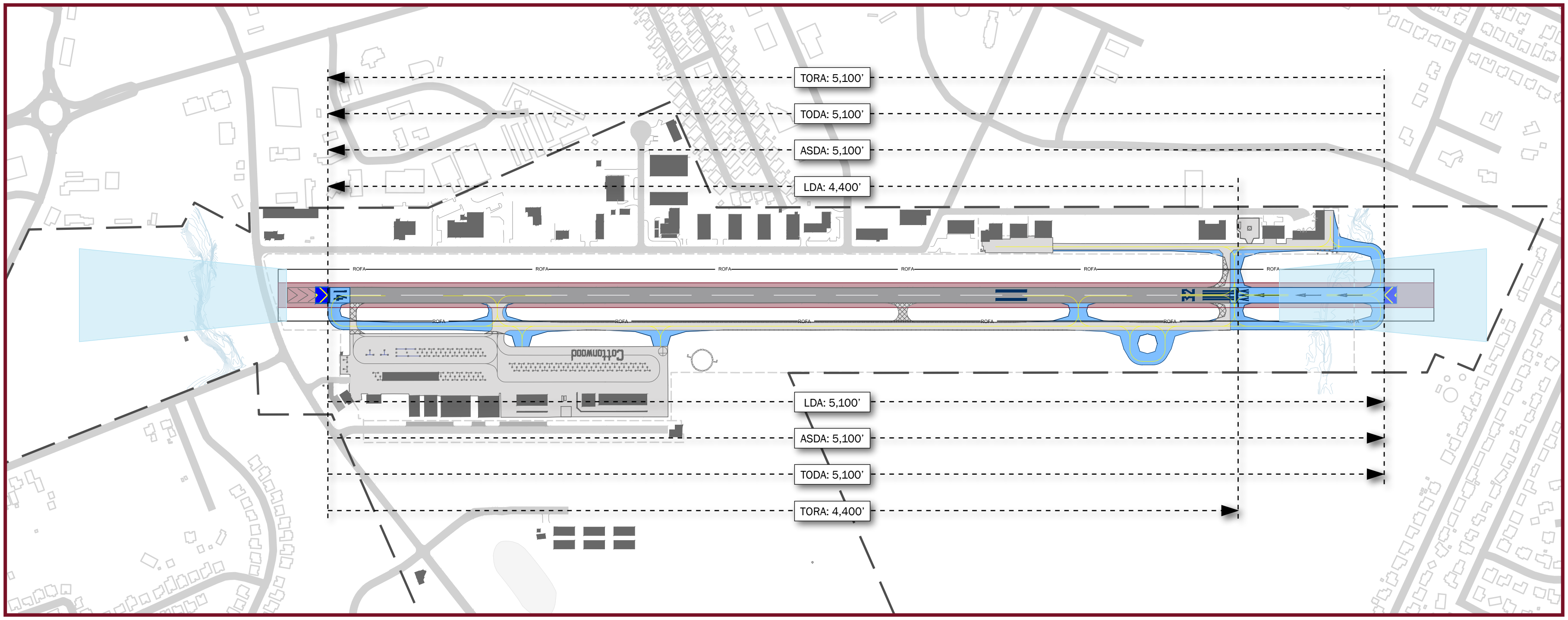
Advantages:

- Proposed runway length of 5,100 feet accommodates the forecast aircraft fleet for Runway 32 takeoffs *only* due to the implementation of declared distances.
- Aircraft taking off from Runway 32 (i.e., northern operations) may reach higher altitudes over the residential communities north of the Airport.
- Proposed construction remains entirely on-Airport property.

Disadvantages:

- Proposed runway extension requires a culvert over the Silver Springs Wash south of the existing Runway 32 approach end.
- Declared distances may require pilot education and training.
- Proposed Runway 32 approach end introduces additional noise impacts to residential community south of Airport.
- Declared distances do not allow for full use of runway pavement for takeoffs and landings in both directions.

Figure 4.4 - Runway Alternative 4: Southern Extension with Declared Distances



- Airport Property Boundary
- Air Operations Area (AOA) Fence - Existing
- Runway Protection Zone (RPZ), Approach/Departure - Future
- Runway Safety Area (RSA) - Future
- ROFA — Runway Object Free Area (ROFA) - Future
- Airfield Pavement - Existing (Runway | Taxiways/Apron)
- Airfield Pavement - Future
- Airfield Pavement - Future Removal
- Blast Pad Pavement - Future
- Runway Markings - Future
- Taxiway Centerlines - Future
- On-Airport Buildings/Aircraft Hangars - Existing
- On-Airport Wash
- Aircraft Tiedowns (Standard) - Existing
- Aircraft Tiedowns (Itinerant) - Existing

NORTH

0 400 800 ft.

Source: Kimley-Horn, 2022.

Note: Standard runway width for ADG II is 60 feet. The FAA indicated that a benefit-cost analysis may be performed to determine the financial feasibility of maintaining a 75-foot runway.

Runway Alternative 5: Maximum Build Out with No Impacts to Mingus Avenue or Wash

Runway Alternative 5 represents the maximum runway build out without impacts to Mingus Avenue, Silver Springs Wash and minimal impacts to off-airport land uses. As presented in **Figure 4.5**, Runway Alternative 5 utilizes the base alternative's Runway 14 approach end (approximately 112 feet north of the existing location) and proposes a southern runway extension of 423 feet for a total runway length of 4,787 feet. Although the total runway length is 313 feet short of the recommended 5,100 feet, this alternative provides the greatest runway length while standardizing all runway facilities and limiting environmental and off-airport impacts. This runway configuration is capable of safely accommodating the Airport's future critical aircraft, although larger aircraft may be required to operate with lighter fuel loads during summer months.

In this alternative, the Runway 32 approach end is relocated to the extent practical as to avoid impacts to the Silver Springs Wash while ensuring a standard RSA and maximizing usable runway pavement. Additionally, declared distances are implemented so that the RSA does not intersect the wash and the Runway 32 approach/departure RPZ remains on Airport property. The future location of the Runway 32 approach end will allow aircraft taking off from Runway 32 to reach higher altitudes over the residential communities north of the Airport, potentially decreasing noise impacts associated with takeoff operations to the north. As shown in **Table 4.3**, declared distances provide 4,787 feet for takeoff operations on Runway 32 and 4,402 feet for takeoff operations on Runway 14. As previously noted, Airport management and members of the PAC have indicated that the majority of takeoff and landing operations occur on Runway 32, so the additional length for Runway 32 operations would be considered a great benefit.

Table 4.3 - Runway Alternative 5 Declared Distances

Declared Distances	Runway 14	Runway 32
Take Off Run Available (TORA)	4,402 feet	4,787 feet
Take Off Distance Available (TODA)	4,787 feet	4,787 feet
Accelerate Stop Distance Available (ASDA)	4,547 feet	4,787 feet
Landing Distance Available (LDA)	4,547 feet	4,402 feet

Source: Kimley-Horn, 2022.

The advantages and disadvantages of Runway Alternative 5 are summarized below.

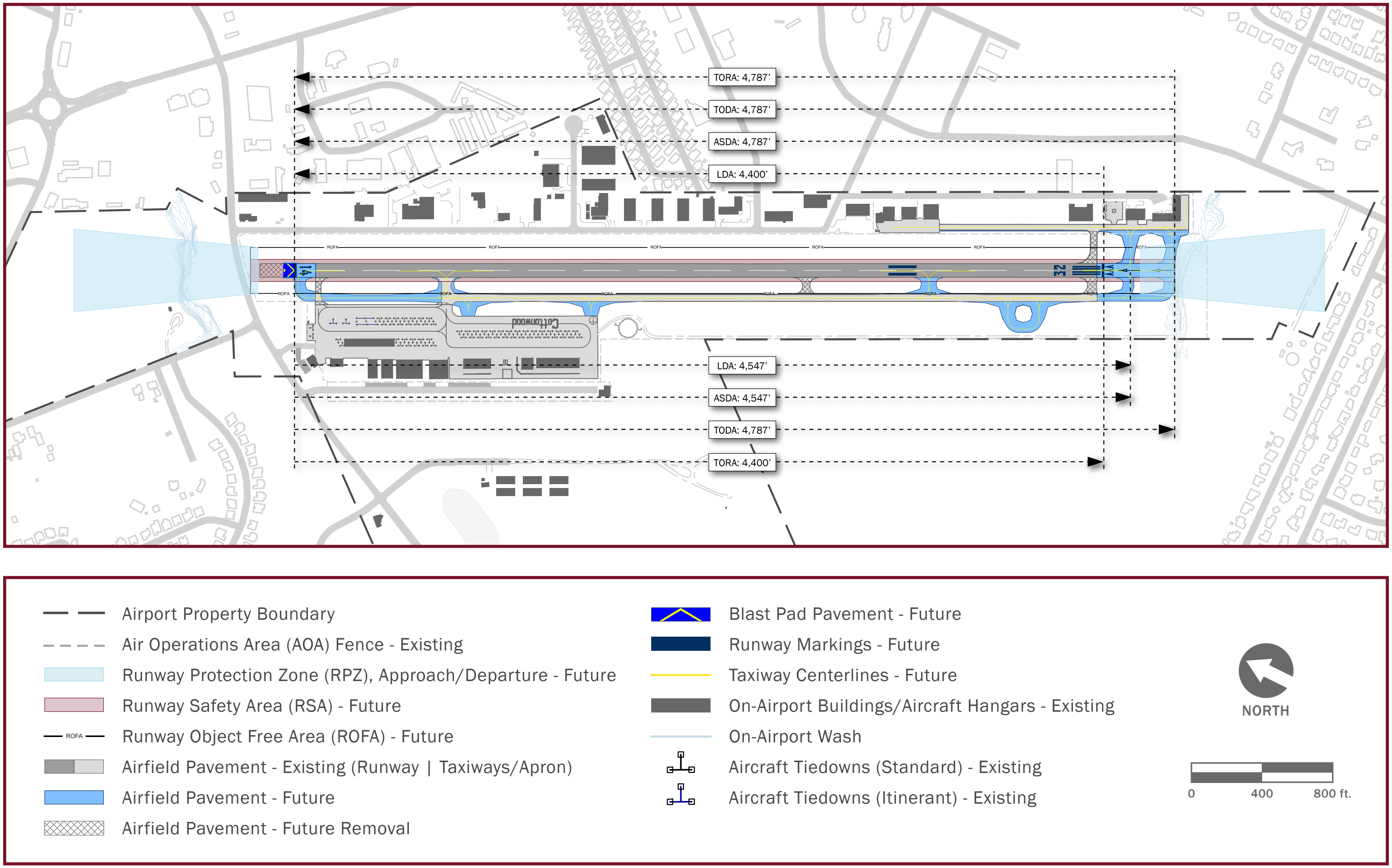
Advantages:

- Pending a pavement strength analysis, existing pavement is utilized for runway extension and standard blast pads.
- Cost effective when compared with Runway Alternatives 2 through 4.
- Aircraft taking off from Runway 32 (i.e., northern operations) may reach higher altitudes over the residential communities north of the Airport.
- Proposed construction remains entirely on-Airport property.

Disadvantages:

- Proposed runway length of 4,787 feet does not accommodate the forecast aircraft fleet.
- Declared distances do not allow for full use of runway pavement for takeoffs and landings in both directions.
- Declared distances may require pilot education and training.

Figure 4.5 - Runway Alternative 5: Maximum Build-Out with No Impacts to Mingus Avenue or Wash



Source: Kimley-Horn, 2022.

Note: Standard runway width for ADG II is 60 feet. The FAA indicated that a benefit-cost analysis may be performed to determine the financial feasibility of maintaining a 75-foot runway.

Recommended Runway Alternative

As described in **Section 4.3**, the runway development alternatives were rated on a scale of 0 to 4 for each evaluation criteria. The ratings are based on each alternative's ability to satisfy the evaluation criteria. The sums of the ratings were then used to determine the recommended runway development alternative for the Airport.

Table 4.4 - Evaluation of Runway Alternatives

Runway 14-32 Alternative	Enhances Operational Safety	Satisfies Forecast Demand	Minimizes Off-Airport Impacts	Minimizes On-Airport Impacts	Feasible and Cost Effective	Total Score
1	1	1	2	2	4	10
2	4	4	0	2	0	10
3	4	4	0	2	0	10
4	3	3	2	2	0	10
5	2	3	3	3	3	14

Source:
Kimley-Horn, 2022.

Scoring legend:
0 = Negatively impacts existing condition
1 = Little-to-no impact on existing condition
2 = Slightly improves existing condition
3 = Improves existing condition
4 = Significantly improves existing condition

As shown in **Table 4.4**, Runway Alternatives 2, 3, and 4 all received relatively low total scores despite their ability to achieve the 5,100-foot recommended runway length. These low scores are primarily due to significant on- and off-Airport impacts (e.g., land acquisition, avigation easements, increased airport-related noise impacts, relocation/tunneling or Mingus Avenue, culverting of Silver Springs Wash) as well as the feasibility and overall cost of each alternative.

Runway Alternative 5 yielded the highest score, which proposes a maximum runway buildout and the utilization of declared distances for minimal on- and off-airport impacts. Despite not achieving the 5,100-foot recommended runway length (a total runway length of 4,787 feet), Runway Alternative 5 provides the greatest runway length possible while avoiding impacts to Mingus Avenue, Silver Springs Wash, and adjacent residential properties. Alternative 5 also meets standards for RSA and ROFA dimensions, and keeps RPZs on Airport property. Overall, the use of declared distances provides a permanent and cost-effective solution to maximizing the length of usable runway. Additionally, the alternative's overall cost is significantly less than that of Runway Alternatives 2, 3, and 4 as land acquisition, roadway relocation/tunneling, and culverting are not necessary.

Based on this evaluation, the recommended runway alternative for Runway 14-32 is Runway Alternative 5: Maximum Build Out with No Impacts to Mingus Avenue or Wash. Of note, the FAA was consulted to determine feasibility, cost, and overall support of the runway alternatives. The FAA has expressed support for Runway Alternative 5 for the reasons previously stated.

4.7. AIRCRAFT APRON AND SUPPORT FACILITIES ALTERNATIVES

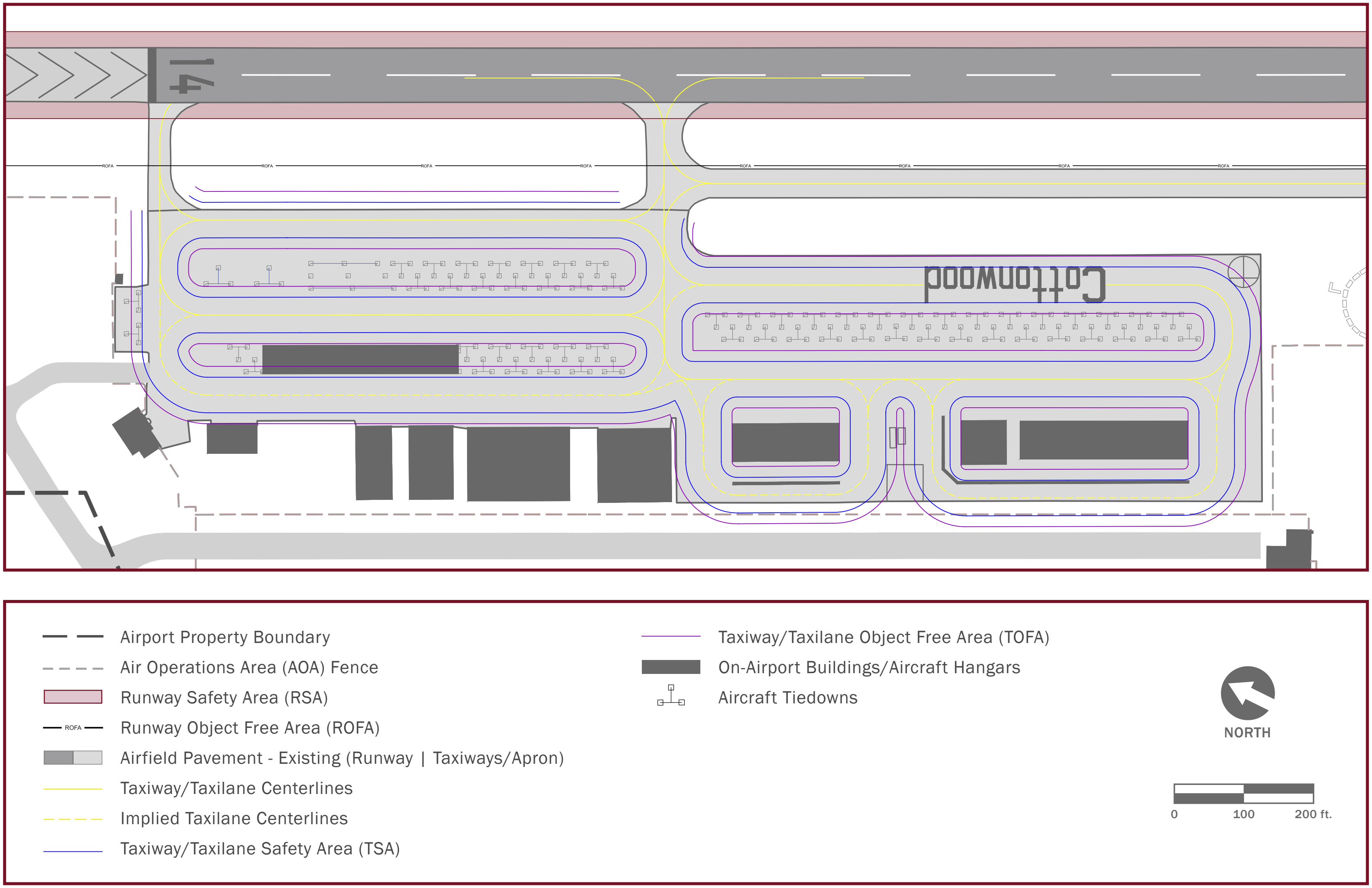
As described in **Chapter 3 – Facility Requirements**, the Airport's main apron has multiple inefficiencies and nonstandard conditions that require mitigation. The alternatives presented within this section address these inefficiencies and nonstandard conditions as well as various facilities on the main apron, including fuel tanks, helicopter parking area, aircraft tie-downs. The objectives of the apron alternatives are to ensure the Airport's main apron satisfies FAA design and safety standards, meets the operational needs of the Airport's existing and future users, and provides compatibility with the recommended runway alternative. The apron alternatives were rated based on the evaluation criteria to determine recommended alternatives for each facility.

Although alternatives will be evaluated for individual facilities (e.g., fuel tanks, helicopter parking area, t-shade), the ultimate locations of each facility will impact one another. It is critical that the recommended alternatives for each facility are conducive with one another and collectively will accommodate future demand. Therefore, the interconnectedness of all facilities was considered during the alternative evaluations and final recommendations.

4.7.1. Apron Configuration

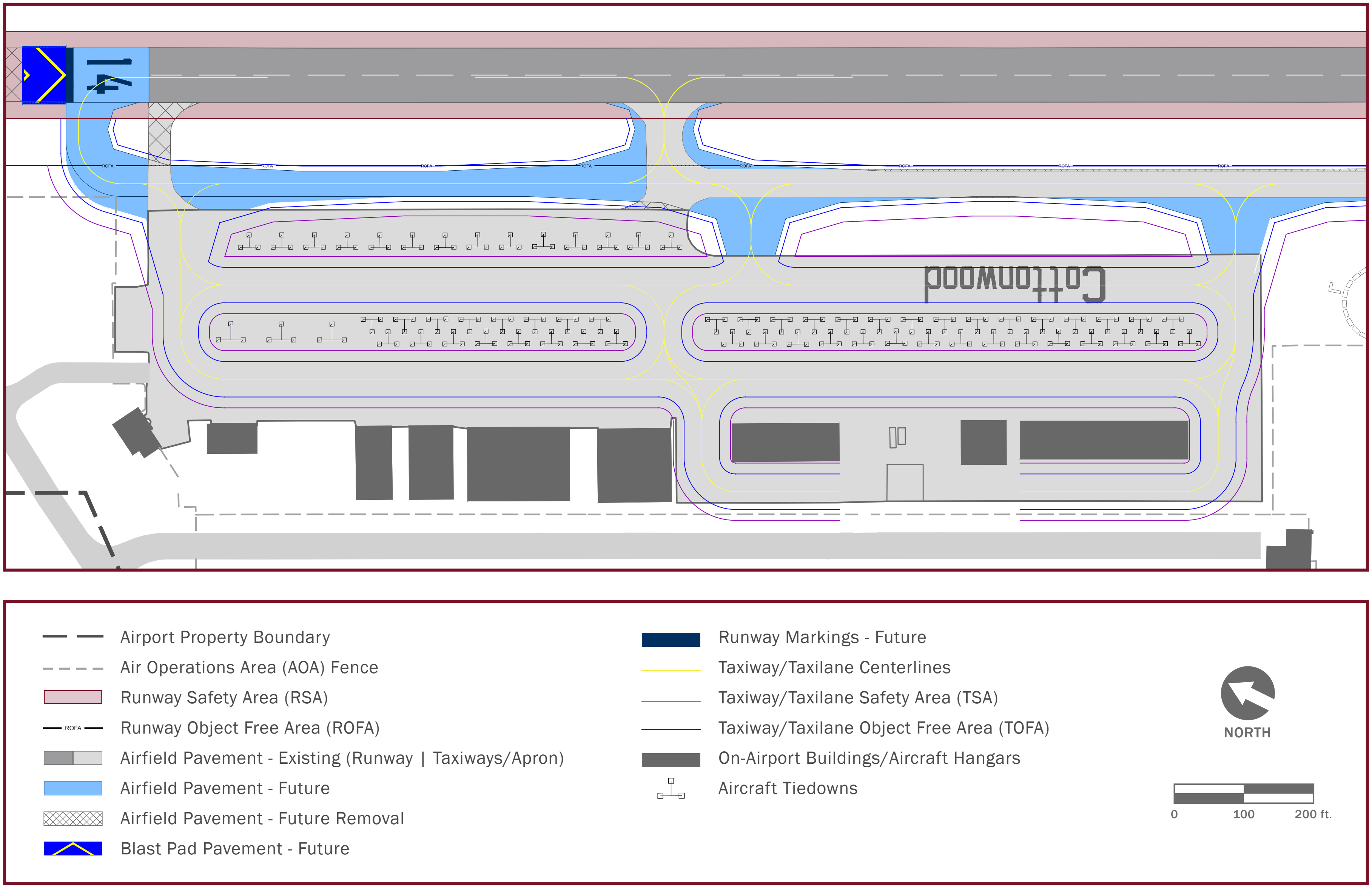
The existing configuration of the main aircraft parking apron and associated taxiway connectors yield multiple nonstandard conditions. As illustrated in **Figure 4.6**, aircraft tiedowns and other facilities penetrate TOFAs, the two taxiway connectors provide direct access between the apron and runway, and the overall circulation is not conducive for efficient movement of the future critical aircraft. **Figure 4.7** presents a reconfiguration of the apron, which mitigates the aforementioned nonstandard conditions while providing a consistent and efficient circulation pattern throughout the apron. To achieve this, the existing taxilane centerlines on the northern half of the apron are extended south to create two parallel taxilanes that span the length of the apron. Additionally, aircraft tiedowns are slightly shifted to mitigate penetrations to the TOFAs. The existing taxiway connectors have been modified to eliminate direct apron to runway access and to align with the recommended runway alternative. A third taxiway connector has been added on the southeast corner of the apron to improve apron access and promote efficient traffic flow. The reconfigured apron, or "base apron configuration," will be used as a foundation for the remaining alternatives within this chapter.

Figure 4.6 - Aircraft Parking Apron Existing Configuration



Source: Kimley-Horn, 2022.

Figure 4.7 - Aircraft Parking Apron Base Configuration



Source: Kimley-Horn, 2022.

4.7.2. Fuel Tanks

Two 10,000-gallon fuel tanks are located on the south portion of the main apron in between the six-unit t-hangar and a conventional hangar. While the type of fuel and storage capacity are adequate to satisfy future demand, the tanks in their existing location penetrate the TOFA. And although there are no marked taxilane centerlines, pilots frequently utilize the apron pavement on both sides of the fueling facility to access the west side of the t-hangars. Therefore, an "implied" taxilane and associated TSA and TOFA are accounted for, as previously shown in **Figure 4.6**. In addition to penetrating the TOFA, the existing location of the fuel tanks represents an advantageous area for future hangar development. Proposed alternatives to relocate the fuel tanks will mitigate TOFA penetrations and free up apron space for possible hangar development in the future. As previously noted, the fuel tank alternatives utilize the base apron configuration (**Figure 4.7**) as the basis from which alternatives are derived.

Fuel Tank Alternatives 1a and 1b

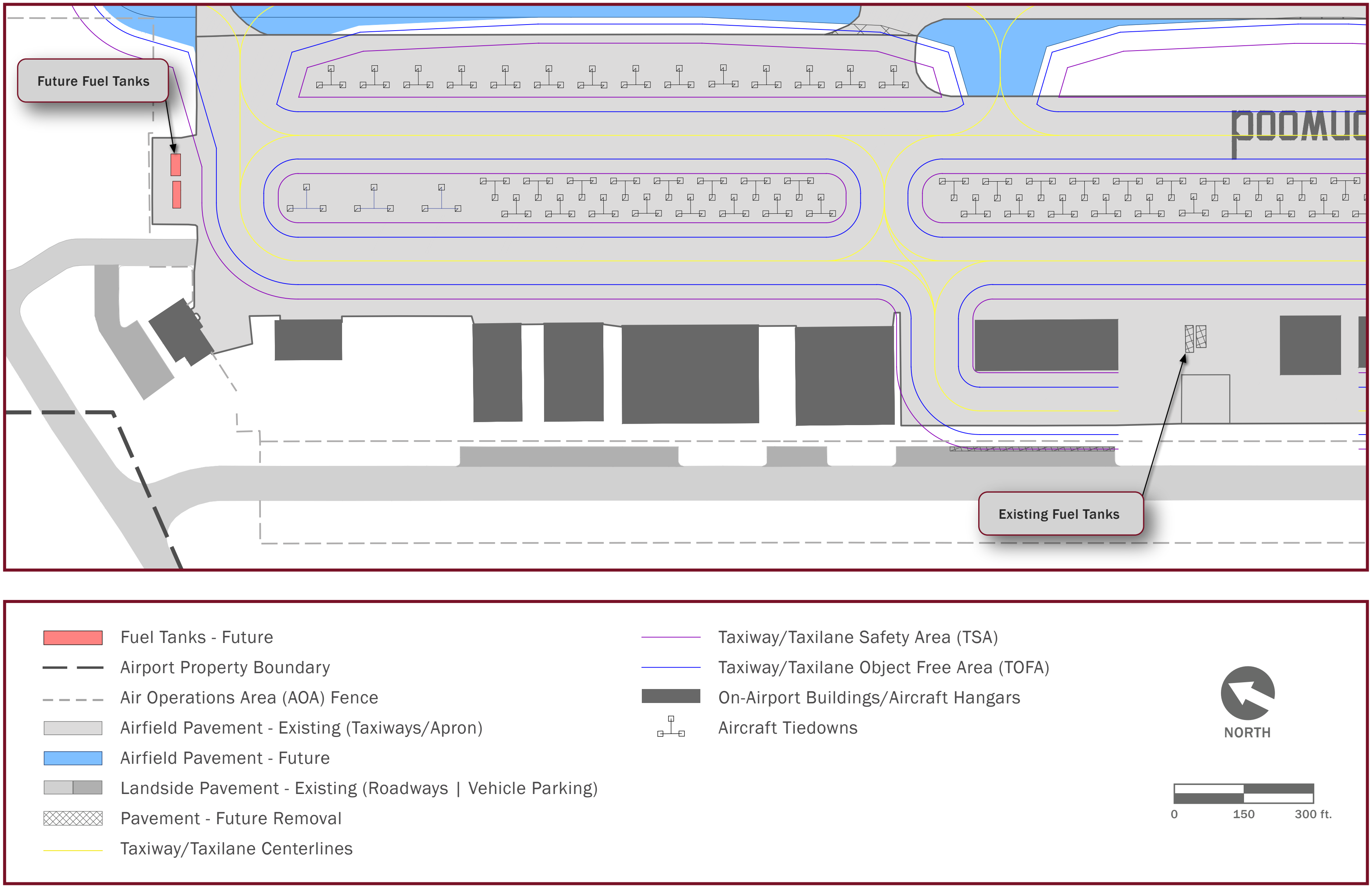
As illustrated in **Figure 4.8** and **Figure** 4.9, Fuel Tank Alternatives 1a and 1b propose the relocation of the fueling facilities to the northern end of the apron on an existing slab of pavement. This location is advantages as no new pavement is required for fuel tank installation. Additionally, the location is convenient for refueling trucks and maintenance vehicles as it is adjacent to an Airport access road. The aforementioned existing pavement slab is currently occupied by two aircraft tiedowns. However, the Airport is equipped with more tiedowns than future demand requires.

Fuel Tank Alternative 1a utilizes the base apron configuration presented at the beginning of this section. In this scenario, the fuel tanks are relocated as shown in **Figure 4.8** with no modifications to the base apron configuration. Alternatively, Fuel Tank Alternative 1b (**Figure 4.9**) introduces a slight modification to the base apron configuration by adding a taxilane bypass south of the new fueling location. This bypass creates a designated aircraft fueling and queuing area adjacent to the fuel tanks while providing an alternative taxilane for taxiing aircraft. It should be noted that the taxilane bypass does necessitate the loss of 3 additional aircraft tiedowns. However, the total number of tiedowns available in Fuel Tank Alternative 1b (59 tiedowns) still accommodate future demand.

Fuel Tank Alternative 2

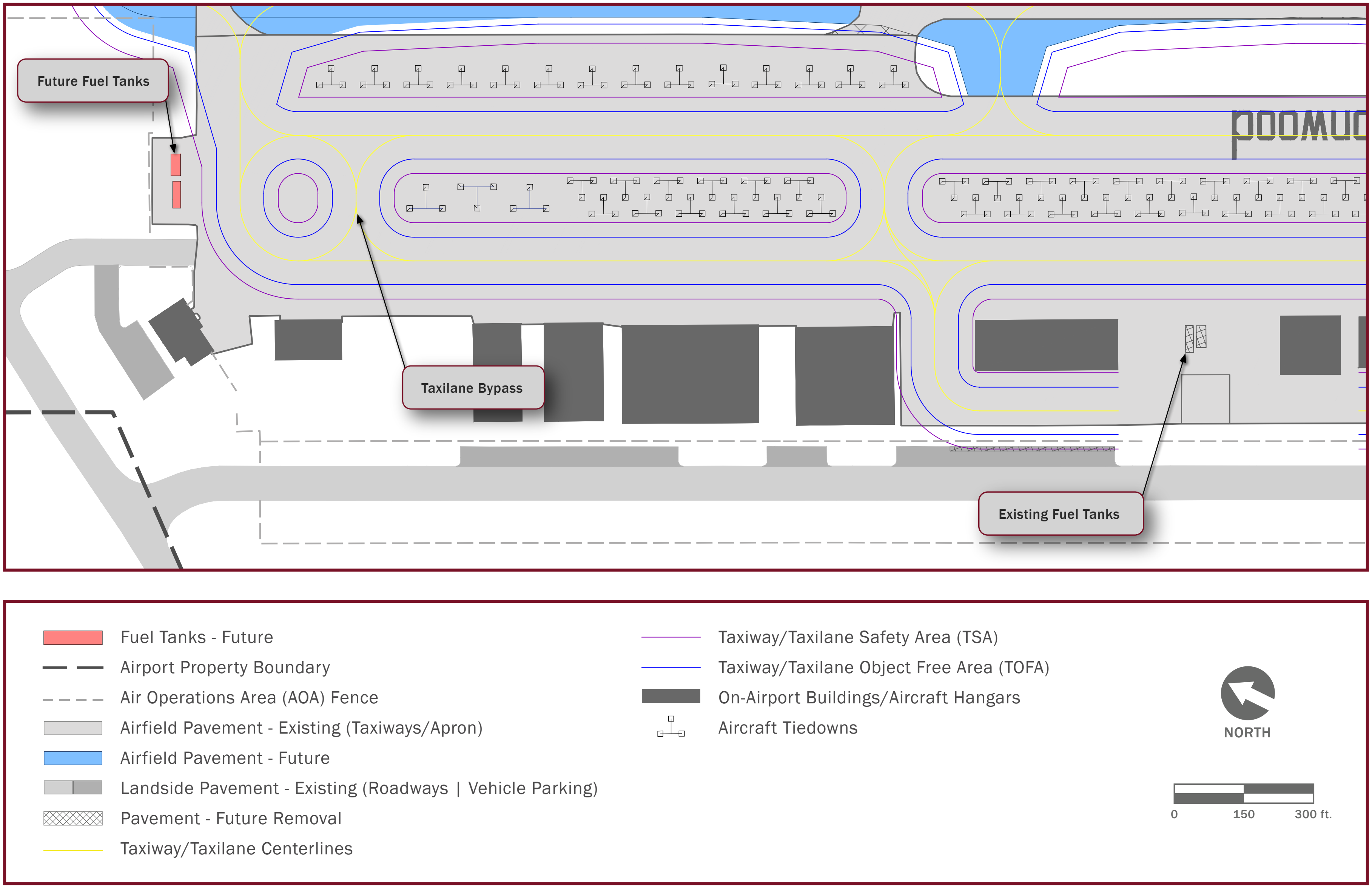
Fuel Tank Alternative 2 proposes the relocation of the fuel tanks in between two existing hangars south of the terminal building. This location is currently unpaved, so Fuel Tank Alternative 2 requires grading and new pavement construction to accommodate the fueling facilities, as illustrated in **Figure 4.10**. Additionally, a light pole is currently located on the edge of the apron pavement in this area and will need to be removed or relocated to make room for the fuel tanks. Like Fuel Tank Alternative 1, this location is convenient for refueling trucks and maintenance vehicles as it is adjacent to an Airport access road. However, this apron-adjacent vacant land near the terminal building represents a prime location for future hangar development. Relocating the fuel tanks to this location restricts future hangar development in this high traffic area.

Figure 4.8 - Fuel Tank Alternative 1a



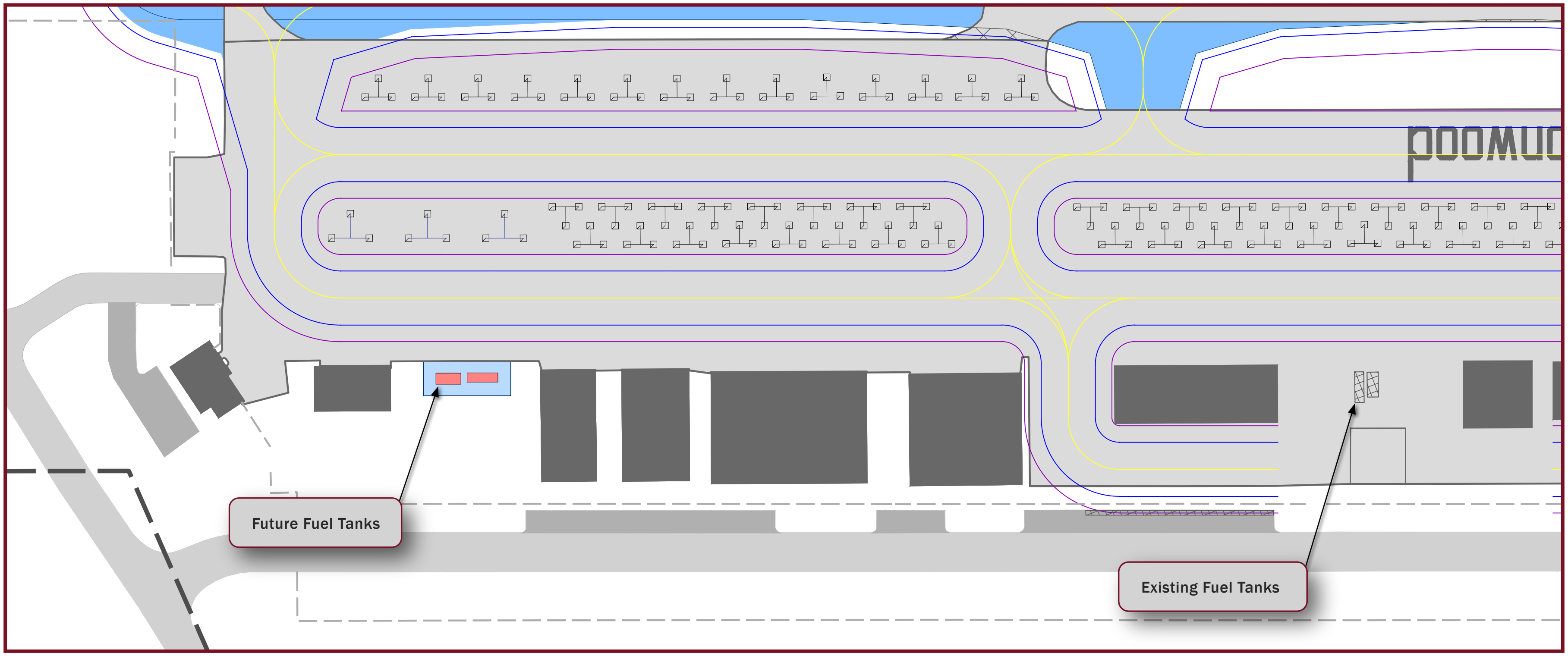
Source: Kimley-Horn, 2022.

Figure 4.9 - Fuel Tank Alternative 1b



Source: Kimley-Horn, 2022.

Figure 4.10 - Fuel Tank Alternative 2



- Fuel Tanks - Future
- Airport Property Boundary
- Air Operations Area (AOA) Fence
- Airfield Pavement - Existing (Taxiways/Apron)
- Airfield Pavement - Future
- Apron Pavement - Future
- Landside Pavement - Existing (Roadways | Vehicle Parking)
- Pavement/Facility Removal
- Taxiway/Taxilane Centerlines
- Taxiway/Taxilane Safety Area (TSA)
- Taxiway/Taxilane Object Free Area (TOFA)
- On-Airport Buildings/Aircraft Hangars
- Aircraft Tiedowns

NORTH

0 150 300 ft.

Source: Kimley-Horn, 2022.

Fuel Tank Recommended Alternative

Fuel tank alternatives were analyzed based on the evaluation criteria presented in **Section 4.3**. As shown in **Table 4.5**, the sums of the ratings were used to determine the recommended alternative for the location of the Airport's fuel tank facilities and associated improvements. The evaluation shows the main differentiators between the three alternatives are operational safety, on-airport impacts, and feasibility and cost effectiveness.

Fuel Tank Alternatives 1a and 2 scored lower than Fuel Tank Alternative 1b in operational safety and on-airport impacts due to the fact that aircraft utilizing the fueling facilities would be required to stop in the middle of an active taxilane or maneuver close to the fueling area as to not block the taxilane. Taxing aircraft may attempt to maneuver around fueling aircraft and pedestrians, potentially compromising safety. The proposed bypass in Alternative 1b, however, provides an alternate taxilane option for those aircraft wanting to taxi around fueling aircraft. A dedicated taxilane bypass would prevent traffic delays, the possibility of aircraft attempting to taxi around fueling aircraft, or the need for aircraft to taxi south in order to access Taxiway A.

Fuel Tank Alternative 2 scored lower than Fuel Tank Alternatives and 1a and 1b in feasibility and cost effectiveness for two reasons: 1) Fuel Tank Alternative 2 requires grading and construction of new pavement to accommodate the fuel tanks whereas Fuel Tank Alternatives 1a and 1b utilize existing apron pavement; and 2) The location of the fuel tanks in Fuel Tank Alternative 2 represents an ideal location for future hangar development as it is proximate to the administration building and airport access road. The Airport may miss out on potential hangar development opportunities by utilizing this location for fuel tanks.

For these reasons, Fuel Tank Alternative 1b is the recommended alternative for the Airport's fueling facilities and associated improvements.

Table 4.5 - Evaluation of Fuel Tank Alternatives

Fuel Tank Alternative	Enhances Operational Safety	Satisfies Forecast Demand	Minimizes Off-Airport Impacts	Minimizes On-Airport Impacts	Feasible and Cost Effective	Total Score
1a	2	4	1	3	4	14
1b	4	4	1	4	4	17
2	3	4	1	2	2	12

Source:
Kimley-Horn, 2022.

Scoring legend:
0 = Negatively impacts existing condition
1 = Little-to-no impact on existing condition
2 = Slightly improves existing condition
3 = Improves existing condition
4 = Significantly improves existing condition

4.7.3. Helicopter Parking Area

A marked helicopter parking area is located on the southeast corner of the Airport's main apron. As previously noted, the helicopter parking area penetrates the TOFA associated with the existing and future adjacent taxilanes and therefore must be relocated. Additionally, the City, the PAC, and other Airport users have expressed interest in siting the helicopter parking area in a location that enhances safety and efficiency of operations. In its existing location, the adjacent aircraft tiedowns experience impacts from helicopter operations, including rotor wash and FOD. Presented below, proposed alternatives for the helicopter parking area provide dedicated areas for helicopter operations while considering impacts to all Airport users.

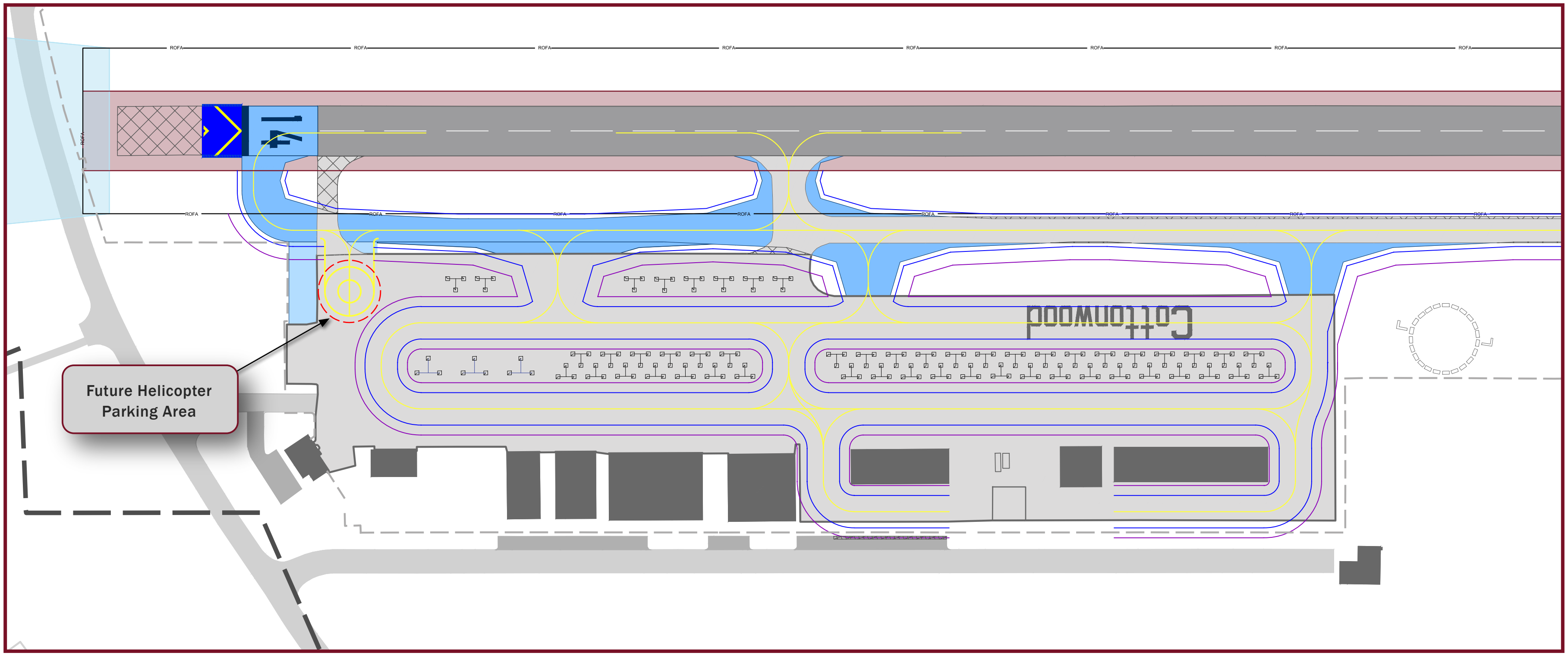
Helicopter Parking Area Alternative 1

Helicopter Parking Area Alternative 1 proposes a relocation to the northeastern corner of the main apron. As shown in Figure 4.11, the parking area itself utilizes existing apron pavement. However, some new pavement is required north of the parking area to reduce rotor wash, dust, and FOD associated with helicopter operations. The proximity to the Runway 14 end provides short taxi routes for helicopters and the location near an Airport access road is conducive for medevac and tour operators. Conversely, the location also introduces potential impacts from noise, rotor wash, dust, and FOD to the adjacent aircraft tiedowns, the terminal building, the recommended future location of the fuel tanks, and to vehicle and pedestrian traffic near Mingus Avenue. Nine aircraft tiedowns are also removed to make room for the helicopter parking area ain this location.

Helicopter Parking Area Alternative 2

Helicopter Parking Area Alternative 2, illustrated in Figure 4.12, proposes the construction of new pavement immediately south of the existing location to accommodate the relocated helicopter parking area. Although grading and pavement construction are required, this location keeps noise, rotor wash, dust, and FOD away from pedestrian and future fueling areas. This alternative does not impact existing aircraft tiedowns, but is located further from the Runway 14 approach end when compared to the previous alternative. However, this location promotes consistency with current operations and procedures due to its proximity to the existing helicopter parking area. Additionally, this alternative requires the relocation of the segmented circle with lighted wind indicator—a project in which the Airport has already expressed interest.

Figure 4.11 - Helicopter Parking Area Alternative 1



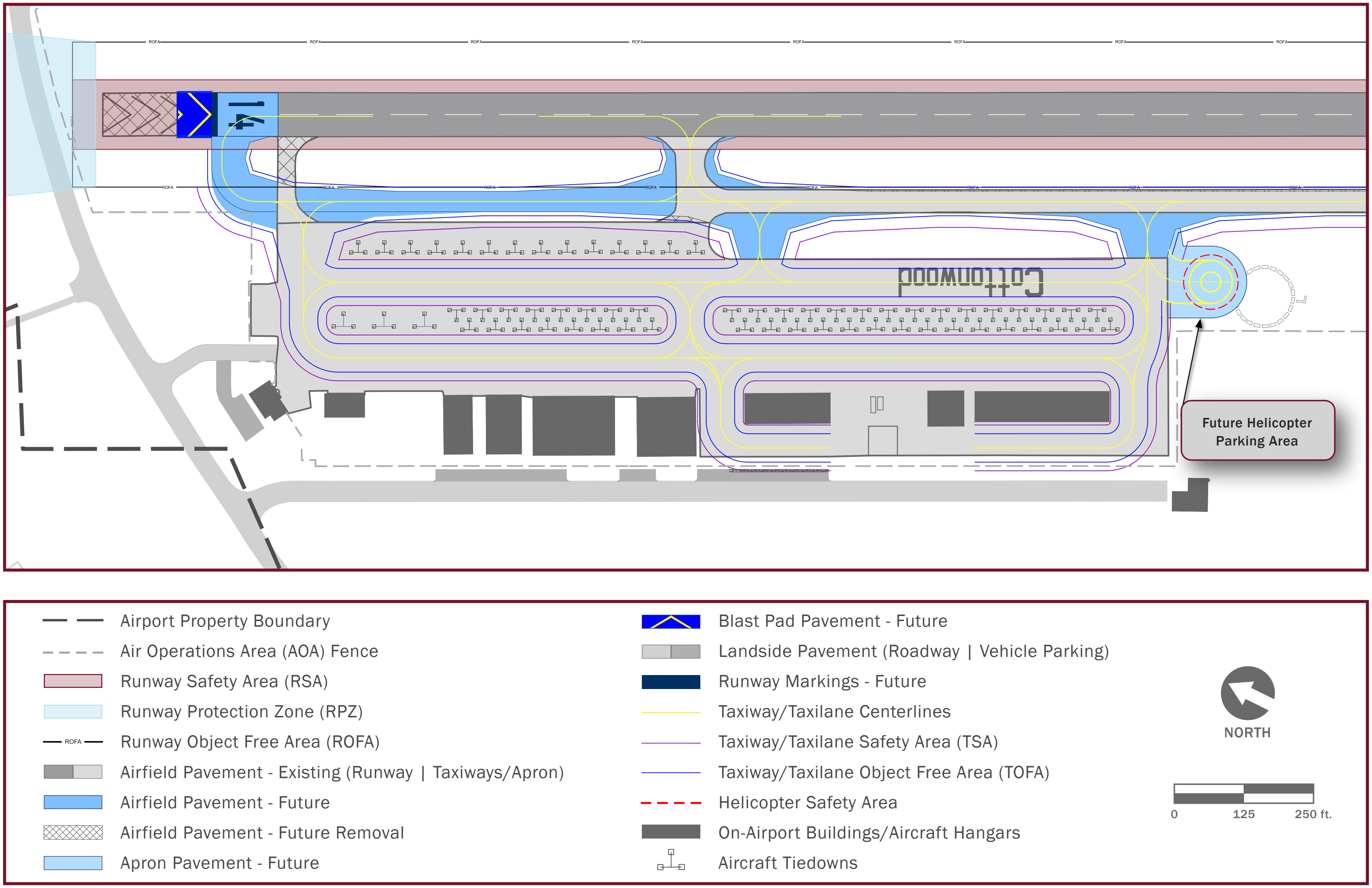
- Airport Property Boundary
- Air Operations Area (AOA) Fence
- Runway Safety Area (RSA)
- Runway Protection Zone (RPZ)
- ROFA — Runway Object Free Area (ROFA)
- Airfield Pavement - Existing (Runway | Taxiways/Apron)
- Airfield Pavement - Future
- Airfield Pavement - Future Removal
- Apron Pavement - Future
- Blast Pad Pavement - Future
- Landside Pavement (Roadway | Vehicle Parking)
- Runway Markings - Future
- Taxiway/Taxilane Centerlines
- Taxiway/Taxilane Safety Area (TSA)
- Taxiway/Taxilane Object Free Area (TOFA)
- Helicopter Safety Area
- On-Airport Buildings/Aircraft Hangars
- Aircraft Tiedowns

NORTH

0 125 250 ft.

Source: Kimley-Horn, 2022.

Figure 4.12 - Helicopter Parking Area Alternative 2



Source: Kimley-Horn, 2022.

Helicopter Parking Area Recommended Alternative

Helicopter parking area alternatives were analyzed based on the evaluation criteria presented in **Section 4.3.** The sums of the ratings were used to determine the recommended alternative for the Airport's helicopter parking area and associated improvements. According to the evaluation presented in **Table 4.6.** the main differentiators between the two alternatives are operational safety, off-airport impacts, and on-airport impacts. Alternative 1 scored lower than Alternative 2 in these areas due to the proposed location of the helicopter parking area in Alternative 1, which may introduce noise, rotor wash, dust, and FOD to the adjacent aircraft tiedowns, the terminal building, the future location of the fuel tanks, and vehicle and pedestrian traffic near Mingus Avenue. Conversely, the proposed location of the helicopter parking area in Alternative 2 maintains helicopter operations near the existing helicopter parking area and away from fueling and pedestrian activity. For these reasons, Alternative 2 is the recommended alternative for the Airport's helicopter parking area and associated improvements.

Table 4.6 - Evaluation of Helicopter Parking Area Alternatives

Helicopter Parking Area Alternative	Enhances Operational Safety	Satisfies Forecast Demand	Minimizes Off-Airport Impacts	Minimizes On-Airport Impacts	Feasible and Cost Effective	Total Score
1	2	4	0	1	3	10
2	4	4	4	4	2	18

Source:
Kimley-Horn, 2022.

Scoring legend:
0 = Negatively impacts existing condition
1 = Little-to-no impact on existing condition
2 = Slightly improves existing condition
3 = Improves existing condition
4 = Significantly improves existing condition

4.7.4. T-Shade

A t-shade provides 12 covered aircraft tiedown positions on the Airport's main apron. In its existing location, the structure penetrates the TOFA and will restrict the movement of the future critical aircraft. The following alternatives mitigate the TOFA penetration and accommodate future traffic at the Airport.

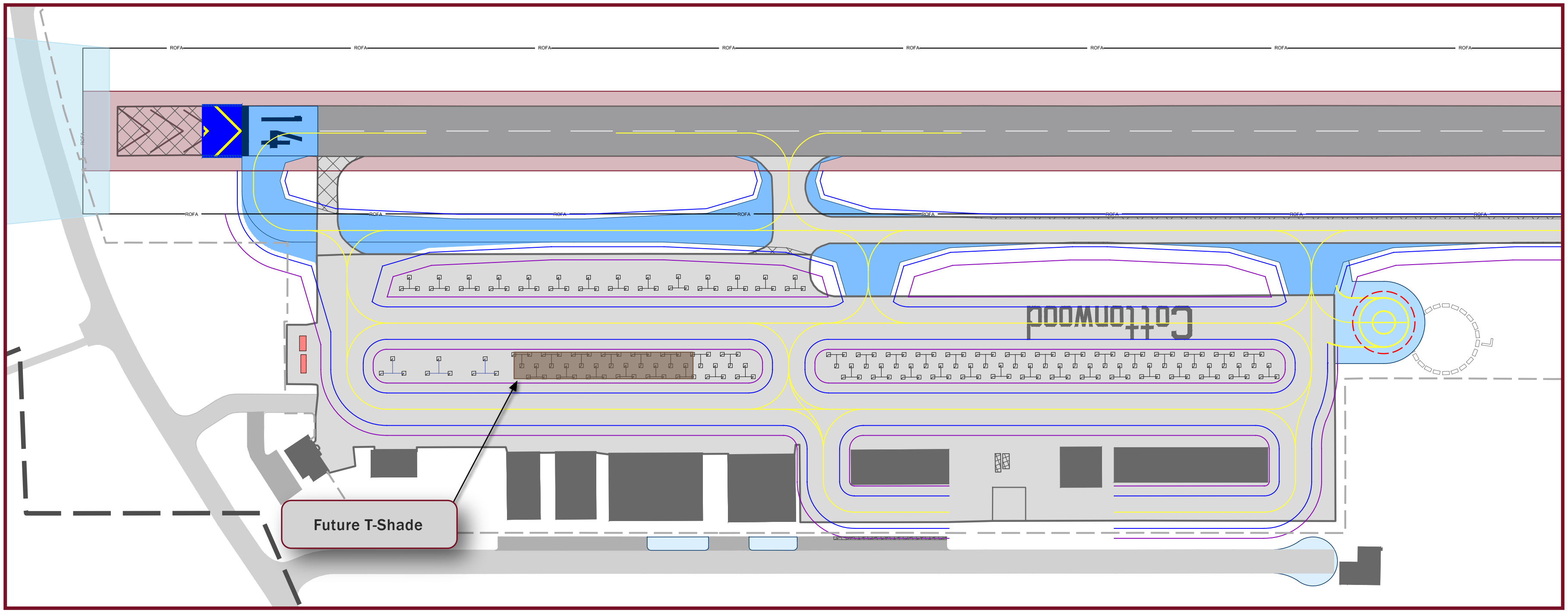
T-Shade Alternative 1: Relocation on Existing Apron Pavement

Alternative 1 proposes relocation of the t-shade to a location on the main apron to avoid TOFA penetrations and meet FAA design standards. While the illustration in **Figure 4.13** shows a t-hangar relocation that is adjacent to its existing position, T-Shade Alternative 1 represents a relocation of the structure to *any location* on the apron that meets FAA standards, including on the southern portion of the main apron. While this alternative proposes a relocation of the t-shade atop existing pavement, the FAA views t-shade structures as hangars and therefore requires local funding for improvements and associated pavement maintenance.

T-Shade Alternative 2: Relocation to New Apron Pavement

T-Shade Alternative 2 proposes a repositioning of the structure to a location *off of* the existing apron. **Figure 4.14** illustrates a relocation of structure to the west of the access road near the EAA building. This alternative requires grading and pavement construction, the installation of new aircraft tiedowns, and the repositioning of the Airport's access roadway. Although T-Shade Alternative 2 results in a net gain of aircraft tiedown positions when compared to T-Shade Alternative 1 (six additional aircraft tiedowns), a nested tiedown configuration is not possible with this configuration due to constrained space for aircraft taxing. A nested tiedown configuration requires the taxilane to wrap around the t-shade structure to provide access to its western side. However, there is not enough space to accommodate the taxilane and associated TSA and TOFA. Therefore, T-Shade Alternative 2 provides six covered tiedown positions, whereas T-Shade Alternative 1 may provide up to 12 covered tiedown positions. This alternative represents the costliest of the three t-shade alternatives due to the need for grading, construction, and roadway repositioning.

Figure 4.13 - T-Shade Alternative 1



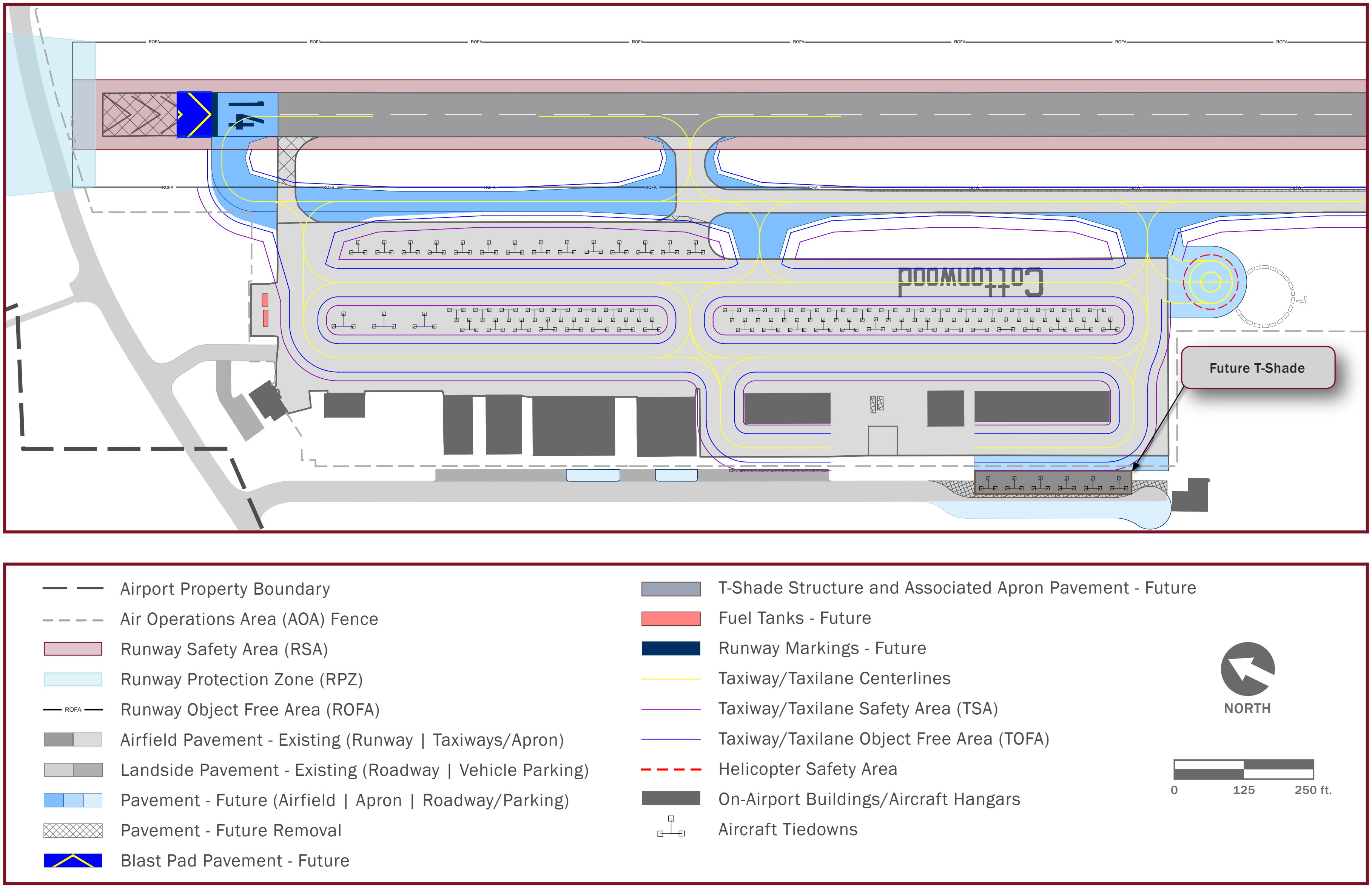
- Airport Property Boundary
- Air Operations Area (AOA) Fence
- Runway Safety Area (RSA)
- Runway Protection Zone (RPZ)
- ROFA Runway Object Free Area (ROFA)
- Airfield Pavement - Existing (Runway | Taxiways/Apron)
- Landside Pavement - Existing (Roadway | Vehicle Parking)
- Pavement - Future (Airfield | Apron | Roadway/Parking)
- Airfield Pavement - Future Removal
- Blast Pad Pavement - Future
- T-Shade Structure - Future
- Fuel Tanks - Future
- Runway Markings - Future
- Taxiway/Taxilane Centerlines
- Taxiway/Taxilane Safety Area (TSA)
- Taxiway/Taxilane Object Free Area (TOFA)
- Helicopter Safety Area
- On-Airport Buildings/Aircraft Hangars
- Aircraft Tiedowns

NORTH

0 125 250 ft.

Source: Kimley-Horn, 2022.

Figure 4.14 - T-Shade Alternative 2



Source: Kimley-Horn, 2022.

T-Shade Alternative 3: Structure Removal

Alternative 3 proposes removal of the existing t-shade structure. While it is recognized that there is a strong desire for covered aircraft parking, especially in warm climates, t-shades are often subject to federal grant eligibility complications and can be expensive to relocate. As previously noted, the FAA recognizes t-shades as hangars and, therefore, the apron pavement underneath the structure may not be federal-grant eligible if maintenance or reconstruction is needed.

T-Shade Recommended Alternative

T-shade alternatives were analyzed based on the evaluation criteria presented in **Section 4.3**. The sums of the ratings were used to determine the recommended alternative. As shown in **Table 4.7**, T-Shade Alternative 2 scored the lowest of the three alternatives primarily due to the costs associated with structure relocation, apron pavement construction, and airport access road rerouting. Additionally, T-Shade Alternative 2 only provides six covered aircraft tiedown positions, whereas T-Shade Alternative 1 provides 12. Although the aviation forecasts prepared for this Master Plan Update do not consider covered aircraft tiedowns, forecast demand for the purposes of this analysis represents the expressed desires of the City, the PAC, and other Airport users to maintain covered aircraft tiedowns. Therefore, T-Shade Alternative 3 scored lower than Alternatives 1 and 2 in satisfying forecast demand and on-airport impacts. For these reasons, T-Shade Alternative 1 is the recommended alternative for the Airport's T-shade relocation and associated improvements.

Table 4.7 - Evaluation of T-Shade Alternatives

T-Shade Alternative	Enhances Operational Safety	Satisfies Forecast Demand*	Minimizes Off-Airport Impacts	Minimizes On-Airport Impacts	Feasible and Cost Effective	Total Score
1	4	4	1	3	1	13
2	4	0	0	2	0	6
3	4	0	1	0	2	7

Source:
Kimley-Horn, 2022.

Note:
* = Covered aircraft tiedowns are not considered in aviation forecasts. Therefore, for the purposes of this analysis, this category represents the expressed desires of the City, the PAC, and various Airport users to maintain covered aircraft tiedowns.

Scoring legend:
0 = Negatively impacts existing condition
1 = Little-to-no impact on existing condition
2 = Slightly improves existing condition
3 = Improves existing condition
4 = Significantly improves existing condition

4.8. HANGAR DEVELOPMENT ALTERNATIVES

As noted in Table 4.1, the Airport requires an additional 30,900 square feet of conventional hangar space and 4,800 square feet of t-hangar space to accommodate forecast demand. Plans for future hangar development at the Airport should incorporate adequate space, flexibility in design and implementation, and opportunities for future growth beyond the 20-year planning horizon of this Master Plan Update. Additionally, FAA design standards, operational efficiency and safety, and vehicle and pedestrian access are important considerations.

The base apron alternative, illustrated in Figure 4.7, serves as the basis from which the hangar development alternatives were created. The recommended alternative for the helicopter parking area, illustrated in Figure 4.12, is also shown in each of the hangar development alternative exhibits (Figure 4.15 through Figure 4.19). Additionally, the exhibits include representations of the 20-foot and 35-foot building restriction lines (BRL). BRLs are a function of the Part 77 Transitional Surface and indicate the maximum height of a structure as to not penetrate the Transitional Surface and create an airspace obstruction. The 20-foot and 35-foot BRLs suggest that structures (e.g., aircraft hangars) may not surpass 20 feet and 35 feet in height, respectively, before penetrating the Transitional Surface.

Five hangar alternatives were developed and evaluated. These alternatives, along with the benefits and constraints of each, are described below and a recommended alternative is presented at the end of this section. Like the Runway 14-32 alternatives, each hangar development alternative incorporates the following no-analysis alternatives as introduced in Section 4.5:

- Standardization of markings and installation of standard lighting for the helicopter parking area
- Installation of new airfield signage and LED lighting
- Extension of Airport access roadway to new development, as needed
- Construction of vehicle parking near new development
- Extension of utilities to new development, as needed
- Extension of AOA fence to new development, as needed
- Upgrading of existing AOA fence to prevent wildlife intrusions onto the airfield
- Removal of AOA fence on west side of Airport access road and associated access gate off of Mingus Avenue

It is critical to note that the hangar alternatives presented within this document are a representation of forecast demand over the 20-year planning horizon and available space for development at the Airport. The exact number, size, and layout of hangars will ultimately be determined based on a developer's preferred concept so long as it is consistent with the ALP. However, a recommended hangar configuration is important to include in the ALP and to ultimately guide future development.

Hangar Development Alternative 1

Hangar Development Alternative 1 represents a southern extension of the existing taxilane centerlines on the southern portion of the apron. Shown in **Figure 4.15**, this alternative provides aircraft with two access points to a new apron south of the Airport's existing main apron (approximately three acres of new pavement) with a 360-degree taxilane configuration around an island of hangars. Of significant note, Hangar Development Alternative 1 requires land acquisition (approximately 0.6 acres) to accommodate hangars and apron pavement. Additionally, the doors of six box hangars and three t-hangar units open to the east and face the future helicopter parking area. The tenants of these hangars may be impacted by rotor wash and potential FOD as a result of adjacent helicopter operations. Ideally, hangars should be oriented in a way that is conducive to being located in proximity to helicopter operations. The advantages and disadvantages of Hangar Development Alternative 1 are summarized below.

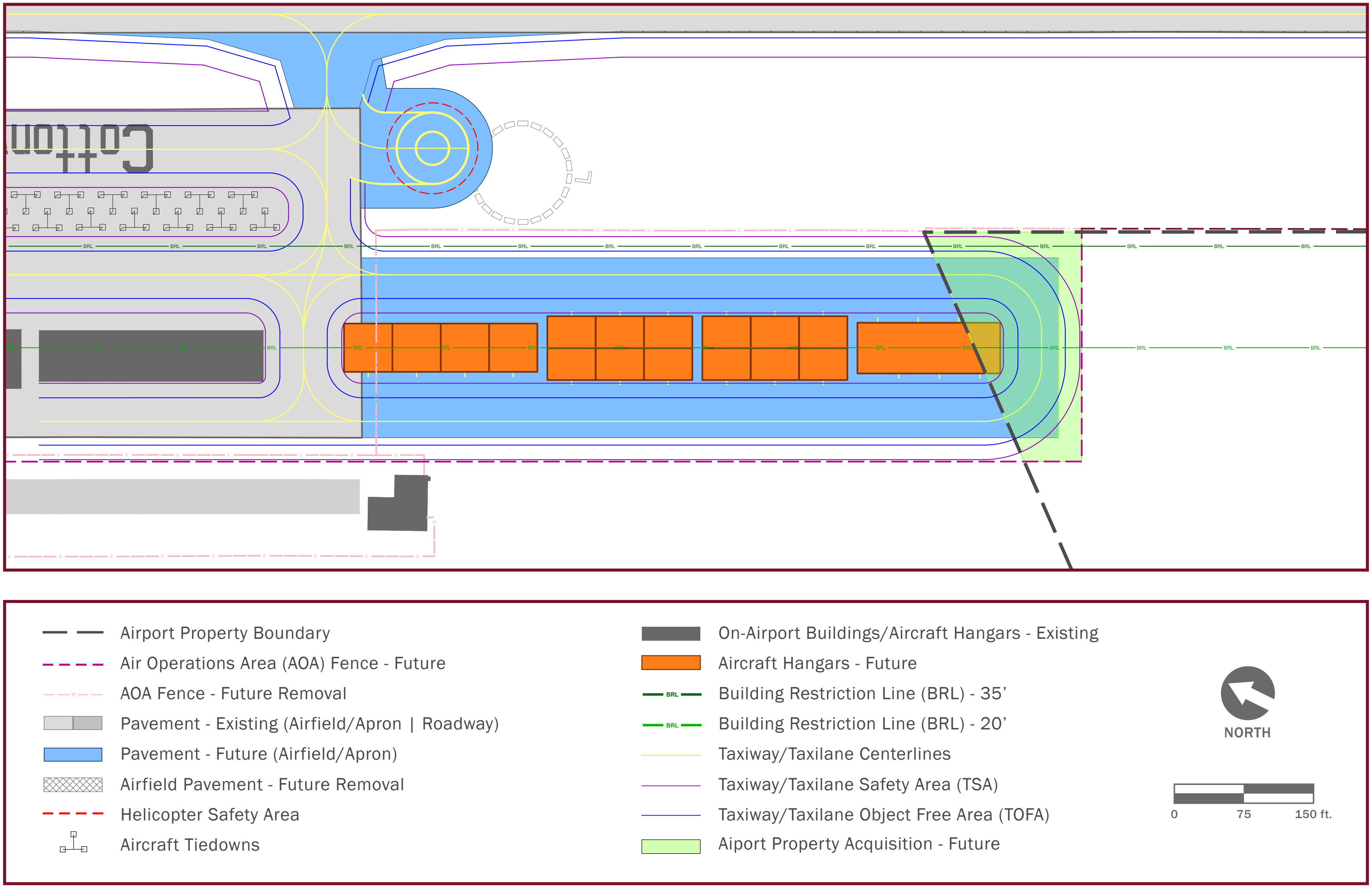
Advantages:

- Efficient taxilane circulation
- Multiple access points (enhances safety)

Disadvantages:

- Requires property acquisition
- Potential impacts from rotor wash and FOD
- Requires grading and utility extension

Figure 4.15 - Hangar Development Alternative 1



Source: Kimley-Horn, 2022.

Hangar Development Alternative 2

Hangar Development Alternative 2 proposes a slight variation to Hangar Development Alternative 1. Shown in **Figure 4.16**, the taxilane circulation is similar to Alternative 1, but the hangars are rearranged so that new development may remain on existing Airport property, eliminating the need for land acquisition. The new apron comprises of approximately 2.7 acres of pavement. In this alternative, the doors of three box hangars and three t-hangar units open to the east and face the future helicopter parking area. Like Hangar Development Alternative 1, the tenants of these hangars may be impacted by rotor wash and potential FOD as a result of adjacent helicopter operations.

The location of the hangars on the western side of the apron affords greater flexibility in hangar size due to increased distance from the 35-foot BRL and more available space west of the proposed apron. Hangar Development Alternative 2 is conducive with future development beyond the 20-year planning horizon as additional hangars and associated taxilanes and infrastructure may connect to the southwestern corner of the proposed apron. The advantages and disadvantage of Hangar Development Alternative 2 are summarized below.

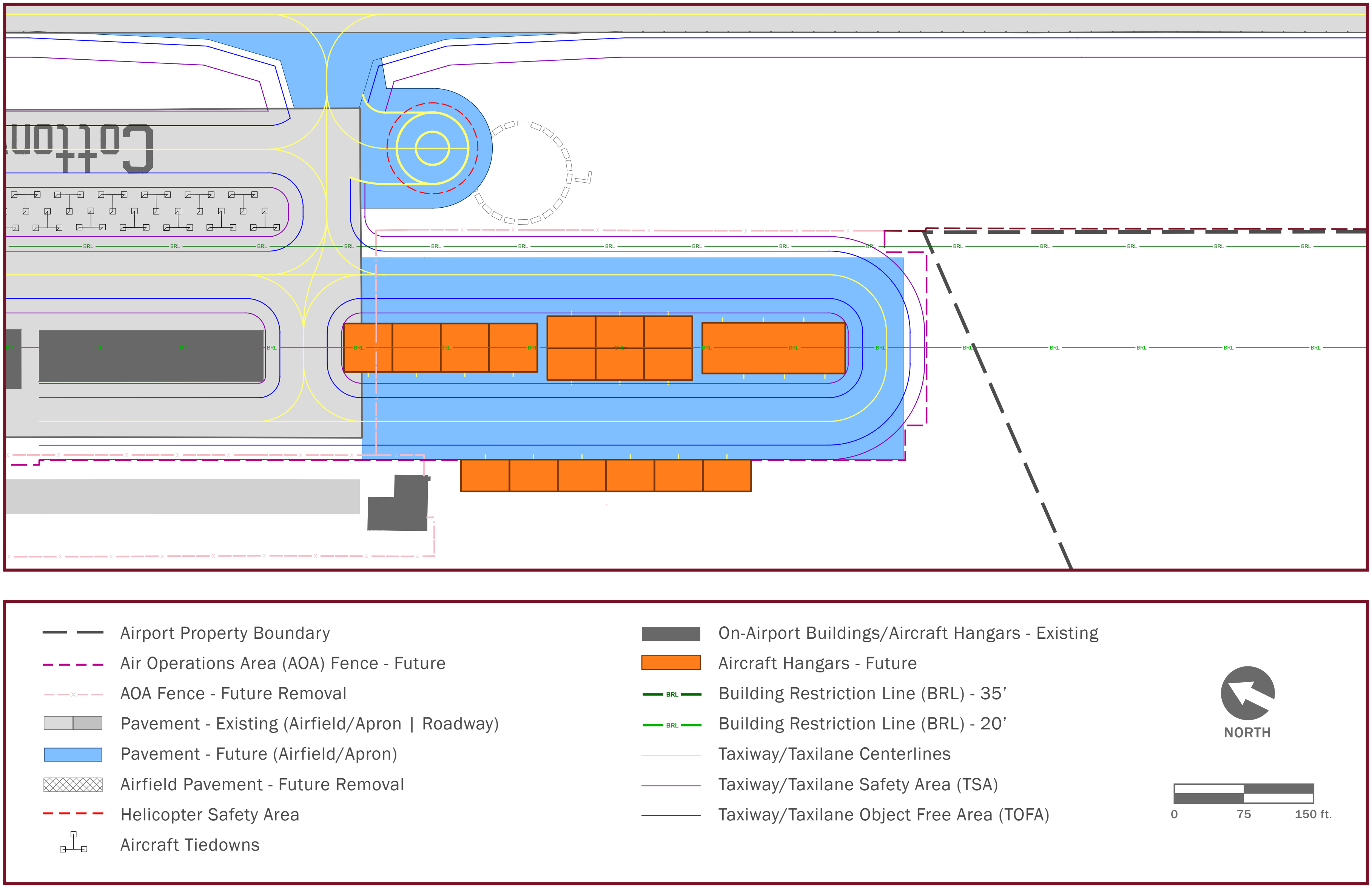
Advantages:

- Efficient taxilane circulation
- Flexibility in sizing of western hangars
- Multiple access points (enhances safety)

Disadvantage:

- Potential impacts to southern hangars from rotor wash and FOD
- Requires grading and utility extension

Figure 4.16 - Hangar Development Alternative 2



Source: Kimley-Horn, 2022.

Hangar Development Alternative 3

Illustrated in **Figure 4.17**, Hangar Development Alternative 3 proposes an approximately 2.6-acre apron containing a 360-degree taxilane configuration around an island of hangars with additional hangars located on the western and eastern sides of the apron. Unlike Hangar Development Alternatives 1 and 2, Hangar Development Alternative 3 strategically orients hangars so that hangar doors do not directly face the helicopter parking area. Although the t-hangars have eastern-facing doors, they are protected from rotor wash and potential FOD by the box hangars to the east. As previously noted, there is increased sizing flexibility with the hangars located on the western side of the apron due to their distance from the 35-foot BRL and more available space west of the proposed apron.

This alternative provides one access point to the proposed apron in order to accommodate hangars east of the apron and to avoid TSA/TOFA impacts to the existing EAA building. The single access point creates an unconventional taxilane intersection north of the proposed apron. Hangar Development Alternative 3 is conducive with future development beyond the 20-year planning horizon as additional hangars and associated taxilanes and infrastructure may connect to the southwestern corner of the proposed apron.

The advantages and disadvantages of Hangar Development Alternative 3 are summarized below.

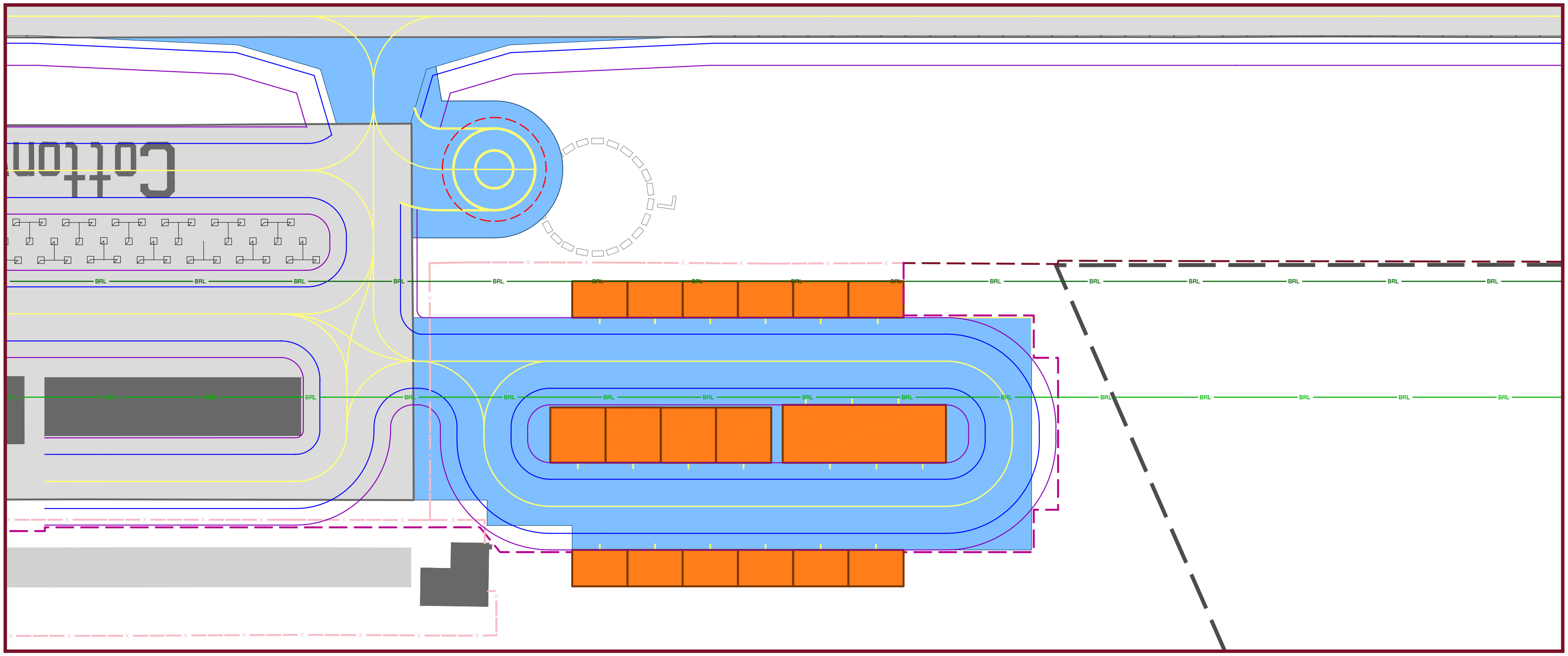
Advantages:

- Avoids impacts from rotor wash and potential FOD
- Flexibility in sizing of western hangars

Disadvantages:

- Single access point
- Unconventional taxilane intersection
- Requires grading and utility extension

Figure 4.17 - Hangar Development Alternative 3



- Airport Property Boundary
- Air Operations Area (AOA) Fence - Future
- AOA Fence - Future Removal
- Pavement - Existing (Airfield/Apron | Roadway)
- Pavement - Future (Airfield/Apron)
- Airfield Pavement - Future Removal
- Helicopter Safety Area
- Aircraft Tiedowns
- On-Airport Buildings/Aircraft Hangars - Existing
- Aircraft Hangars - Future
- Building Restriction Line (BRL) - 35'
- Building Restriction Line (BRL) - 20'
- Taxiway/Taxilane Centerlines
- Taxiway/Taxilane Safety Area (TSA)
- Taxiway/Taxilane Object Free Area (TOFA)

NORTH

0 75 150 ft.

Source: Kimley-Horn, 2022.

Hangar Development Alternative 4

Hangar Development Alternative 4 proposes a new apron south of the Airport's existing main apron (approximately 2.6 acres of new pavement) and is similar to Hangar Development Alternatives 1 and 2 in that it represents a southern extension of the existing taxilane centerlines and provides a 360-degree circulation pattern with two access points. As illustrated in **Figure 4.18**, the conventional hangars in the middle of the taxilane are strategically oriented so that hangar doors do not directly face the helicopter parking area. And while three t-hangars units have eastern-facing doors, they are located on the southernmost portion of the proposed apron to avoid significant impacts from rotor wash and potential FOD associated with helicopter operations. The remaining hangars are entirely located on the west side of the proposed apron, allowing for greater flexibility in hangar size due to increased distance from the 35-foot BRL and more available space west of the proposed apron. Due to the positioning of the hangars, the eastern taxilane may be underused when compared with the western taxilane from which the majority of the hangars may be accessed. However, a 360-degree taxilane configuration enhances efficiency and safety by providing multiple taxiing routes and access points. Hangar Development Alternative 4 is conducive with future development beyond the 20-year planning horizon as additional hangars and associated taxilanes and infrastructure may connect to the southwestern corner of the proposed apron.

The advantages and disadvantages of Hangar Development Alternative 4 are summarized below.

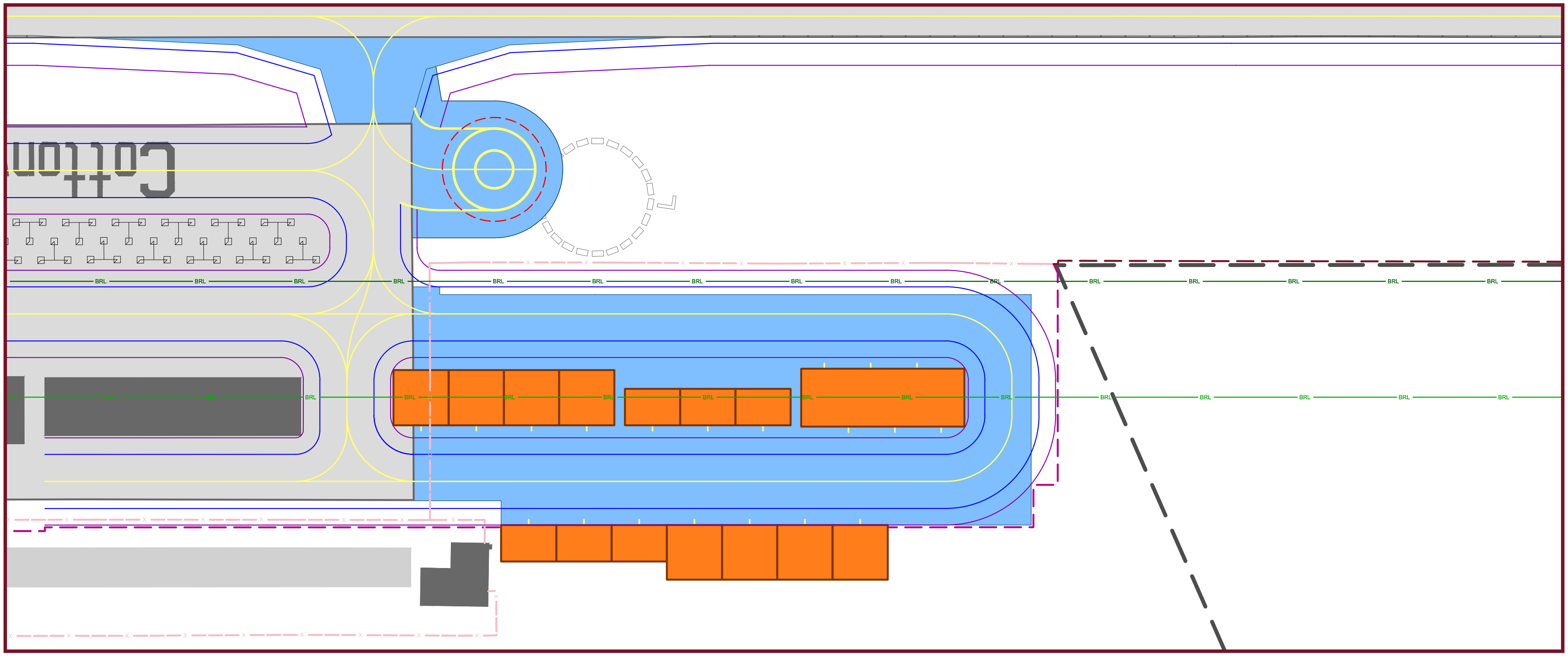
Advantages:

- Avoids significant impacts from rotor wash and potential FOD
- Efficient taxilane circulation
- Flexibility in sizing of western hangars
- Multiple access points (enhances safety)

Disadvantage:

- Potential underutilized east taxilane
- Requires grading and utility extension

Figure 4.18 - Hangar Development Alternative 4



- Airport Property Boundary
- Air Operations Area (AOA) Fence - Future
- AOA Fence - Future Removal
- Pavement - Existing (Airfield/Apron | Roadway)
- Pavement - Future (Airfield/Apron)
- Airfield Pavement - Future Removal
- Helicopter Safety Area
- Aircraft Tiedowns
- On-Airport Buildings/Aircraft Hangars - Existing
- Aircraft Hangars - Future
- Building Restriction Line (BRL) - 35'
- Building Restriction Line (BRL) - 20'
- Taxiway/Taxilane Centerlines
- Taxiway/Taxilane Safety Area (TSA)
- Taxiway/Taxilane Object Free Area (TOFA)

NORTH

0 75 150 ft.

Source: Kimley-Horn, 2022.

Hangar Development Alternative 5

Hangar Development 5, illustrated in **Figure 4.19**, presents a unique configuration when compared to Hangar Development Alternatives 1 through 4. This alternative proposes a new apron (approximately 2 acres of new pavement) with one access point from the Airport's existing apron. Hangars are located on each side of the taxilane with the eastern hangar doors facing away from the helicopter parking area. On the south portion of the prosed apron, a 360-degree taxilane configuration that is perpendicular to the runway provides access to the t-hangar unit and additional conventional hangars. The single access point to the hangar area creates an unconventional taxilane intersection where the proposed apron meets the existing apron, and the single taxilane may cause periodic congestion during periods of high activity. Hangar Development Alternative 5 is conducive with future development beyond the 20-year planning horizon as additional hangars and associated taxilanes and infrastructure may connect to the southwestern corner of the proposed apron.

The advantages and disadvantages of Hangar Development Alternative 5 are summarized below.

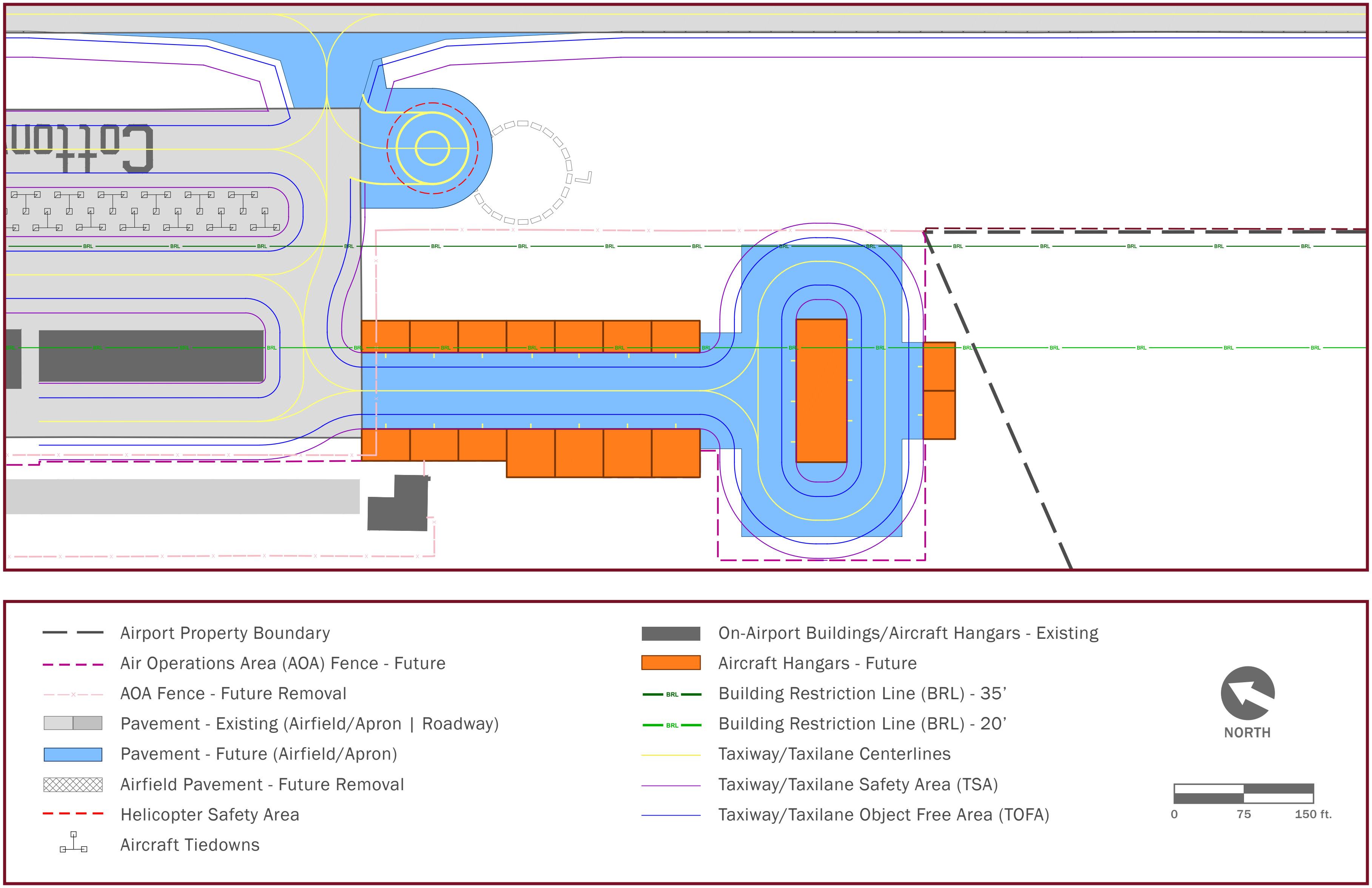
Advantages:

- Avoids impacts from rotor wash and potential FOD
- Flexibility in sizing of western hangars
- Conducive for phased development (north to south)

Disadvantages:

- Single access point
- Unconventional taxilane intersection
- Requires grading and utility extension

Figure 4.19 - Hangar Development Alternative 5



Source: Kimley-Horn, 2022.

Hangar Development Recommended Alternative

Hangar development alternatives were analyzed based on the evaluation criteria presented in **Section 4.3**. Shown in **Table 4.8**, Hangar Development Alternative 1 scored notably lower than Alternatives 2 through 4, primarily due to compromises in operational safety (i.e., the number of hangar doors facing the helicopter parking area), required land acquisition, and a lack of flexibility to exceed forecast demand. Conversely, Hangar Development Alternatives 2 through 4 scored relatively similar across all evaluation criteria. These alternatives were determined to enhance operational safety for taxing aircraft and provide flexibility to exceed forecast demand. When comparing the alternatives to one another, however, Hangar Development Alternatives 3 and 4 require slightly more grading and pavement construction, leading to lower scores in feasibility and cost effectiveness. Similarly, the unique apron layout and taxilane intersections of Hangar Development 5 yields a lower score in on-airport impacts. Therefore, Hangar Development Alternative 2 yielded the highest score. Along with support from stakeholders, the PAC, and the City, Alternative 2 is the recommended alternative to guide future hangar development at the Airport.

Table 4.8 - Evaluation of Hangar Development Alternatives

Hangar Development Alternative	Enhances Operational Safety	Satisfies Forecast Demand*	Minimizes Off-Airport Impacts	Minimizes On-Airport Impacts	Feasible and Cost Effective	Total Score
1	2	3	0	3	0	8
2	3	4	1	3	3	14
3	3	4	1	3	2	13
4	3	4	1	3	2	13
5	3	4	1	2	3	13

Source:
Kimley-Horn, 2022.

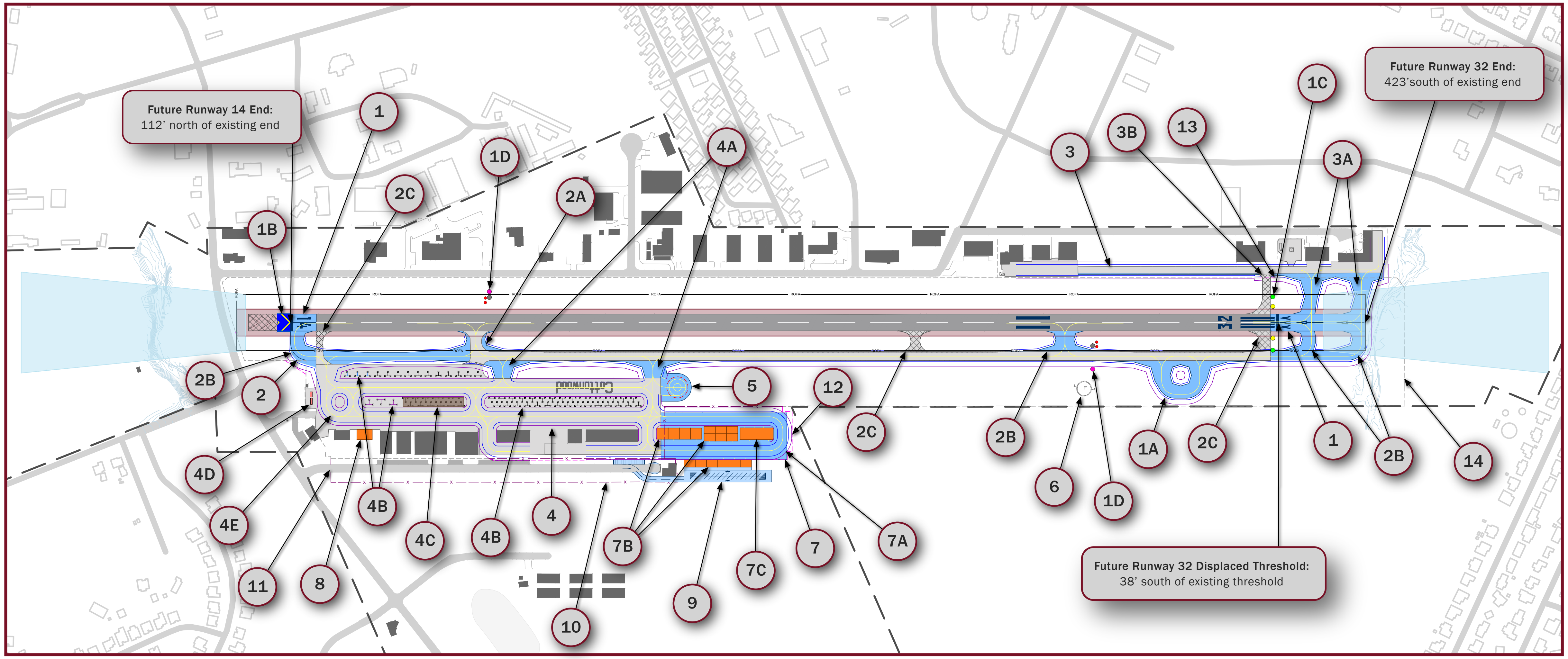
Note:
* = Alternatives that score 4 in this category provide flexibility to exceed forecast demand.

Scoring legend:
0 = Negatively impacts existing condition
1 = Little-to-no impact on existing condition
2 = Slightly improves existing condition
3 = Improves existing condition
4 = Significantly improves existing condition

4.9. RECOMMENDED DEVELOPMENT PLAN

This chapter of the Master Plan Update presents several development alternatives to address aviation forecasts and facility needs over the 20-year planning horizon. The RDP, shown in **Figure 4.20**, combines the no-analysis alternatives (presented in **Section 4.3**) and the individual recommended alternatives for various facilities at the Airport (as identified throughout this chapter). The RDP represents the ultimate conditions of Cottonwood Municipal Airport at the end of the 20-year planning period, which are also depicted on the ALP. A phased implementation plan for these improvements, as well as cost estimates and potential funding sources, are presented in **Chapter 5 – Implementation Phasing Plan**.

Figure 4.20 - Recommended Development Plan



- Airport Property Boundary
- Air Operations Area (AOA) Fence - Existing
- AOA Fence - Removal
- AOA Fence - Future
- Runway Protection Zone (RPZ), Approach/Departure - Future
- Runway Safety Area (RSA) - Future
- Runway Object Free Area (ROFA) - Future
- Airfield Pavement - Existing (Runway | Taxiways/Apron)
- Airfield Pavement - Future
- Airfield Pavement - Future Removal
- Blast Pad Pavement - Future
- Runway Markings - Future
- Taxiway Centerlines - Future
- Taxiway/Taxilane Safety Area (TSA) - Future
- Taxiway/Taxilane Object Free Area (TOFA) - Future
- Helicopter Operating Area Safety Area - Future
- On-Airport Buildings/Aircraft Hangars - Existing
- Aircraft Hangars - Future
- Fuel Tanks - Future
- Off-Airport Buildings
- Relocated T-Shade Structure
- Paved Roads | Vehicle Parking - Existing
- Paved Roads/Vehicle Parking - Future
- On-Airport Wash
- Aircraft Tiedowns (Standard) - Future
- Aircraft Tiedowns (Itinerant) - Future
- Aircraft Tiedowns (Electric Charging Stations) - Future
- Runway End Identifier Lights (REILs) - Existing
- REILs - Future
- Precision Approach Path Indicator (PAPI) - Existing/Future
- PAPI Power Control Units (PCU) - Existing
- PAPI PCUs - Future

0 275 550 1,100 ft.

NORTH

DECLARED DISTANCES

Existing Runway 14-34 Dimensions	4,252' x 75'	
Future Runway 14-32 Dimensions	4,787' x 75'	
Future Declared Distances	**Rwy 14**	**Rwy 32**
Take Off Run Available (TORA)	4,402'	4,787'
Take Off Distance Available (TODA)	4,787'	4,787'
Accel. Stop Distance Available (ASDA)	4,547'	4,787'
Landing Distance Available (LDA)	4,547'	4,402'

PROJECT LIST

1. Design & Construct Runway Extension & Strengthening
- 1A. Design & Construct Run-up Area
- 1B. Standardize Runway 14 Blast Pad
- 1C. Relocate Runway 32 Runway End Identifier Lights (REILs)
- 1D. Relocate Precision Approach Path Indicator (PAPI) Power Control Units (PCUs)

2. Design & Construct Taxiway A Extension & Narrowing
- 2A. Standardize Existing Taxiway Connectors
- 2B. Design & Construct 4 Taxiway Connectors
- 2C. Remove Taxiway Pavement

3. Design & Construct East Taxilane Modifications
- 3A. Design & Construct 2 Taxiway Connectors
- 3B. Remove Taxiway Pavement

4. Design & Construct Apron Reconfiguration
- 4A. Design & Construct 2 Taxiway Connectors
- 4B. Relocate Aircraft Tiedowns
- 4C. Relocate T-Shade Structure
- 4D. Relocate Fuel Tank
- 4E. Restripe Taxilane Centerlines

5. Design & Construct Relocated Helicopter Operating Area

6. Relocate Segmented Circle with Lighted Wind Indicator

7. Design & Construct Hangar Development Area
- 7A. Design & Construct Taxilane (includes Grading)
- 7B. Design & Construct 16 Box Hangars
- 7C. Design & Construct Six-Unit T-Hangar

8. Design & Construct Box Hangar

9. Design & Construct Roadway & Vehicle Parking

10. Remove AOA Fence

11. Remove Access Gate

12. Construct AOA Fence

13. Lower AOA Fence

14. Install Wildlife Skirting on AOA Fence

Source: Kimley-Horn, 2022.

Note: Standard runway width for ADG II is 60 feet. The FAA indicated that a benefit-cost analysis may be performed to determine the financial feasibility of maintaining a 75-foot runway.

4.10. ON-AIRPORT LAND USE

The recommended On-Airport Land Use Plan defines future land use for occupied and vacant land within the Airport's boundaries. This plan provides a framework for development that is compatible with existing and proposed facilities as presented in the RDP (**Figure 4.20**). For undeveloped areas, the plan does not indicate immediate development or relocation of facilities but designates the areas where facilities would be developed as needs arise. The specific layouts of airside, landside, and support facilities within the identified areas will be informed by the RDP and as individual facilities are designed and constructed.

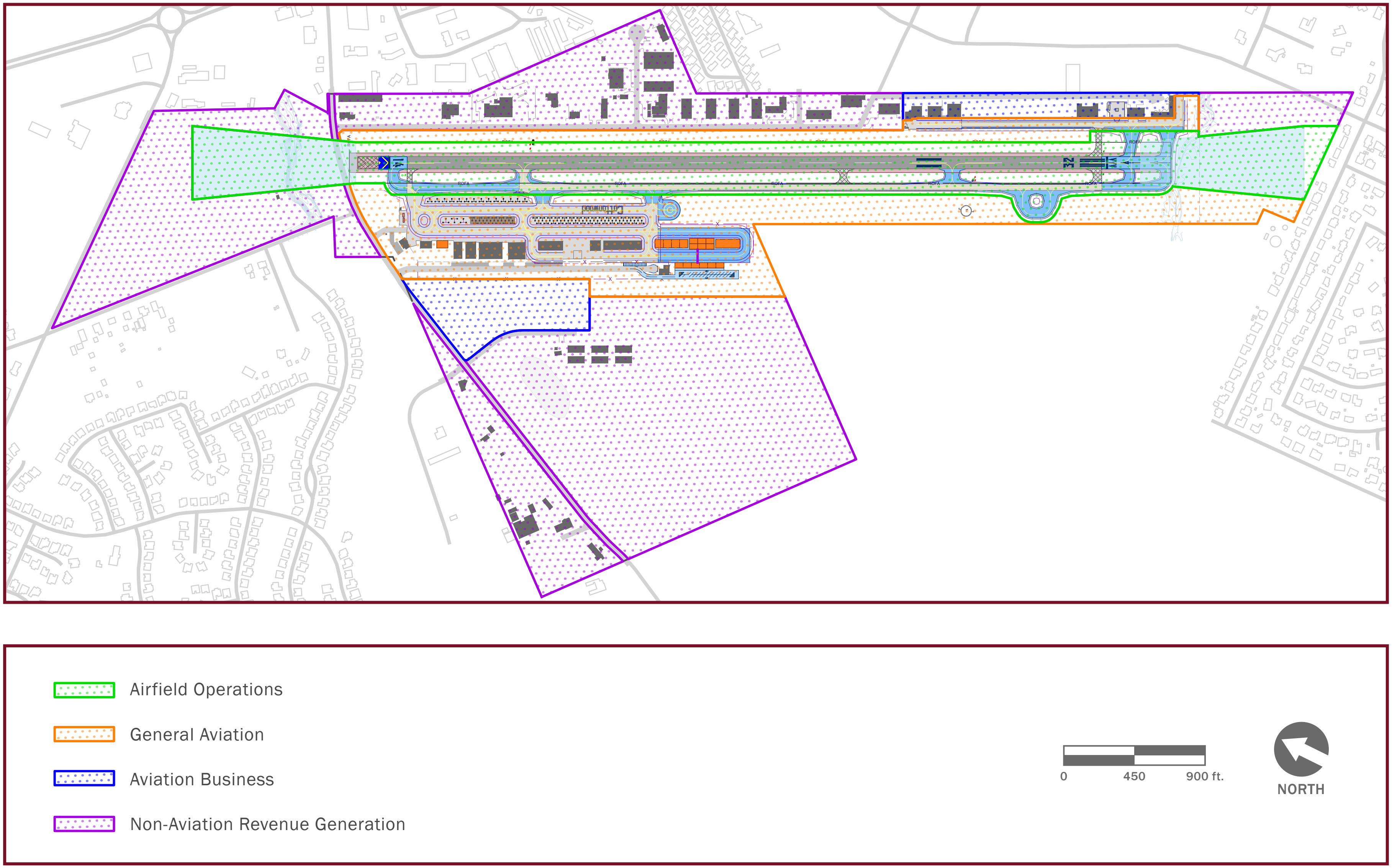
As presented in **Figure 4.21**, the On-Airport Land Use Plan identifies four functional categories of land use:

Table 4.9 - Airport Land Use Categories

Land Use	General Description	Example of Uses
Airfield Operations	Areas within the movement area dedicated to aircraft takeoff, landing, and taxing operations.	Runway 14-32, taxiways, run-up areas, Airport property within runway and taxiway protection areas (e.g., RSA, RPZs, TSAs).
General Aviation	Areas dedicated to aircraft storage, fueling, and maintenance.	Aircraft parking aprons, hangars, tie-down areas, taxilanes, associated vehicle parking facilities.
Aviation Business	Areas dedicate for businesses related to aviation activity and services.	Flight training, aviation-related manufacturing/repair, FBO, associated vehicle parking.
Non-Aviation Revenue Generation	Areas not needed for long-term aviation purposes that could generate revenue for the airport.	Commercial, retail, general industrial/manufacturing.

Source: *Kimley-Horn, 2022.*

Figure 4.21 - Future On-Airport Land Use



Source: Kimley-Horn, 2022.

CHAPTER 5: IMPLEMENTATION PLAN AND FINANCIAL ANALYSIS

5.1. CHAPTER INTRODUCTION

Previous chapters of this Master Plan Update presented analyses that evaluated the Airport's facility needs based on existing infrastructure and forecasts of aviation demand. Various alternatives were then developed to address these facility needs, which were presented to members of the Master Plan Advisory Committee, the public, City staff, and the FAA. Based on feedback from these stakeholder groups, a Recommended Development Plan (RDP), presented in **Chapter 4 – Alternatives**, was developed to reflect a summation of all improvements to be made at Cottonwood Municipal Airport during the 20-year planning horizon.

This chapter summarizes projects as described in the RDP, environmental documentation requirements for various projects, anticipated funding sources, as well as an updated 5-year and 10-year airport Capital Improvement Program (CIP). Also included are opinions of probable costs (OPCs) for each project. OPCs should be re-evaluated and updated as projects transition from high-level planning to engineering and construction. Additionally, implementation of projects will depend on obtaining environmental clearance, the availability of public and private funds, FAA programming, City priorities, and attainment of forecast activity levels.

5.2. RECOMMENDED DEVELOPMENT PLAN

In addition to projects recommended based on analyses provided in this Master Plan Update, projects included in the Airport's previous CIP that are still valid and improvement projects identified within the Arizona Airport Pavement Management System (APMS) are described below. These projects are planned based upon anticipated demand and funding availability, and are grouped into the following phases:

5.2.1. Near Term Projects (0 - 5 Years)

- Reconstruct Taxiway A, Taxiway C, and replace Taxiway D. Reconstruct two new connector taxiways. Includes LED taxiway signage.
- Seal coat and re-mark Rwy 14/32.
- Install LED lights for Runway 14/32. Upgrade electrical vault & install airfield lighting control system.
- Upgrade Runway 14/32 PAPIs and REILs.
- Upgrade Runway guidance signs to LED.
- Environmental Assessment for Runway 14/32 improvements.
- Construct new helicopter landing area/parking apron area. Includes standard markings/lighting.
- Install emergency generator.
- Design/Construct Runway 14/32 extension, strengthening, and reconstruction.
- Relocate Power Control Units for Rwy 14/32 PAPIs.
- Install wildlife anti-dig fencing.
- Vegetation obstacle removal.
- Construct two new hangars.

5.2.2. Mid Term Projects (6 – 10 Years)

- Apron reconfiguration and new connector taxiways.
- East taxilane improvements.
- Site preparation for hangar development.
- New vehicle parking and extension of access road.
- Relocate fuel tanks.
- Install new Jet A fuel tank.
- Lower AOA fence to mitigate airspace obstruction.
- Replace rotating beacon.
- Remove Mingus Ave. access gate and relocate AOA fencing.
- Relocate T-shade.
- Purchase Airport vehicle.
- Construct two new hangars.
- Update Airport Master Plan/Airport Layout Plan.

5.2.3. Long Term Projects (11 – 20 Years)

Based on demand and availability of funding, as well as input provided by the Sponsor, it was determined that the projects identified in the RDP should be completed within a 10-year timeframe. However, as activity and demand at the Airport evolves over time, the Sponsor should continue to track its CIP and adjust projects and phasing as appropriate. Additionally, the Airport should continue to perform routine pavement management projects and monitor/remove obstacles to air navigation as needed.

5.3. ENVIRONMENTAL CONSIDERATIONS

It is important to have a strategy for the acquisition of required environmental approvals under the National Environmental Policy Act (NEPA) for the RDP. For certain projects, it is anticipated that FAA approval of the ALP will be conditional upon environmental review. Other environmental considerations related to NEPA may include impacts to sensitive habitats or hazardous waste sites on Airport property. An overview of environmental considerations was conducted as part of this Master Plan Update; however, project specific NEPA documentation will be required prior to design and construction.

The three types of environmental review are described below:

Environmental Assessment (EA): A public document prepared by an airport sponsor to provide sufficient evidence to determine if a proposed action would require the preparation of an Environmental Impact Statement (EIS) or a finding of no significant impact (FONSI). This process takes 6 months to 2 years to complete, on average.

Environmental Impact Statement (EIS): A public document that is required for an airport development action that may “significantly affect the quality of the human environment.” The EIS describes a proposed action’s impacts on the environment, the impacts associated with alternatives, and plans to mitigate impacts. On average, this process takes 2 to 3 years to complete.

Categorical Exclusion (CatEx): Actions that do not cumulatively or individually have a significant impact on the human environment fall into this category. Neither an EA nor EIS are required for such actions. Typically, the process of CatEx documentation and FAA approval takes 2 to 6 months.

RDP projects that are anticipated to require environmental review are presented in **Table 5.1**.

Table 5.1 - Project NEPA Documentation Requirements

Project	NEPA Documentation
Taxiway A reconstruction	CatEx
Runway 14/32 lighting improvements	CatEx
Runway 14/32 PAPI and REIL updates	CatEx
Upgrade Runway guidance signs to LED	CatEx
New helicopter landing area/parking apron area	CatEx
Install emergency generator	CatEx
Runway 14/32 extension and reconstruction	EA
Relocate PCUs for Rwy 14 and 32 PAPIs.	CatEx
Install wildlife anti-dig fencing	CatEx
Apron reconfiguration and new connector taxiways	CatEx
East taxilane improvements	CatEx
Site preparation for hangar development	CatEx
New vehicle parking and access road extension	CatEx
Relocate fuel tanks	CatEx
Install new Jet A fuel tank	CatEx
Replace rotating beacon	CatEx
Remove Mingus Ave. Access Gate, AOA Fence	CatEx
Relocate T-shade	CatEx
New hangar construction	CatEx

Source:
FAA Order 1050.1F Environmental Impacts: Policies and Procedures

Notes:
CatEx: Categorical Exclusion
EA: Environmental Assessment

5.4. FUNDING PLAN

The funding plan identifies likely funding sources for RDP projects. To support the development of the funding plan, a Capital Improvement Program (CIP) was developed concurrent with the RDP. The CIP identifies funding sources that are expected to be available through the planning period for RDP projects.

5.4.1. Assumptions

The funding plan was developed using information and assumptions that provide a reasonable foundation for analysis on the level of an airport master plan update. It is important to note that some of the assumptions used to project funding sources may not come to fruition as unanticipated circumstances and events may take place. Therefore, there will be variance between forecast and actual results, and the difference between the two could be material.

The funding plan is by nature preliminary and is not intended for use in support of bond sales or to obtain other forms of financing. Additionally, more detailed financial analyses and cost estimates are necessary to implement individual projects. Note that some RDP projects could be postponed if forecast aviation activity does not occur, construction costs significantly increase, or if projected funding is not available.

Cost estimates for RDP projects were developed using region-specific criteria. These estimates included hard and soft construction costs, as well as estimates for planning, design and contingency. Generally, estimates for construction projects included a 12 percent planning, environmental, and design cost. Additionally, projects identified to be completed within the 6-10 year planning horizon included a 10 percent increase in total cost to account for inflation.

5.4.2. Funding Sources

The following sections include detailed descriptions of assumed funding sources. Each funding source available has unique availability, eligibility, and time constraints. For each source considered, availability of a given fund does not necessarily indicate that all of the available fund would be allocated to RDP projects.

Airport Improvement Program Grants

The Airport Improvement Program (AIP) is the FAA grant program that funds capital development at eligible airports in the NPIAS, which includes general aviation airports that are categorized by the FAA as “Local” like Cottonwood Municipal Airport. Annual non-primary entitlement grants are provided from the AIP to airports, which is based on 20 percent of the 5-year cost of need, up to an annual maximum of $150,000. In the event that additional funding is required, the FAA may also issue discretionary AIP grants to supplement the entitlement funds. AIP funds can be used for most non-revenue-generating airport development. However, these funds may also be used for revenue-generating projects if there are no other needs at an airport and the FAA is in agreement with the situation.

Grant-specific assumptions made for this analysis are described below:

Entitlement Grants. As an operator of a non-primary airport, the City is eligible for an AIP entitlement apportionment in each federal fiscal year that the AIP is funded to $3.2 billion or more. The entitlement is calculated as 20 percent of the 5-year cost of the Airport’s need listed in the most recent NPIAS, up to $150,000 annually. It was assumed that the current FAA methodology for entitlement allocation would remain constant. Therefore, available AIP entitlement grants for the City would total approximately $3.0 million over the 20-year planning period or $1.5 million within a 10-year timeframe.

Discretionary Grants. The FAA administers discretionary grants for projects based on their priority. Projects that involve reconstruction/rehabilitation, safety, and capacity receive the highest level of priority. The City is eligible for 91.06 percent of eligible project costs to be financed with discretionary funds due to its status as an operator of a non-primary airport in Arizona. This percentage may vary depending on the amount of discretionary funds administered. During the planning period, it was estimated that the City would require approximately $3.2 million in FAA discretionary grants through the 10-year planning period.

Bipartisan Infrastructure Bill. The Bipartisan Infrastructure Bill (BIL), also known as the Infrastructure Investments and Jobs Act (IIJA), was signed into law on November 15, 2021. The $1.2 trillion bill allocates $25 billion for aviation infrastructure over a five (5) year period. $15 billion will be allocated towards formula funding for airport development grants based on passenger counts. Airports will be able to compete for $5 billion in grant programs for airport terminal and landside improvements. The remaining $5 billion will be used to update FAA towers and facilitates. The Airport is eligible to receive a total of $159,000 annually in BIL funding between fiscal year 2022 and 2026. As such, it was assumed that the Airport would receive its full allotment of $795,000, which must be spent by the end of fiscal year 2026.

State Funds

The Arizona Department of Transportation (ADOT) provides grants to assist with federal grant matching for projects that are eligible for FAA grants (Federal/State/Local grants), airport pavement preservation, and other projects that benefit the State aviation system (State/Local grants).

ADOT established the Arizona Development Loan Program to enhance the utilization of available state funds. This program was designed to be a flexible funding mechanism that would assist eligible airport sponsors as they improved the economic status of their respective airports. Eligible airport operators identified in the ADOT State Airports System Plan (SASP) may use this program for projects related to the following: Construction of runways, taxiways, aprons, aircraft storage facilities (hangars), utility services (water, power, sewer, etc.), ramp lighting, airport drainage, planning studies, land acquisition, approach aids, general aviation terminal buildings, airport fencing, fueling facilities, planning studies, and the preparation of plans and specifications for airport construction projects when the Loan Program is active.

ADOT provides half of the local matching share for capital development funded by the FAA, subject to funding availability in the State Aviation Fund. The ADOT State/Local grant program provides support for airport development for up to 90 percent of the eligible cost of a project. State/Local projects receive priority utilizing the ADOT priority ranking system and must be approved by the State Transportation Board.

Another funding mechanism sponsored by the State includes grants administered based on the results of the ADOT Airport Pavement Management System (APMS) Program. Every year, the State uses the APMS to identify airport pavement maintenance projects that are eligible for funding for the next five years. The project selection criteria does not guarantee that a pavement maintenance program will be funded.

The 10-year CIP identifies that approximately $1.9 million in State grant funding will needed for Federal/State/Local and State/Local eligible development projects. Multi-year phasing may be required for specific projects presented in the RDP and CIP based on funding availability and project eligibility.

Local Funding

As noted, for FAA and ADOT grant eligible projects, a local match by an airport sponsor of 4.47% or 10% is required, respectively. For projects that are not eligible for grant funding and are not funded privately (such as by a tenant or developer), local funds must be used. For projects identified in the 10-year CIP, local funding comprises approximately $5 million. It should be noted that several projects assumed a 50%/50% split between local and third-party funding. These projects primarily include those that provide a direct benefit to tenants or preparation for and construction of aircraft storage hangars.

Private or Third-Party Funding

Projects identified in the CIP that are anticipated to occur on private leaseholds or provide direct benefit to a tenant may not be eligible for AIP or State grants. In such cases, private or third-party funding may be required. Typically, private development projects on airport property consist of a long-term (20-30 year) lease where a developer can recoup project construction costs. As noted, the CIP includes some projects that assumed a 50%/50% local-private funding split. Over the 10-year planning period, it was assumed that approximately $4.1 million in private funding would be needed.

5.4.3. Capital Improvement Program

Table 5.2 summarizes the Airport's CIP for near term (FY 2024-2028) and mid-term (FY 2029-2033) projects. Estimated capital expenditures total approximately $16.5 million (in escalated dollars) for all projects in the CIP. The timing of the Airport's 5-year CIP is denoted. Projects listed in the 6-10 range do not have specific years associated and should be prioritized based on realized need and demand. Projects identified within a 5-year timeframe typically reflect more immediate airport needs or facilities with potential funding having already been secured, as opposed to a 10-year CIP that identifies anticipated needs throughout the planning horizon.

Table 5.2 - 10-Year Airport Capital Improvement Program

Project	Fiscal Year	Funding Source	Project Cost	Federal Share	State Share	Private/ Third Party Share	Local Share
FY 2024-2028 Projects							
Taxiway A reconstruction	2024	FSL	$1,270,700	$1,157,099	$56,800	--	$56,800
Seal Coat and remark RWY 14/32	2024	FSL	$221,417	$201,622	$9,897	--	$9,897
Install LED lights on RWY 14/32. Upgrade electrical vault & airfield lighting control system	2024	SL	$1,000,000	--	$900,000	--	$100,000
Upgrade RWY 14/32 PAPIs and REILs	2024	SL	$200,000	--	$180,000	--	$20,000
Upgrade guidance signs to LED	2024	SL	$400,000	--	$360,000	--	$40,000
Environmental Assessment for RWY 14/32 improvements	2025	FSL	$300,000	$273,180	$13,410	--	$13,410
New helicopter landing area (includes marking and lighting)	2025	FSL	$78,795	$71,751	$3,522	--	$3,522
Install emergency generator	2025	SL	$50,000	--	$45,000	--	$5,000
Vegetation obstacle removal	2026	FSL	$215,400	$196,143	$9,628	--	$9,628
Runway 14/32 extension, strengthening, and reconstruction (design in FY 2026, construction FY 2027)	2026/ 2027	FSL	$1,672,905	$1,523,347	$74,779	--	$74,779
Relocate power control units for PAPIs	2027	FSL	$65,000	$59,189	$2,906	--	$2,906
Install wildlife anti-dig fencing	2028	FSL	$381,160	$347,084	$17,038	--	$17,038
Construct 2 new hangars	2028	L/P	$1,209,200	--	--	$604,600	$604,600
FY 2029-2033 Projects							
Apron reconfiguration and new connector taxiways	--	FSL	$1,228,700	$1,118,854	$54,923	--	$54,923
East taxilane improvements	--	L/P	$132,220	--	--	$66,110	$66,110
Site preparation for hangar development	--	L/P	$6,310,700	--	--	$3,155,350	$3,155,350
New vehicle parking and access road extension	--	L/P	$520,300	--	--	$260,150	$260,150
Relocate fuel tanks	--	L	$53,000	--	--	--	$53,000
Install new Jet A fuel tank	--	L	$305,000	--	--	--	$305,000
Lower AOA fence (obstacle)	--	SL	$1,680	--	$1,512	--	$168
Replace rotating beacon	--	SL	$178,080	--	$160,272	--	$17,808
Remove Mingus Ave. access gate and AOA fence	--	L	$61,600	--	--	--	$61,600
Relocate T-shade	--	L	$81,000	--	--	--	$81,000

Project	Fiscal Year	Funding Source	Project Cost	Federal Share	State Share	Private/ Third Party Share	Local Share
Purchase Airport vehicle	--	FSL	$44,800	$40,795	$2,003	--	$2,003
Master Plan Update/ ALP Update	--	FSL	$560,000	$509,936	$25,032	--	$25,032
		0-5- Year Subtotal	**$7,064,577**	**$3,829,416**	**$1,672,980**	**$604,600**	**$957,580**
		6-10 Year Subtotal	**$9,477,080**	**$1,669,585**	**$243,741**	**$3,481,610**	**$4,082,143**
		Grand Total	**$16,541,657**	**$5,499,001**	**$1,916,722**	**$4,086,210**	**$5,039,724**

Sources:
Kimley-Horn, 2022.

Airport Management.

Notes:
All construction projects include design and construction costs unless otherwise noted.
FSL: Federal/State/Local
SL: State/Local
L: Local
P: Private

5.5. FINANCIAL FEASIBILITY ANALYSIS

The Financial Feasibility Analysis compares the anticipated local share for projects identified in the 10-year CIP with the Airport's ability to fund these projects. A schedule for implementation is identified; however, final financial requirements are contingent on economic conditions, actual aviation-related activity, and other factors. Therefore, the City of Cottonwood is responsible for managing and budgeting of all Airport-generated revenues and expenditures including local matching for Federal and State grants.

The Airport's revenues and expenditures, as well as a comparison of cash flows and local grant matching requirements, are provided in the following sections.

5.5.1. Airport Revenues

Below are descriptions of categorized Airport revenues along with the amount that the City has budgeted for each category in Fiscal Year 2022. Projections of revenues and expenditures developed for the 10-year the Cash Flow Analysis incorporate general assumptions regarding forecast aviation demand at the Airport as well as inflation rates. Total revenues at the Airport in Fiscal Year 2022 amounted to $360,740.

- **Taxes, Fees, and Transfers: 2022 Revenue = $205,815.** Includes sales tax revenues, transfers from the City to pay for capital improvement projects and operating shortages, commercial operating permit, Airport application fees, penalties/late fees, and budget balance carryover.
- **Fueling Revenues (net): 2022 Revenue = N/A.** Includes the net revenues from fuel sales. Value is determined by subtracting the fuel sales expenses from the fuel sales income. In 2020 and part of 2021, the Airport's FBO operated fuel concessions. Starting in 2021, those duties were transferred to the Airport.
- **Building Rental Income (non-hangar): 2022 revenue = $12,000.** Includes revenues for the terminal/admin building and FBO facilities. Although the Airport does not currently have a full-service FBO, it is assumed that another FBO would commence operations in Fiscal Year 2023.
- **Tie-Down, Land Lease, and Hangar Rent: 2022 Revenue = $82,245.** Includes revenues associated with aircraft tie-downs, land lease fees, and City-owned hangar fees.
- **Other Income: 2022 Revenue = $2,000.** Includes miscellaneous revenues not categorized by the City and rent from the FBO building.

5.5.2. Airport Expenditures

Below are descriptions of categorized Airport expenditures along with the amount that the City has budgeted for each category in Fiscal Year 2022. Total expenditures at the Airport in Fiscal Year 2022 amounted to $358,010

Personnel Services: 2022 expenditure = $113,860. Includes employee salaries, benefits, and insurance.

Memberships, Office Expenses, and Marketing Expenses: 2022 expenditures = $11,500. Includes operational equipment and supplies, office supplies, travel/training, subscriptions/memberships, and the Airport's annual event.

Operating and Maintenance Expenses: 2022 expenditures = $54,670. Includes vehicle, building, and equipment maintenance and repair, transfers for grants, furnishing and equipment and Airport improvements (non-capital).

Legal and Support Expenses: 2022 expenditures = $119,940. Includes contractual services, bank charges, computer support, general counsel, liability insurance, indirect costs to the General Fund, and any budget reserves.

5.5.3. Cash Flow Analysis

The cash flow analysis compares forecast Airport revenues and expenditures. The net result is then compared to local grant matching requirements in the 10-year CIP to identify surpluses or deficits. Airport Management provided budget information for Fiscal Year 2022 and the projected budget for Fiscal Year 2023. The cash flow analysis made assumptions to identify estimates of future revenues and expenditures. These assumptions are identified in **Table 5.3**. As noted in the table, *Baseline Fiscal Year* indicates the year from when an annual growth rate or inflation rate was applied. This year is either the actual budget for FY 2022 or the projected budget for FY 2023 to factor for abnormally high or low budgets. Budget items that did not have actual values in FY 2022 or 2023, or that were not anticipated to recur in the 10-year horizon were omitted from the cash flow analysis for future years.

Table 5.3 - Cash Flow Analysis Assumptions

Item	Category	Annual Growth Rate	Baseline Fiscal Year*
Revenues			
Fuel Sales Income (net)***	Fueling Revenues (net)	1.7%	N/A
Tie Down Rent	Tie-Down/Land Lease, Hangar Rent	3.0%	2023
Land Lease Fees	Tie-Down/Land Lease, Hangar Rent	3.0%	2023
City Hangar Lease Fees	Tie-Down/Land Lease, Hangar Rent	3.0%	2023
Other Income	Other Income	3.0%	2022
Expenditures			
Salaries	Personnel Expenditures	3.0%	2023
Social Security	Personnel Expenditures	3.0%	2023
Medicare Tax	Personnel Expenditures	3.0%	2023
AZ State Retirement	Personnel Expenditures	3.0%	2023
Health/Life Insurance	Personnel Expenditures	3.0%	2023
Worker's Compensation	Personnel Expenditures	3.0%	2023
Recreation Membership Benefits	Memberships, Office/Marketing	3.0%	2023
Operational Equipment & Supplies	Memberships, Office/Marketing	3.0%	2023
Office Supplies	Memberships, Office/Marketing	3.0%	2023
Vehicle Maintenance & Repair	O&M Expenditures	3.0%	2023
Equipment Maintenance & Repair	O&M Expenditures	3.0%	2023
Building M&R	O&M Expenditures	3.0%	2023
Contractual Services	Legal/Support Services	3.0%	2023
Bank Charges	Legal/Support Services	3.0%	2023
Computer Support	Legal/Support Services	3.0%	2022
General Counsel	Legal/Support Services	3.0%	2022
Utilities	O&M Expenditures	3.0%	2023
Telephone	O&M Expenditures	3.0%	2023
Travel/Training	Memberships, Office/Marketing	3.0%	2023
Subscriptions/Memberships	Memberships, Office/Marketing	3.0%	2023
Airport Annual Event	Memberships, Office/Marketing	3.0%	2022
Liability Insurance	Legal/Support Services	3.0%	2023
Indirect Cost to General Fund	Legal/Support Services	3.0%	2023
Furnishing & Equipment	O&M Expenditures	3.0%	2022

Sources:

Airport Management, Kimley-Horn 2022.

Notes:

**Baseline Fiscal Year indicates the year from when an annual growth rate or inflation rate was applied. This year is either the actual budget for FY 2022 or the projected budget for FY 2023 to factor for abnormally high or low budgets.*

*** Transfers in includes local grant requirements. The cash flow identifies the amount needed to transfer. As such that amount is calculated in Table 5.5.*

****1.7% growth rate mimics annual growth rate for aircraft operations over 20-year planning horizon. Based on historical data, net airport revenues roughly equate to $2 per aircraft operation. This figure was applied to forecast total operations based on the Airport's operational monitoring system rather than the FAA-approved forecast developed for this Master Plan Update.*

Table 5.4 depicts The Airport's budget for Fiscal Year 2022, anticipated budget for Fiscal Year 2023, and budget estimates for Fiscal Years 2024 through 2032 based on the assumptions identified in **Table 5.3.** It should be noted that local share for capital improvement project grants (Transfer out to Grants) is not calculated for future years. That value is identified in **Table 5.5** as the additional amount the Airport will need to satisfy local grant requirements. As shown in **Table 5.4**, the Airport is anticipated to have slight year-to-year deficits between Fiscal Years 2023-2032 that amount to an overall deficit of $72,400 through the 10-year horizon.

Table 5.5 identifies total Airport revenues, expenditures, and deficits by year based on the 10-year CIP derived from **Table 5.2.** By 2032, it is anticipated that the Airport will have an overall budget deficit of $5,902,265 when local grant match requirements are factored for. It should be noted that several of the projects in the 6–10-year timeframe are anticipated to be privately/locally funded, which is a significant contributing factor to the forecast deficit.

Table 5.4 - 10-Year Airport Cash Flow Analysis

Item	2022 Budget	2023 Budget	2024 Est.	2025 Est.	2026 Est.	2027 Est.	2028 Est.	2029 Est.	2030 Est.	2031 Est.	2032 Est.
Airport Revenues											
Taxes, Fees, and Transfers	$205,815	--	--	--	--	--	--	--	--	--	--
Fueling Revenues (Net)	N/A	$76,400	$77,574	$78,892	$80,233	$81,597	$82,984	$84,166	$85,596	$87,051	$88,531
Building Rental Income (Non-Hangar)	$12,000	$30,000	$30,900	$31,827	$32,782	$33,765	$34,778	$35,822	$36,896	$38,003	$39,143
Tie-Down, Land Lease, and Hangar Rent	$140,925	$174,242	$179,469	$184,853	$190,399	$196,111	$201,994	$208,054	$214,295	$220,724	$227,346
Other Income	$2,000	--	$2,060	$2,122	$2,185	$2,251	$2,319	$2,388	$2,460	$2,534	$2,610
TOTAL REVENUES	$360,740	$280,642	$290,003	$297,694	$305,599	$313,724	$322,074	$330,429	$339,248	$348,312	$357,629
Airport Expenditures											
Personnel Expenditures	$133,860	$155,780	$160,453	$165,267	$170,225	$175,332	$180,592	$186,009	$191,590	$197,337	$203,258
Memberships, Office/ Marketing	$11,500	$14,560	$20,147	$20,751	$21,374	$22,015	$22,675	$23,356	$24,056	$24,778	$25,521
Operating and Maintenance Expenses	$119,940	$71,190	$39,336	$40,516	$41,731	$42,983	$44,273	$45,601	$46,969	$48,378	$49,829
Legal and Support Expenses	$92,710	$84,020	$70,404	$72,066	$73,778	$75,541	$77,357	$79,228	$81,155	$83,140	$85,184
Legal and Support Expenses	$358,010	$325,550	$290,340	$298,600	$307,108	$315,871	$324,897	$334,194	$343,770	$353,633	$363,792
TOTAL EXPENDITURES	$133,860	$155,780	$160,453	$165,267	$170,225	$175,332	$180,592	$186,009	$191,590	$197,337	$203,258
SURPLUS/ (DEFICIT)	$2,730	$(44,908)	$(337)	$(906)	$(1,509)	$(2,147)	$(2,823)	$(3,765)	$(4,522)	$(5,321)	$(6,163)

Sources:
Kimley-Horn, 2022, Airport Management.

Table 5.5 - 10-Year Airport Cash Flow Analysis with Local Grant Requirements

Item	2022 Budget	2023 Budget	2024 Est.	2025 Est.	2026 Est.	2027 Est.	2028 Est.	2029 Est.**	2030 Est.**	2031 Est.**	2032 Est.**
Airport Revenues											
TOTAL REVENUES	$360,740	$280,642	$290,003	$297,694	$305,599	$313,724	$322,074	$330,429	$339,248	$348,312	$357,629
TOTAL EXPENDITURES	$133,860	$155,780	$160,453	$165,267	$170,225	$175,332	$180,592	$186,009	$191,590	$197,337	$203,258
LOCAL GRANT REQUIREMENT	$65,270	$2,440*	$226,698	$21,932	$19,382	$67,931	$621,638	$1,020,536	$1,020,536	$1,020,536	$1,020,536
SURPLUS/ (DEFICIT)	$(62,540)	$(47,348)	$(227,034)	$(22,838)	$(20,891)	$(70,078)	$(624,461)	$(1,024,301)	$(1,024,301)	$(1,024,301)	$(1,024,301)

Sources:
Kimley-Horn, 2022, Airport Management.
Note:
**Estimate based on remaining grant for Airport Master Plan Update.*
***Actual year of CIP projects may vary. 6-10 year local share of $4.696M was averaged between years 2028 through 2032.*

5.5.4. Recommendations

According to the cash flow analysis, the Airport's anticipated revenues are not expected to cover the local match requirements for recommended improvements over the 10-year planning horizon. However, this analysis assumed that all projects in the CIP would be completed by the year 2032. Additionally, Airport revenues and expenditures may fluctuate over time, which could result in occasional funding increases and reduce the amount of reserves that the City would need to allocate in the Airport's budget.

An additional item that has constrained the Airport's ability to generate revenues has been the structure of long-term lease agreements for properties on the east side of the airfield and within the Airport's business park. All leases in these areas have a term length of 100 years, most of which were signed into agreement in 1983. These agreements were extremely favorable for lessees and do not generate revenue for the Airport at or near current fair market values. Discussions have been had about the Airport selling the properties outright, however, the City has identified that it intends to keep those properties and examine options to maximize revenues in other ways.

Generally, the Airport could take certain actions to generate additional revenues to minimize the deficits anticipated to occur within the 10-year horizon. These could include increased tenant lease rates, installation of Jet A fueling facilities that would generate revenues over time, leasing ground for private hangar developments at fair market value rates, developing commercial aviation hangars to support aviation business such as maintenance, avionics, charter, installation of energy-efficient utilities, sale of concessions, or other several other actions.