Forecasts

An important factor when planning the future needs of an airport involves a definition of aviation demand that may reasonably be expected to occur in the near term (5 years), intermediate term (10 years), and long term (20 years). Aviation demand forecasting for Mesquite Metro Airport (HQZ) will primarily consider based aircraft, aircraft operations, and peak activity periods.

The Texas Department of Transportation (TxDOT) has oversight responsibility to review and approve aviation forecasts developed in conjunction with airport planning studies for non-primary airports in Texas. TxDOT reviews individual airport forecasts with the objective of comparing them to the Federal Aviation Administration (FAA) *Terminal Area Forecasts* (TAF) and the *National Plan of Integrated Airport Systems* (NPIAS). Even though the TAF is updated annually, there has almost always been a disparity between the TAF and master planning forecasts, primarily because the TAF forecasts are the result of a top-down model that does not consider local conditions or recent trends. While the FAA forecasts are a point of comparison for master plan forecasts, they also serve other purposes, such as asset allocation by the FAA and TxDOT.

When reviewing a sponsor's forecast from the master plan, TxDOT must ensure that the forecast is based on reasonable planning assumptions, uses current data, and is developed using appropriate forecast methods. As stated in FAA Order 5090.3C, *Field Formulation of the National Plan of Integrated Airport Systems*, forecasts should be:

- Realistic;
- Based on the latest available data;
- Reflective of current conditions at the airport (as a baseline);
- Supported by information in the study; and
- Able to provide adequate justification for airport planning and development.

The forecast process for an airport master plan consists of a series of basic steps that vary in complexity depending on the issues to be addressed and the level of effort required. The steps include a review of previous forecasts; determination of data needs; identification of data sources; collection of data; selection of forecast methods; preparation of the forecasts; and documentation and evaluation of the results. FAA Advisory Circular (AC) 150/5070-6C, *Airport Master Plans*, outlines seven steps involved in the forecast process:

1) **Identify Aviation Activity Measures:** The level and type of aviation activities likely to impact facility needs. For general aviation, this typically includes based aircraft and operations.
2) **Review Previous Airport Forecasts:** May include the FAA TAF, state or regional system plans, and previous master plans.
3) **Gather Data:** Determine what data are required to prepare the forecasts, identify data sources, and collect historical and forecast data.
4) **Select Forecast Methods:** Several appropriate methodologies and techniques are available, including regression analysis; trend analysis; market share or ratio analysis; exponential smoothing; econometric modeling; comparison with other airports; survey techniques; cohort analysis; choice and distribution models; range projections; and professional judgement.
5) **Apply Forecast Methods and Evaluate Results:** Prepare the actual forecasts and evaluate for reasonableness.
6) **Summarize and Document Results:** Provide supporting text and tables, as necessary.
7) **Compare Forecast Results with the FAA's TAF:** Based aircraft and total operations are considered consisted with the TAF if they meet one of the following criteria:
    - Forecasts differ by less than 10 percent in the five-year forecast period and less than 15 percent in the 10-year forecast period;
    - Forecasts do not affect the timing or scale of an airport project; or
    - Forecasts do not affect the role of the airport as defined in the current version of FAA Order 5090.3, *Field Formulation of the National Plan of Integrated Airport Systems.*

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

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

The forecasts for this master plan will utilize a base year of 2023 with a long-range forecast out to 2043.

NATIONAL AVIATION TRENDS

Each year, the FAA updates and publishes a national aviation forecast. Included in this publication are forecasts for large air carriers, regional/commuter air carriers, general aviation, and FAA workload measures. The forecasts are prepared to meet the budget and planning needs of the FAA and provide information that can be used by state and local authorities, the aviation industry, and the general public. The current edition upon preparation of this chapter was *FAA Aerospace Forecast – Fiscal Years 2023-2043*, published in May 2023. The FAA primarily uses the economic performance of the United States as an indicator of future aviation industry growth. Similar economic analyses are applied to the outlook for aviation growth in international markets. The following discussion is summarized from the *FAA Aerospace Forecast*.

Since its deregulation in 1978 and the Great Recession of 2007-2009, the U.S. commercial air carrier industry has been characterized by boom-to-bust cycles. The volatility associated with these cycles was thought by many to be a structural feature of an industry that was capital intensive but cash poor; however, the Great Recession of 2007-2009 marked a fundamental change in the operations and finances of U.S. airlines. Since the end of the recession in 2009, U.S. airlines have revamped their business models to minimize losses by lowering operating costs, eliminating unprofitable routes, and grounding older, less fuel-efficient aircraft. To increase operating revenues, carriers initiated new services that customers were willing to purchase and started charging separately for services that were historically bundled in the price of a ticket. The industry experienced an unprecedented period of consolidation, with three major mergers occurring within five years. The results of these efforts were impressive: 2019 marked the eleventh consecutive year of profitability for the U.S. airline industry.

The COVID-19 pandemic in 2020 effectively ended those boom years, with airline activity and profitability plummeting almost overnight. In response, airlines cut capacity and costs, and most were able to weather the storm. Some small regional carriers ceased operations as a result of the pandemic, but no mainline carriers did. Some segments of aviation were less impacted: cargo activity surged, boosted by consumer purchases, and general aviation generally maintained pre-pandemic levels of activity. By the middle of 2021, leisure travel began to rebound with the introduction of vaccines and the lifting of some local restrictions. Two new low-cost carriers were formed and one regional carrier that had ceased operations in 2020 was revived. By the third quarter of 2021, industry profitability neared the breakeven point, and by the end of 2022, U.S. airlines reported that business demand had recovered to 70-80 percent of pre-pandemic levels. Higher fares accompanied the strong rebound in leisure demand, leading to positive financial results. The top nine U.S. passenger carriers posted operating and net profits, proving strong success for the new business models air carriers have been utilizing to weather the pandemic.

The business changes airlines implemented due to the pandemic will shape the industry long after recovery is complete. Airlines retired older, less fuel-efficient aircraft and encouraged voluntary employee separations. This has led to airlines seeking newer aircraft investments while meeting the current demand for the rebuilding of business and international travel, which has lagged behind leisure traffic during the recovery. There is confidence that U.S. airlines can generate solid returns on capital and sustained profits; however, over the long term, aviation demand will be driven by economic activity as the growing U.S. and world economies provide the basis for aviation to grow.

ECONOMIC ENVIRONMENT

According to the FAA forecast, the annual gross domestic product (GDP) of the U.S. is expected to increase by 1.8 percent over the next 20 years. U.S. carriers posted an unexpected profit in 2022, and the FAA expects carriers to remain profitable over the next few years as demand rises, despite higher fares which offset the raised labor and fuel costs. As yields stabilize and carriers return to levels of capacity consistent with their fixed costs and shed excess debt, consistent profitability should continue. Over the long term, we see a competitive and profitable aviation industry characterized by increasing demand for air travel, and airfares growing more slowly than overall inflation, reflecting growing U.S. and global economies.

Prior to the COVID-19 pandemic, the U.S. economy was recovering from the most serious economic downturn and slow recovery since the Great Depression. Demand for aviation is fundamentally driven by economic activity; as economic growth picks up, so will growth in aviation activity. Overall, the FAA forecast calls for annual passenger growth over the next 20 years to average 2.7 percent. Oil prices surged to $93 per barrel in 2022 – largely due to the Russian invasion of Ukraine – after averaging $55 per barrel over the five-year period from 2016 to 2021. Prices are expected to ease over the next two years before slowly climbing to $113 per barrel by the end of the forecast period in 2043.

FAA GENERAL AVIATION FORECASTS

The long-term outlook for general aviation (GA) is promising, as growth at the high end of the segment offsets continuing retirements at the traditional low end. The active general aviation fleet is forecast to remain relatively stable between 2023 and 2043, increasing by just 0.2 percent. While steady growth in both GDP and corporate profits results in continued growth of the turbine and rotorcraft fleets, the largest segment of the fleet – fixed-wing piston aircraft – continues to shrink over the forecast period.

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

TABLE 2A | FAA General Aviation Forecast

Demand Indicator	2023	2043	CAGR
General Aviation Fleet			
Total Fixed-Wing Piston	136,290	118,975	-0.7%
Total Fixed-Wing Turbine	26,645	39,740	2.0%
Total Helicopters	10,320	13,870	1.5%
Total Other (experimental, light sport, etc.)	35,840	43,810	1.0%
Total GA Fleet	**209,095**	**216,395**	**0.2%**
General Aviation Operations			
Local	14,801,816	16,622,293	0.6%
Itinerant	15,077,947	16,704,132	0.5%
Total General Aviation Operations	**29,879,763**	**33,326,425**	**0.5%**
CAGR = Compound Annual Growth Rate (2023-2043)			

Source: FAA Aerospace Forecast – FY 2023-2043

General Aviation Fleet Mix

For 2023, the FAA estimates there are 136,290 piston-powered fixed-wing aircraft in the national fleet. That number is forecast to decline by 0.7 percent by 2043, resulting in 118,975 aircraft. This includes a decline of 0.7 percent in SEP aircraft and a decline of 0.2 percent in MEP aircraft.

Total turbine aircraft are forecast to grow at an annual rate of 2.0 percent through 2043. The FAA estimates there are 26,645 fixed-wing turbine-powered aircraft in the national fleet in 2023 and there will be 39,740 by 2043. Turboprops are forecast to grow by 0.8 percent annually, while business jets are projected to grow by 2.7 percent annually through 2043.

Total helicopters are projected to grow by 1.5 percent annually in the forecast period. There are an estimated 10,320 total helicopters in the national fleet in 2023, and that number is expected to grow to a total of 13,870 by 2043. This includes annual growth rates of 0.5 percent for piston helicopters and 1.8 percent for turbine helicopters.

The FAA also forecasts experimental aircraft, light sport aircraft (LSA), and others. Combined, there are an estimated 35,840 other aircraft in 2023 that are forecast to grow to 43,810 by 2043, for an annual growth rate of 1.0 percent.

General Aviation Operations

The FAA also forecasts total operations based on activity at control towers across the United States. Operations are categorized as air carrier, air taxi/commuter, general aviation, and military. While the fleet size remains relatively level, the number of general aviation operations at towered airports is projected to increase from 29.9 million in 2023 to 33.3 million in 2043, with an average increase of 0.5 percent per year as growth in turbine, rotorcraft, and experimental hours offsets a decline in fixed-wing piston hours. This includes annual growth rates of 0.6 percent for local general aviation operations and 0.5 percent for itinerant general aviation operations. **Exhibit 2A** presents the historical and forecast U.S. active general aviation aircraft and operations.

General Aviation Aircraft Shipments and Revenue

On an annual basis, the General Aviation Manufacturers Association (GAMA) publishes an aviation industry outlook that documents past and current trends and provides an assessment of the future condition of the general aviation industry. **Table 2B** presents historical data related to general aviation aircraft shipments.

Worldwide shipments of general aviation airplanes increased in the year 2022, with a total of 2,818 units delivered around the globe, compared to 2,646 units in 2021 – the second year in a row to experience an increase after the drop during 2020, when only 2,408 units were delivered. Worldwide general aviation billings were the highest in 2014. In 2022, an increase in new aircraft shipments generated more than $22 billion, compared to $21.6 billion in the previous year. North America continues to be the

largest market for general aviation aircraft and leads in the manufacturing of piston, turboprop, and jet aircraft. The Asia-Pacific region is the second largest market for piston-powered aircraft, while Latin America is the second leading in the turboprop market. Europe leads in business jet deliveries.

TABLE 2B | Annual General Aviation Airplane Shipments

Manufactured Worldwide and Factory Net Billings						
Year	Total	SEP	MEP	TP	J	Net Billings ($ million)
2002	2,677	1,591	130	280	676	11,778
2003	2,686	1,825	71	272	518	9,998
2004	2,962	1,999	52	319	592	12,093
2005	3,590	2,326	139	375	750	15,156
2006	4,054	2,513	242	412	887	18,815
2007	4,277	2,417	258	465	1,137	21,837
2008	3,974	1,943	176	538	1,317	24,846
2009	2,283	893	70	446	874	19,474
2010	2,024	781	108	368	767	19,715
2011	2,120	761	137	526	696	19,042
2012	2,164	817	91	584	672	18,895
2013	2,353	908	122	645	678	23,450
2014	2,454	986	143	603	722	24,499
2015	2,331	946	110	557	718	24,129
2016	2,268	890	129	582	667	21,092
2017	2,324	936	149	563	676	20,197
2018	2,441	952	185	601	703	20,515
2019	2,658	1,111	213	525	809	23,515
2020	2,408	1,164	157	443	644	20,048
2021	2,646	1,261	148	527	710	21,603
2022	2,818	1,366	158	582	712	22,866

SEP = Single-Engine Piston
MEP = Multi-Engine Piston
TP = Turboprop
J = Jet

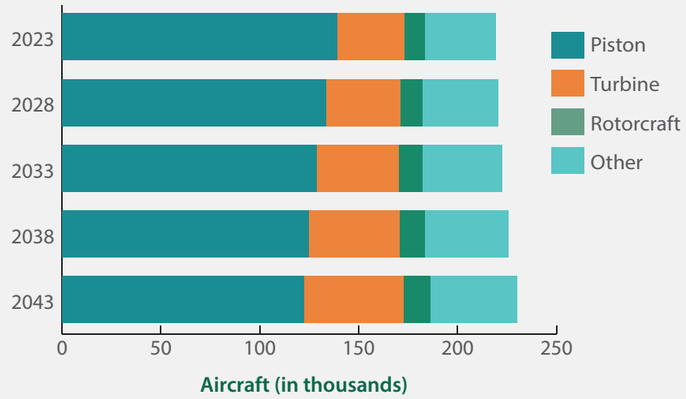
Source: General Aviation Manufacturers Association (GAMA) 2022 Annual Report

Business Jets | Business jet deliveries increased from 710 units in 2021 to 712 units in 2022. The North American market accounted for 67.6 percent of business jet deliveries, which is a 1.7 percent increase in market share compared to 2021.

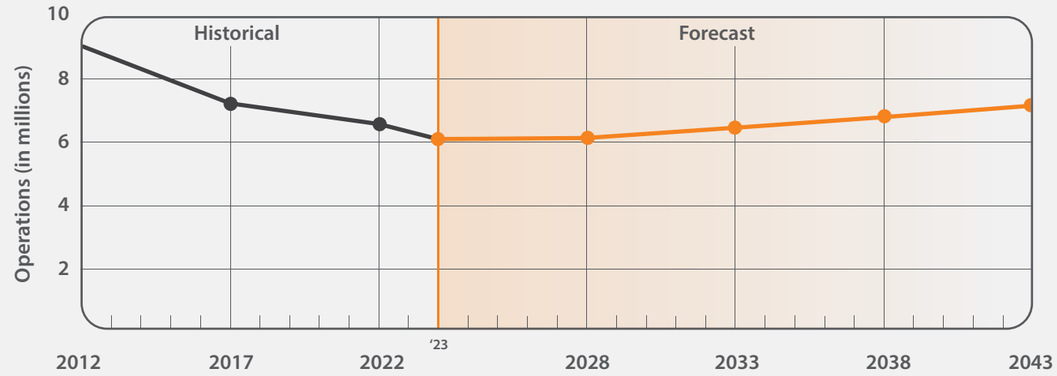
Turboprops | Turboprop shipments increased from 527 in 2021 to 582 in 2022. North America's market share of turboprop aircraft increased by 3.1 percent in the last year. The European, Middle East and Africa, and Asia-Pacific market shares decreased, while the market share of Latin American markets increased.

Pistons | In 2022, piston airplane shipments increased to 1,524 units from 1,409 units in the prior year. North America's market share of piston aircraft deliveries rose 1.2 percent from the year 2021. The European, Latin American, and Middle East and Africa regions experienced a positive rate in market shares during the past year, while the Asia-Pacific market saw a decline.

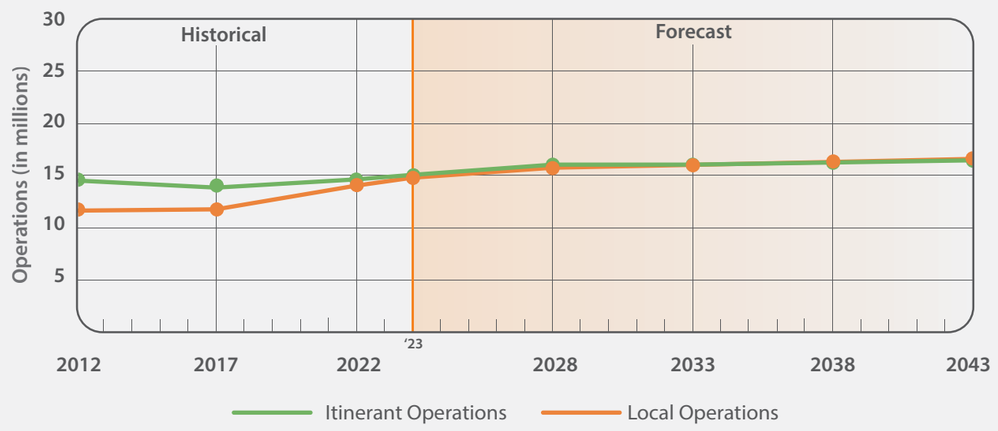
U.S. Active General Aviation Aircraft



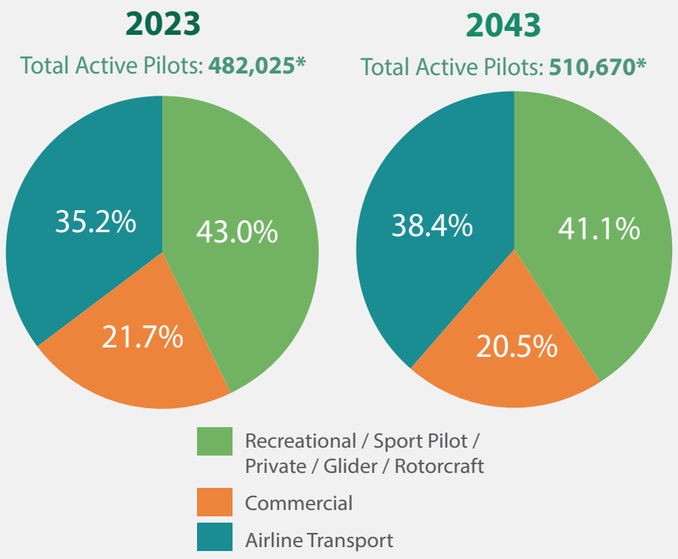
U.S. Air Taxi Operations



U.S. General Aviation Operations



Active Pilots By Certificate



*Excludes Student Pilot Certificates

Source: FAA Aerospace Forecasts FY2022-2042

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U.S. PILOT POPULATION

There were 476,346 active pilots certificated by the FAA at the end of 2022, with 482,025 active pilots projected in 2023. All pilot categories – except private and recreational-only certificates – are expected to continue to increase for the forecast length. Excluding student pilots, the number of active pilots is projected to increase by about 28,645 (up 0.3 percent annually) between 2023 and 2043. The airline transport pilot (ATP) category is forecast to increase by 26,200 (up 0.7 percent annually). Sport pilots are predicted to increase by 2.5 percent and commercial pilots will remain steady over the forecast period, while private pilot certificates are projected to decrease at an average annual rate of 0.2 percent through 2043. The FAA has currently suspended the student pilot forecast.

RISKS TO THE FORECAST

While the FAA is confident that its forecasts for aviation demand and activity can be reached, they are dependent on several factors, including the strength of the global economy, security (including the threat of international terrorism), and oil prices. Higher oil prices could lead to further shifts in consumer spending away from aviation, dampening a recovery in air transport demand. The COVID-19 pandemic introduced a new risk, and although the industry has rebounded, the threat of future global health emergencies and potential economic fallout remains.

AIRPORT SERVICE AREA

The initial step in determining the aviation demand for an airport is to define its generalized service area for various segments of aviation. The service area is primarily defined by evaluating the locations of competing airports and their capabilities, services, and relative attraction and convenience. In determining the aviation demand for an airport, it is necessary to identify the role of the airport, as well as the specific areas of aviation demand the airport is intended to serve. HQZ is classified as a reliever airport within the NPIAS, meaning that its main purposes are to relieve congestion at local commercial service airports, such as Dallas/Fort Worth International Airport (DFW) and Dallas Love Field (DAL), and to provide more general aviation access to the overall community.

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

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

As a rule, a general aviation airport's service area typically extends for approximately 30 nautical miles (nm). There are 21 public-use airports within the 30-mile range of HQZ, 13 of which are included within the NPIAS. The remaining eight public-use airports within the 30-mile range of HQZ provide local economic benefits and general aviation services to the area but do not qualify as NPIAS airports and, therefore, are not eligible to receive federal grants through the *Airport Improvement Program*. It should be noted that of the 13 NPIAS airports, only public-use airports with at least 5,000 feet of runway length have been included in this analysis. This brings the number of NPIAS airports within 30 nautical miles to nine. Two airports are classified as primary commercial service airports: DAL and DFW. The remaining seven airports all offer similar or competing amenities to HQZ, but only one provides lower instrument approach minimums than HQZ, that being McKinney International Airport (TKI). **Table 2C** provides a summary of the NPIAS airports within 30 nautical miles of HQZ having a runway length greater than 5,000 feet.

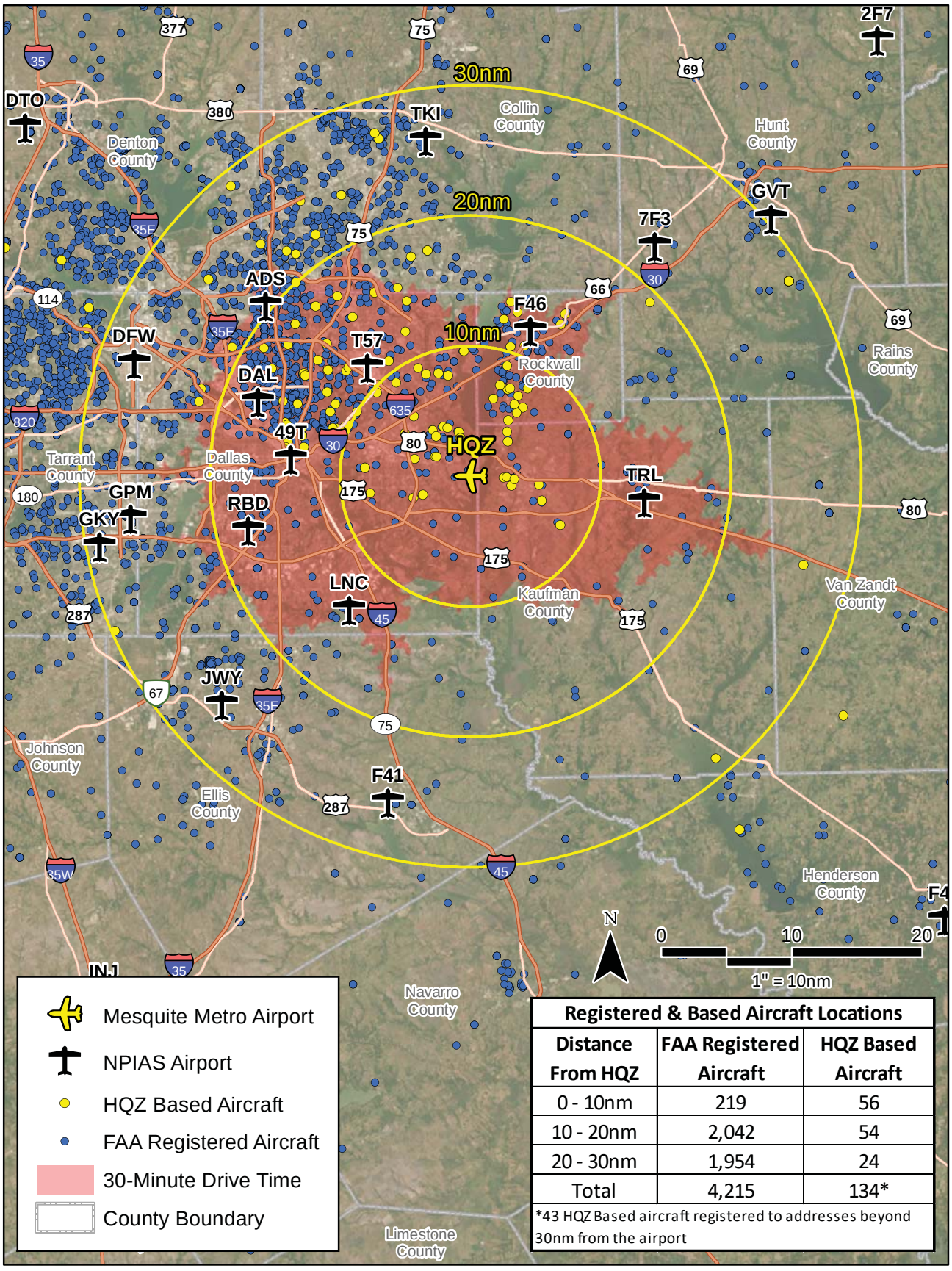
TABLE 2C | Regional Airports within 30 Nautical Miles of Mesquite Metro Airport

Airport	Distance/Direction from HQZ[1]	FAA Service Level[2]	Towered	Based Aircraft[3]	2022 Annual Operations[4]	Longest Runway[1]	Visibility Minimum[1]
Mesquite Metro Airport (HQZ)	–	Reliever	Yes	181	108,057	6,000′	¾-mile
Terrell Municipal Airport (TRL)	13.5 nm E	GA	No	81	33,650[1]	5,006′	¾-mile
Lancaster Regional Airport (LNC)	13.9 nm SW	Reliever	No	69	67,100[1]	6,500′	¾-mile
Dallas Love Field Airport (DAL)	17.2 nm WNW	Primary	Yes	283	230,529	8,800′	½-mile
Dallas Executive Airport (RBD)	17.5 WSW	Reliever	Yes	360	88,466	7,136′	¾-mile
Addison Airport (ADS)	20.4 nm NW	Reliever	Yes	573	120,256	7,203′	1-mile
Mid-Way Regional Airport (JWY)	25.9 nm SW	GA	No	80	49,700[1]	6,500′	¾-mile
McKinney International Airport (TKI)	26.0 nm N	Reliever	Yes	210	142,001	7,002′	½-mile
Dallas/Fort Worth International Airport (DFW)	27.1 nm WNW	Primary	Yes	0	656,676	13,401′	½-mile
Arlington Municipal Airport (GKY)	28.9 nm W	Reliever	Yes	200	133,301	6,080′	¾-mile

GA = General Aviation
nm = nautical mile

Sources:
[1] Airnav.com; FAA Form 5010, Airport Master Record
[2] FAA NPIAS
[3] basedaircraft.com; FAA-validated counts
[4] Annual operations are derived from FAA OPSNET unless otherwise noted.

When evaluating the GA service area, two primary demand segments must be considered: based aircraft and itinerant operations. An airport's ability to attract based aircraft is an important factor when defining the service area, with proximity being a consideration for most aircraft owners. Aircraft owners typically choose to base at airports that are close to their homes or businesses. **Exhibit 2B** depicts a radius of 10, 20, and 30 nautical miles from HQZ extending beyond Dallas and Kaufman Counties and into neighboring Rockwall, Collin, Denton, Tarrant, Ellis, Henderson, Van Zandt, and Hunt counties. Registered aircraft in the region and aircraft based at HQZ are also shown on the exhibit, with large clusters of registered aircraft located in the Dallas-Fort Worth Metroplex and near other local airports, such as Lancaster Regional Airport (LNC); Dallas Executive Airport (RBD); Addison Airport (ADS); McKinney International Airport (TKI); Arlington Municipal Airport (GKY); and beyond. In total, there are 4,215 aircraft registered within a 30-nm radius of HQZ. The airport has an FAA-validated based aircraft count of 181 aircraft, 74 percent of which are attributed to addresses within 30 nm of the airport.



Registered & Based Aircraft Locations		
Distance From HQZ	FAA Registered Aircraft	HQZ Based Aircraft
0 - 10nm	219	56
10 - 20nm	2,042	54
20 - 30nm	1,954	24
Total	4,215	134*

*43 HQZ Based aircraft registered to addresses beyond 30nm from the airport

The second demand segment to consider Is itinerant operations. These are operations that are performed by aircraft that arrive from outside the airport area and land at or depart from HQZ for another airport. In most cases, pilots will use airports nearer their intended destinations; however, this is dependent on the airport's ability to accommodate aircraft operators in terms of the facility and services available. As a result, airports with better facilities and services are more likely to attract a larger portion of the region's itinerant operations.

When compared to other public-use airports in the region, HQZ offers similar amenities, such as maintenance and aircraft storage. Four of the reliever airports within the 30-nm radius of HQZ have control towers and longer runways: Dallas Executive (RBD), Addison (ADS), McKinney International (TKI), and Arlington Municipal (GKY) Airports. McKinney International Airport (TKI) is the only reliever airport within the 30-nm radius that offers better instrument approach minimums than HQZ. The instrument approach minimums provided by HQZ are the same as LNC, RBD, and GKY but are better than ADS. The location of HQZ provides better access to the City of Mesquite, Dallas and Kaufman Counties, and the eastern portion of the Dallas-Fort Worth Metroplex than many other competing airports. The distribution of HQZ based aircraft also shows that most are concentrated within Dallas, Kaufman, and Rockwall Counties. For these reasons, and for the purposes of this study, the primary service area of HQZ includes the entirety of Dallas, Kaufman, and Rockwall Counties.

FORECASTING APPROACH

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

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

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

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

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

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

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

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

- Based Aircraft
- Based Aircraft Fleet Mix
- General Aviation Operations
- Air Taxi and Military Operations
- Operational Peaks

The following forecast analyses examine each of these aviation demand categories expected at HQZ over the next 20 years. Each segment will be examined individually and collectively to provide an understanding of the overall aviation activity at the airport through 2043.

EXISTING FORECASTS

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

FAA *TERMINAL AREA FORECAST* (TAF FEBRUARY 2023)

On an annual basis, the FAA publishes the TAF for each airport included in the *National Plan of Integrated Airport Systems* (NPIAS). The TAF is a generalized forecast of airport activity that is used by the FAA primarily for internal planning purposes. It is available to airports and consultants to use as a baseline projection and is an important point of comparison when developing local forecasts. The current TAF was published in February 2023.

Table 2D presents the 2023 TAF for HQZ. It is important to note that the TAF based aircraft count is higher than the current FAA-validated count from the based aircraft registry. The TAF reflects 187 based aircraft, while the registry reflects 181 FAA-validated based aircraft. The total operations count used in the TAF notes 1,704 fewer operations than the count reported by the HQZ airport traffic control tower (ATCT); the tower reported 109,617 operations for the most recent 12-month period ending in September 2023. Once the forecasts presented in this chapter are approved by the FAA, the FAA could update the TAF to reflect the selected forecasts.

TABLE 2D | 2023 FAA Terminal Area Forecast

	2023	2028	2033	2043	CAGR 2023-2043
ANNUAL OPERATIONS					
Itinerant					
Air Carrier	0	0	0	0	0.00%
Air Taxi	1,910	1,910	1,910	1,910	0.00%
General Aviation	27,082	27,424	27,770	28,475	0.25%
Military	95	95	95	95	0.00%
Total Itinerant	***29,087***	***29,429***	***29,775***	***30,480***	***0.23%***
Local					
General Aviation	78,640	82,650	86,865	95,951	1.00%
Military	186	186	186	186	0.00%
Total Local	***78,826***	***82,836***	***87,051***	***96,137***	***1.00%***
Total Operations	***107,913***	***112,265***	***116,826***	***126,617***	***0.80%***
BASED AIRCRAFT					
Based Aircraft	***187***	***187***	***187***	***187***	***0.00%***

Source: FAA Terminal Area Forecast (TAF), May 2021

The TAF for HQZ shows total operations increasing from 107,913 annually to 126,617 by 2043 for a compound annual growth rate (CAGR) of 0.80 percent. General aviation itinerant and local operations are projected to grow at 0.25 percent and 1.00 percent CAGRs, respectively. Air carrier activity, which includes large aircraft with 60 or more passenger seats, is projected to remain at zero operations through the planning period. Air taxi and military operations show flat-line projections. The TAF also projects that based aircraft will remain at 187 through 2043.

GENERAL AVIATION FORECASTS

General aviation (GA) encompasses all portions of civil aviation except commercial service and military operations. To determine the types and sizes of facilities that should be planned to accommodate general aviation activity at HQZ, certain elements of this activity must be forecast. These indicators of general aviation demand include based aircraft, aircraft fleet mix, and annual operations.

The number of based aircraft is the most basic indicator of general aviation demand. By first developing a forecast of based aircraft for the airport, other demand indicators can be projected. The process of developing forecasts of based aircraft begins with an analysis of aircraft ownership in the primary general aviation service area through a review of historical aircraft registrations. An initial forecast of registered aircraft is developed and will be used as one data point to arrive at a based aircraft forecast for the airport.

BASED AIRCRAFT FORECAST

Forecasts of based aircraft may directly influence needed facilities and applicable design standards. The needed facilities may include hangars, aprons, taxilanes, etc. The applicable design standards may include separation distances and object clearing surfaces. The size and type of based aircraft are also an important consideration; the addition of numerous small aircraft may have no effect on design standards, while the addition of a few larger business jets can have a substantial impact on applicable design standards.

Because of the numerous variables known to influence aviation demand, several separate forecasts of based aircraft are developed. Each forecast is then examined for reasonableness and any outliers are discarded or given less weight. Collectively, the remaining forecasts will create a planning envelope. A single planning forecast is then selected for use in developing facility needs for the airport. The selected forecast of based aircraft can be one of the forecasts developed, based on the experience and judgement of the forecaster, or it can be a blend of the forecasts.

Based Aircraft Inventory

Documentation of the historical number of based aircraft at the airport has been somewhat intermittent. The FAA did not require airports to report based aircraft numbers until recently, with the establishment of a based aircraft inventory in which it is possible to cross-reference based aircraft claimed by one airport with other airports. The FAA is now utilizing this based aircraft inventory as a baseline for determining how many and what type of aircraft are based at any individual airport. This database evolves daily as aircraft are added or removed. It is the responsibility of the sponsor (owner) of each airport to input based aircraft information into the FAA database (www.basedaircraft.com).

Airport staff have undertaken a comprehensive physical count and submitted the count to the FAA for validation. The most recent validation of based aircraft at HQZ occurred on October 18, 2023, and identified 181 validated based aircraft. Of the validated based aircraft, there are 147 single-engine piston aircraft, 16 multi-engine piston aircraft, 7 turboprop aircraft, 10 business jets, and 1 helicopter.

Registered Aircraft Forecast

Aircraft ownership trends for the primary service area (Dallas, Kaufman, and Rockwall Counties) typically dictate based aircraft trends for an airport. As such, a forecast of registered aircraft for the primary service area is developed for use as an input to the subsequent based aircraft forecast.

In addition to the projections summarized below, several regressions were also prepared which considered independent variables, including population, income, and employment. None of the resulting regressions produced an r^2 value greater than 0.70, indicating poor correlation; therefore, the regressions were not included in the discussion to follow.

Table 2F presents the history of registered aircraft in the service area from 2013 through 2023. These figures are derived from the FAA aircraft registration database, which categorizes registered aircraft by county based on the zip code of the registered aircraft. Although this information generally provides a correlation to based aircraft, it is not uncommon for some aircraft to be registered in one county but based at an airport outside the county, or vice versa.

TABLE 2F | Registered Aircraft Fleet Mix in Dallas, Kaufman, and Rockwall Counties, Texas

Year	SEP	MEP	TP	Jet	H	Other*	UAV	Total
2013	1,371	187	114	354	170	81	0	2,277
2014	1,327	186	114	294	164	85	0	2,170
2015	1,462	213	115	292	171	83	11	2,347
2016	1,477	206	119	262	160	76	33	2,333
2017	1,437	197	103	304	131	67	39	2,278
2018	1,345	168	108	288	132	54	37	2,132
2019	1,349	153	108	312	134	52	26	2,134
2020	1,312	151	112	291	125	46	15	2,052
2021	1,295	154	105	309	129	43	15	2,050
2022	1,280	142	122	374	169	41	7	2,135
2023	1,296	135	118	384	118	41	7	2,099
10-year % Change	**-5.47%**	**-27.81%**	**3.51%**	**8.47%**	**-30.59%**	**-49.38%**	**--**	**-7.82%**
						Compound Annual Growth Rate (CAGR) from 2013 to 2023:		**-0.81%**

SEP = Single-Engine Piston
MEP = Multi-Engine Piston
TP = Turboprop
H = Helicopter
UAV = Unmanned Aerial Vehicle
*Other includes gliders, ultralights, experimental aircraft

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

Over the 10-year period, aircraft registrations in the service area have declined from 2,277 in 2013 to 2,099 in 2023, a decrease of 7.82 percent. The fleet mix breakout shows that single-piston aircraft, which account for most registered aircraft, have dropped by the largest total number of aircraft. The other category, which includes gliders, ultralights, and balloons, has dropped by the largest percentage (49.38 percent). Jets, turboprops, and unmanned aerial vehicles (UAV/drones) are the only categories with growth over the 10-year period. Jets grew from 354 aircraft in 2013 to 384 in 2023. Drones were not included as a separate category until 2015, with 11 registered aircraft, and the number has fluctuated

over nine years, ending with seven aircraft registered in 2023. Like most areas of the country, the decline in registered aircraft since 2013 is partially attributable to two primary factors: the impact of the 2007-2009 recession and the FAA's re-registration process, which took place between 2010 and 2013. Now that the number of registered aircraft within the service area has been identified, several projections of future registered aircraft are considered for the 20-year planning horizon.

Trend Line/Historical Growth Rate Projection

Utilizing the last 10 years of registered aircraft data, a trend line projection was completed. This resulted in 1,585 registered aircraft by 2043 (-1.39% CAGR). A five-year trend was also prepared, which eliminates years (2013-2014) when there were lingering fluctuations due to the FAA changing aircraft registration requirements. The five-year trend line projection results in 1,994 registered aircraft by 2043 (-0.26% CAGR).

Over the last five years, the number of registered aircraft in the service area has a CAGR of -0.31 percent. By applying this CAGR to the current number of registered aircraft, a forecast emerges that results in 1,972 by 2043.

Share of U.S. Active General Aviation Aircraft

The service area's 2,099 registered aircraft in 2023 represents approximately 1.004 percent of the U.S. active general aviation fleet of aircraft. If the service area maintained a constant market share, it would result in 2,172 registered aircraft by 2043 (0.17% CAGR). Given that the service area's market share of registered aircraft has been as high as 1.139 percent in 2013, an increasing market share projection that considers a return to the higher range of the historical market share was prepared. The increasing projection rises to the 10-year average market share of 1.048 percent, which results in registered aircraft growing to 2,267 by 2043 (0.39% CAGR). The market share of U.S. active general aviation aircraft projections is included in **Table 2G**.

TABLE 2G | Registered Aircraft Projections – Market Share of U.S. Active GA Aircraft

Year	Registered Aircraft	U.S. Active GA Aircraft	% of U.S. Active GA Aircraft
2013	2,277	199,927	1.139%
2014	2,170	204,408	1.062%
2015	2,347	210,031	1.117%
2016	2,333	211,794	1.102%
2017	2,278	211,757	1.076%
2018	2,132	211,749	1.007%
2019	2,134	210,981	1.011%
2020	2,052	204,140	1.005%
2021	2,050	209,194	0.980%
2022	2,135	209,140	1.021%
2023	2,099	209,095	1.004%
Constant Market Share			
2028	2,103	209,510	1.004%
2033	2,113	210,455	1.004%
2043	2,172	216,395	1.004%
Increasing Market Share			
2028	2,126	209,510	1.015%
2033	2,159	210,455	1.026%
2043	2,267	216,395	1.048%

Sources: FAA Aerospace Forecast, 2023-2043; Coffman Associates analysis

Share of Texas Based Aircraft

For the purposes of this forecast, consideration was also given to the ratio of service area registered aircraft compared to the total number of based aircraft, both historically and forecasted by the FAA to be in the State of Texas. This was done due to the expected growth in based aircraft numbers at the state level, as opposed to the general declining historical trend of national registrations. The service area's 2,099 registered aircraft count in 2023 represents approximately 17.13 percent of all based aircraft in Texas. If the service area maintained this market share, it would result in 2,587 aircraft by 2043 (1.05% CAGR). An additional growth forecast was prepared based on average historical levels of registered aircraft. This results in a total service area aircraft count of 2,702 by 2043 (1.27% CAGR). **Table 2H** shows the market share of the service area compared to Texas totals.

TABLE 2H | Registered Aircraft Projections – Market Share of Texas Based Aircraft

Year	Registered Aircraft	Texas Based Aircraft	% of Total Texas Based Aircraft
2013	2,277	11,835	19.240%
2014	2,170	12,279	17.672%
2015	2,347	11,865	19.781%
2016	2,333	13,065	17.857%
2017	2,278	12,416	18.347%
2018	2,132	12,920	16.502%
2019	2,134	11,968	17.831%
2020	2,052	11,600	17.690%
2021	2,050	11,977	17.116%
2022	2,135	12,121	17.614%
2023	2,099	12,251	17.133%
Constant Market Share			
2028	2,206	12,877	17.133%
2033	2,323	13,559	17.133%
2043	2,587	15,102	17.133%
Increasing Market Share			
2028	2,231	12,877	17.322%
2033	2,374	13,559	17.511%
2043	2,702	15,102	17.889%

Sources: Texas TAF, February 2023; Coffman Associates analysis

Ratio of Registered Aircraft to Population

The number of registered aircraft in an area often fluctuates based upon population trends. In 2023, the service area had 0.72 registered aircraft per 1,000 residents. Over the past 10 years, this ratio has decreased due to a growing population and a decline in total registered aircraft. Two projections have been prepared: one based on maintaining the current ratio constant over the forecast period, and an increasing ratio which returns to the 10-year historical high of 0.85. Maintaining the constant ratio (0.72) through 2043 results in 2,438 registered aircraft (0.75% CAGR). The increasing ratio projection results in 2,896 registered aircraft by 2043 (1.62% CAGR).

Registered Aircraft Forecast Summary

Table 2J summarizes the nine registered aircraft forecasts for the HQZ primary service area. Three of the nine forecasts resulted in a declining CAGR, which is not an unreasonable scenario based on recent history; however, three years have seen growth in registrations since the end of 2013, which is when the effects of the FAA's new aircraft registration requirements were most greatly felt. Registrations are also up from 10-year lows experienced during the COVID-19 pandemic. This provides some confidence that aircraft registrations may be stabilizing with potential to grow in the future, assuming population growth occurs as

forecast and economic conditions improve and grow. For this reason, as well as the projected rise in registered aircraft throughout the state, the constant percentage of Texas based aircraft forecast will be carried forward as the selected forecast. This modestly optimistic forecast results in 2,206 registered aircraft in 2028; 2,323 in 2033; and 2,587 in 2043.

TABLE 2J | Registered Aircraft Forecast Summary

Projection	2028	2033	2043	CAGR 2023-2043
5-Year Trend Line	2,065	2,041	1,994	-0.26%
5-Year Growth Rate	2,067	2,035	1,972	-0.31%
10-Year Trend Line	2,015	1,935	1,784	-0.81%
Constant % of U.S. Active	2,103	2,113	2,172	0.17%
Increasing % of U.S. Active	2,126	2,159	2,267	0.39%
Constant % of TX Based	**2,206**	**2,323**	**2,587**	**1.05%**
Increasing % of TX Based	2,231	2,374	2,702	1.27%
Constant AC/1000 Population	2,191	2,278	2,438	0.75%
Increasing AC/1000 Population	2,294	2,492	2,896	1.62%

Boldface indicates selected forecast.
CAGR = Compound Annual Growth Rate

Source: Coffman Associates analysis

Based Aircraft Market Share of Registered Aircraft Forecast

Utilizing the forecast of registered aircraft in HQZ's primary service area, a market share forecast of based aircraft at HQZ has been developed. In 2023, the 181 based aircraft at HQZ represented 8.62 percent of the aircraft registered in the service area. By maintaining this market share as a constant through the planning years, a forecast emerges resulting in 223 based aircraft by 2043 (1.05% CAGR). An evaluation of historical based aircraft indicated that HQZ's market share has fluctuated over time but has generally increased over the past 10 years; therefore, an increasing market share projection was also prepared with the assumption that this 10-year growth rate would continue to the point that HQZ's market share would reach 9.32 percent of service area registrations. This increasing market share projection results in 241 based aircraft by 2043 (1.44% CAGR). **Table 2K** presents the two market share projections.

TABLE 2K | Based Aircraft Market Share of Registered Aircraft Forecast

Year	HQZ Based Aircraft	Service Area Registered Aircraft	HQZ Market Share %
2013	186	2,277	8.17%
2014	182	2,170	8.39%
2015	178	2,347	7.58%
2016	177	2,333	7.59%
2017	170	2,278	7.46%
2018	167	2,132	7.83%
2019	191	2,134	8.95%
2020	180	2,052	8.77%
2021	185	2,050	9.02%
2022	186	2,135	8.71%
2023	181	2,099	8.62%
Constant Market Share			
2028	190	2,206	8.62%
2033	200	2,323	8.62%
2043	223	2,587	8.62%
Increasing Market Share			
2028	194	2,206	8.79%
2033	209	2,323	9.00%
2043	241	2,587	9.32%

Sources: FAA TAF; basedaircraft.com; Coffman Associates analysis

Growth Rate Projections

According to based aircraft records, HQZ's count has fluctuated but has declined slightly in the last 10 years, from 186 in 2013 to 181 in 2023 (-0.28% CAGR). Assuming HQZ maintains this growth rate over the course of the forecast period, the declining forecast yields a based aircraft count of 171 by 2043.

Given that registered aircraft within the state are projected to grow over the planning period, a growth rate projection utilizing the state's 20-year CAGR of 1.05 percent has also been considered. When the 20-year CAGR is applied to HQZ based aircraft, a forecast emerges that yields 223 based aircraft by 2043.

Socioeconomic Growth Projections

Based aircraft growth is often related to population and economic activity of the service area. For this reason, based aircraft projections tied to projected growth in population, employment, and gross regional product (GRP) for the service area were also prepared. Through 2043, population in the service area is projected to grow at a CAGR of 0.75 percent; employment is projected to have a CAGR of 1.53 percent; and GRP is projected to have a CAGR of 2.72 percent. Applying these CAGRs results in 210 based aircraft for population, 245 for employment, and 309 for GRP by 2043.

Regression Analysis

Several forecasts were prepared utilizing historical based aircraft data and the regression model. Correlations were examined utilizing independent variables, including population; employment; income; GRP; and U.S. active aircraft, as well as a time series regression. The regression that produced the best correlation was the time series regression, which had a r^2 value of 0.129. As described previously, correlation values over 0.95 indicate good predictive reliability. Since none of the based aircraft regressions produced a correlation value over 0.95, the regression forecasts have been excluded from consideration.

Selected Based Aircraft Forecast

Selecting a based aircraft forecast is ultimately based on the judgement of the forecast analyst. A selected forecast should be reasonable and based on a sound methodology. The methodology presented in this analysis first examines the history of aircraft ownership in the service area (Dallas, Kaufman, and Rockwall Counties). Utilizing the selected registered aircraft projection, a market share analysis was conducted based on maintaining a constant market share and an increasing market share over the forecast period. Additional projections considered the FAA TAF's projection for based aircraft growth in the state; maintaining HQZ's 10-year growth rate; and growth rates based on key socioeconomic indicators (population, employment, and GRP). These seven projections are summarized in **Table 2L**.

TABLE 2L | Based Aircraft Forecast Summary

Projection	2023	2028	2033	2043	CAGR 2023-2043
HQZ 2023 TAF	187	187	187	187	0.00%
Constant Market Share		190	200	223	1.05%
Increasing Market Share		**194**	**209**	**241**	**1.44%**
10-Year Growth Rate		179	176	171	-0.28%
State TAF Growth Rate	**181**	191	201	223	1.05%
Service Area Population Growth Rate		188	195	210	0.75%
Service Area Employment Growth Rate		195	211	245	1.53%
Service Area GRP Growth Rate		207	237	309	2.72%

Boldface indicates selected forecast.
CAGR = Compound Annual Growth Rate

Sources: FAA TAF; basedaircraft.com; Coffman Associates analysis

Future aircraft basing at the airport will depend on several factors, including the state of the economy; fuel costs; available facilities; competing airports; and hangar development potential. Forecasts assume a reasonably stable and growing economy, as well as reasonable development of airport facilities necessary to accommodate aviation demand. HQZ will not see significant based aircraft growth unless new hangar facilities are constructed. Competing airports will play a role in deciding demand; however, HQZ should fare well in this competition, as it is served by a runway system capable of handling most general aviation aircraft and additional demand for based aircraft hangars.

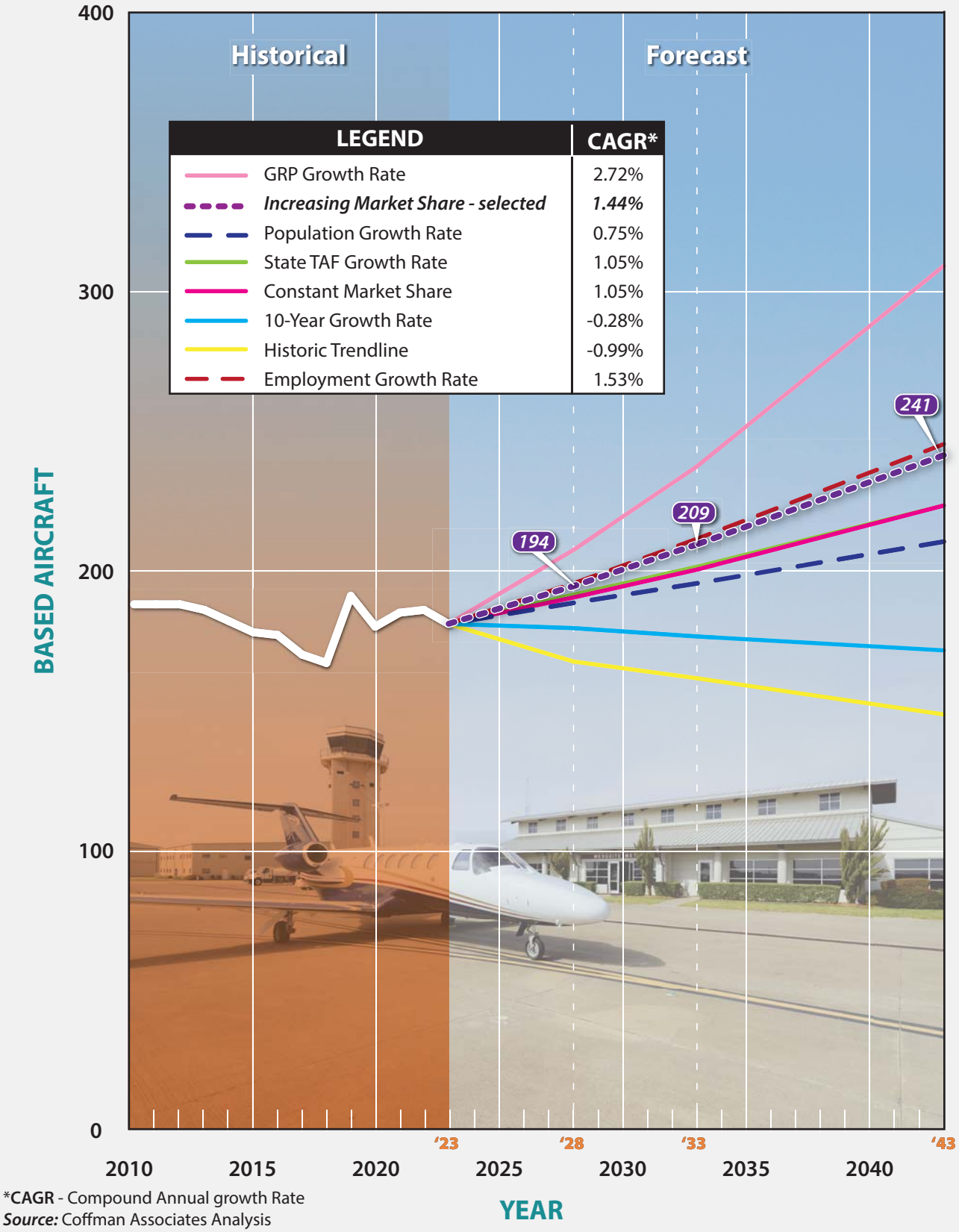
Consideration must also be given to the current and future aviation conditions at the airport. HQZ provides an array of aviation services and will continue to be favored by aviation operators due to its location and available facilities. It is important to note that the airport also maintains a hangar waiting list, which further indicates existing demand potential. A significant flight training program is in the process of beginning its operation at HQZ, which will also introduce new based aircraft.

The potential for available hangar space is not the only factor in future based aircraft levels. Economic conditions within the service area are also projected to increase at strong rates, which will support aviation and based aircraft growth. The increasing market share projection has been selected as the preferred forecast. The selected forecast is reasonably optimistic and assumes that HQZ can continue to gain a market share of registered aircraft in the county with expanded facilities, and that continued employment growth in the local area will drive demand for more based aircraft.

Exhibit 2C presents the seven based aircraft forecasts that comprise the planning envelope.

BASED AIRCRAFT FLEET MIX FORECAST

It is important to understand the current and projected based aircraft fleet mix at an airport to ensure the planning of proper facilities. For example, the addition of one or several larger turboprop or business jet aircraft to the airfield could have a significant impact on the separation requirements and the various obstacle clearing surfaces.



***CAGR** - Compound Annual growth Rate
Source: Coffman Associates Analysis

The current based aircraft fleet mix consists of 147 single-engine piston aircraft; 16 multi-engine piston aircraft; seven turboprops; 10 jets; one helicopter; and zero gliders (or other aircraft). As a general aviation reliever airport with a significant level of both flight training and corporate aviation activities, HQZ should continue to have a diverse fleet mix, including small single-engine pistons, turbine-powered aircraft, and helicopters. The forecasted growth trends in the HQZ based aircraft fleet mix take FAA projections of the national general aviation fleet mix into consideration. Consistent with national aviation trends, growth is anticipated to occur within the more sophisticated categories, including the turboprop, jet, and helicopter categories. **Table 2M** presents the forecast fleet mix for based aircraft at HQZ.

TABLE 2M | Based Aircraft Fleet Mix

Aircraft Type	2023	Percent	2028	Percent	2033	Percent	2043	Percent
SEP	147	81.2%	159	82.0%	170	81.5%	193	80.0%
MEP	16	8.8%	14	7.0%	10	5.0%	8	3.5%
Turboprop	7	3.9%	8	4.0%	11	5.5%	14	6.0%
Jet	10	5.5%	12	6.0%	15	7.0%	22	9.0%
Helicopter	1	0.6%	2	1.0%	2	1.0%	4	1.5%
Glider/Other	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total	**181**	**100.00%**	**194**	**100.00%**	**209**	**100.00%**	**241**	**100.00%**

SEP = Single-Engine Piston
MEP = Multi-Engine Piston

Sources: FAA Based Aircraft Registry, Coffman Associates analysis

OPERATIONS FORECAST

Operations at HQZ are classified as either general aviation, air taxi, or military. General aviation operations include a wide range of activity, from recreational use and flight training to business and corporate uses. Air taxi operations are those conducted by aircraft operating under FAR Part 135, otherwise known as for-hire or on-demand activity. Air taxi operations typically include commuter, air cargo, air ambulance, and many fractional ownership operations. Military operations include those operations conducted by the branches of the U.S. military. Air carrier is an additional category of operation that is conducted by large aircraft with 60 or more passenger seats. These flights are very infrequent at HQZ, and therefore are not included as part of the operations forecast.

It should be noted that the FAA's forecast of air taxi operations trends lower in the short term and returns to growth after 2028 due to ongoing changes to the scheduled airline aircraft fleet mix. Airlines are transitioning away from 50-seat regional jets that are counted under the air taxi category to larger jets with seating capacities of 60 seats or more that are counted under the air carrier category. This airline fleet mix transition should have no impact on unscheduled HQZ air taxi operations.

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

Several methods have been employed to develop a reasonable planning envelope of future potential aircraft operations. The following sections present several new operations forecasts. Counts from the HQZ airport traffic control tower (ATCT) were utilized in this analysis. **Table 2N** shows the historical operations data for HQZ since 2014, when the ATCT became operational.

TABLE 2N | Historical Operations Data

Calendar Year	ITINERANT					LOCAL			Total Operations
	Air Carrier	Air Taxi	General Aviation	Military	Total	Civil	Military	Total	
2014	55	199	20,993	20	21,267	39,755	4	39,759	61,026
2015	0	66	31,459	35	31,560	39,205	144	39,349	70,909
2016	2	545	34,497	63	35,107	40,906	14	40,920	76,027
2017	0	675	30,422	21	31,118	33,911	14	33,925	65,043
2018	8	1,386	20,694	31	22,119	29,940	22	29,962	52,081
2019	0	1,063	21,981	42	23,086	46,300	18	46,318	69,404
2020	0	1,821	23,065	105	24,991	66,192	20	66,212	91,203
2021	0	1,639	26,868	111	28,618	73,835	50	73,885	102,503
2022	2	1,678	26,022	80	27,782	80,095	180	80,275	108,057
2023*	2	1,124	25,985	73	27,184	82,375	58	82,433	109,617

*2023 data represent 12 months ending September 2023

Source: FAA Operations and Performance Data (OPSNET), https://aspm.faa.gov/

Historical Growth Rate Projections

For the 2014-2023 period, HQZ's ATCT indicates CAGRs of 2.16 percent for itinerant general aviation operations; 7.56 percent for local general aviation operations; and 18.90 percent for air taxi operations. The growth rates for local general aviation and air taxi operations are much higher than industry expectations and will likely moderate over time. For that reason, a historical growth rate projection for itinerant general aviation operations was the only one prepared and results in 39,800 operations annually by 2043.

Market Share Projections

Market share analysis compares known historical and forecast data points to arrive at a trend for the unknown variable (HQZ operations). The first forecast considers the current market share of general aviation (itinerant and local) and air taxi operations at the airport compared to the FAA national forecast for operations at towered airports.

In 2023, HQZ accounted for 0.178 percent of U.S. itinerant general aviation operations; 0.539 percent of U.S. local general aviation operations; and 0.017 percent of U.S. air taxi operations. By carrying these percentages forward through the planning horizon, a constant market share forecast emerges. **Table 2P** shows the results. The constant market share is considered a low range projection as historical data indicate that HQZ's market share has grown for each operational category over the past 10 years.

To reflect historical trends, a mid range increasing market share projection was prepared. The mid range projection takes HQZ's 2043 market share of itinerant general aviation operations to 0.214 percent, reflecting growth at approximately half the previous 10-year high. HQZ's 2043 market share of local general aviation operations is taken to 0.695 percent and the 2043 market share of air taxi operations is taken to 0.026 percent, both reflecting the increase in market share experienced between 2014 and 2023. The results of these mid range projections are also shown in **Table 2P**.

High range increasing market share projections were also prepared which consider the potential for operations to exceed the peak periods and growth rates of the past 10 years. The resulting projections take HQZ's 2043 market shares to 0.250 percent (itinerant general aviation); 0.850 percent (local general aviation); and 0.037 percent (air taxi). The results of the high range projections are shown in **Table 2P**.

TABLE 2P | Operations Market Share Projections

	GENERAL AVIATION ITINERANT			GENERAL AVIATION LOCAL			AIR TAXI		
Year	HQZ	U.S.	HQZ Market %	HQZ	U.S.	HQZ Market %	HQZ	U.S.	HQZ Market %
2014	20,993	13,942,761	0.151%	39,755	11,679,412	0.340%	199	8,309,285	0.002%
2015	31,459	13,856,535	0.227%	39,205	11,679,293	0.336%	66	7,768,815	0.001%
2016	34,497	13,930,865	0.248%	40,906	11,629,923	0.352%	545	7,514,622	0.007%
2017	30,422	13,933,523	0.218%	33,911	11,842,865	0.286%	675	7,127,837	0.009%
2018	20,694	14,067,161	0.147%	29,940	12,510,742	0.239%	1,386	7,127,624	0.019%
2019	21,981	14,385,032	0.153%	46,300	13,295,230	0.348%	1,063	7,298,510	0.015%
2020	23,065	12,333,442	0.187%	66,192	12,366,299	0.535%	1,821	4,948,758	0.037%
2021	26,868	14,108,432	0.190%	73,835	13,452,474	0.549%	1,639	6,255,960	0.026%
2022	26,022	14,561,684	0.179%	80,095	14,295,966	0.560%	1,678	6,418,884	0.026%
2023*	25,985	14,581,046	0.178%	82,375	15,269,476	0.539%	1,124	6,455,673	0.017%
Constant Market Share – Low Range									
2028	28,600	16,068,000	0.178%	85,100	15,768,000	0.539%	1,100	6,073,000	0.017%
2033	29,000	16,274,000	0.178%	86,500	16,043,000	0.539%	1,100	6,401,000	0.017%
2043	29,800	16,704,000	0.178%	89,700	16,622,000	0.539%	1,200	7,105,000	0.017%
CAGR	0.69%			0.43%			0.33%		
Increasing Market Share – Mid Range									
2028	29,700	16,068,000	0.185%	86,700	15,768,000	0.550%	1,200	6,073,000	0.020%
2033	31,600	16,274,000	0.194%	94,500	16,043,000	0.589%	1,400	6,401,000	0.022%
2043	35,700	16,704,000	0.214%	115,500	16,622,000	0.695%	1,800	7,105,000	0.026%
CAGR	1.60%			1.70%			2.38%		
Increasing Market Share – High Range									
2028	31,500	16,068,000	0.196%	97,300	15,768,000	0.617%	1,400	6,073,000	0.022%
2033	34,800	16,274,000	0.214%	111,500	16,043,000	0.695%	1,700	6,401,000	0.027%
2043	41,800	16,704,000	0.250%	141,300	16,622,000	0.850%	2,600	7,105,000	0.037%
CAGR	2.41%			2.73%			4.28%		

*2023 data represent 12 months ending September 2023
CAGR: Compound Annual Growth Rate

Sources: U.S. Operations: FAA Aerospace Forecast, 2023-2043; Historical HQZ Operations: HQZ ATCT counts; HQZ Projections: Coffman Associates analysis

Statewide TAF Growth Rate Forecast

FAA Order 5090.3C, *Field Formulation of the NPIAS*, provides a method for estimating future operations at airports by applying the statewide TAF growth rate. While this is typically used for non-towered airports, it does provide a useful method for checking the reasonableness of other forecasts and can be the selected forecast if determined to be the most reasonable. For all NPIAS airports in Texas, the FAA projects an annual growth rate of 0.49 percent for itinerant general aviation operations; 0.60 percent for local general aviation operations; and -0.02 percent for air taxi operations in the state. Utilizing these growth rates to form projections takes HQZ's 2043 operations to 28,600 (itinerant general aviation); 92,900 (local general aviation); and 1,100 (air taxi).

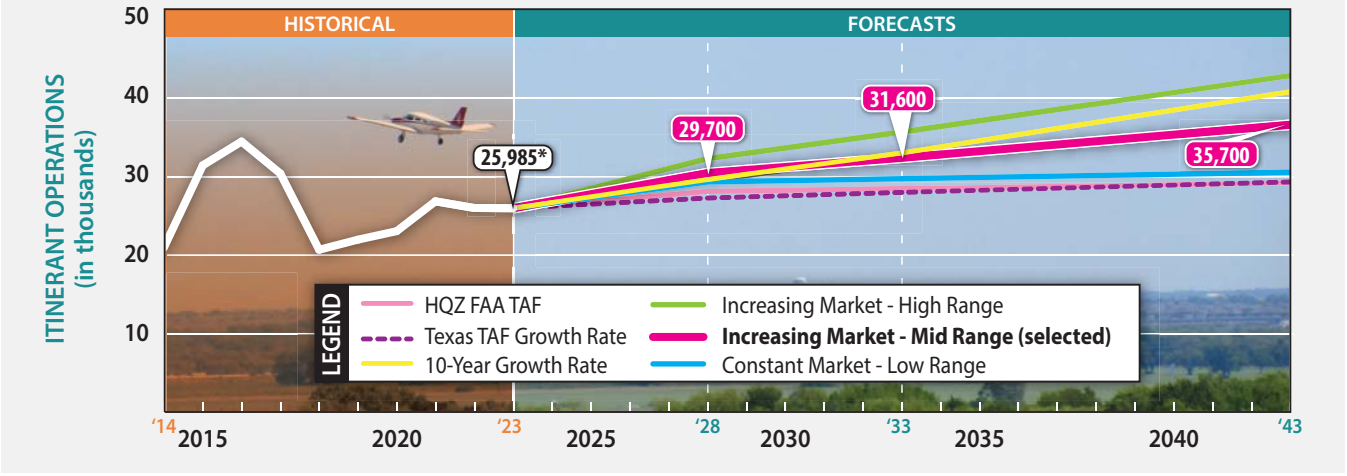
Regression Analysis

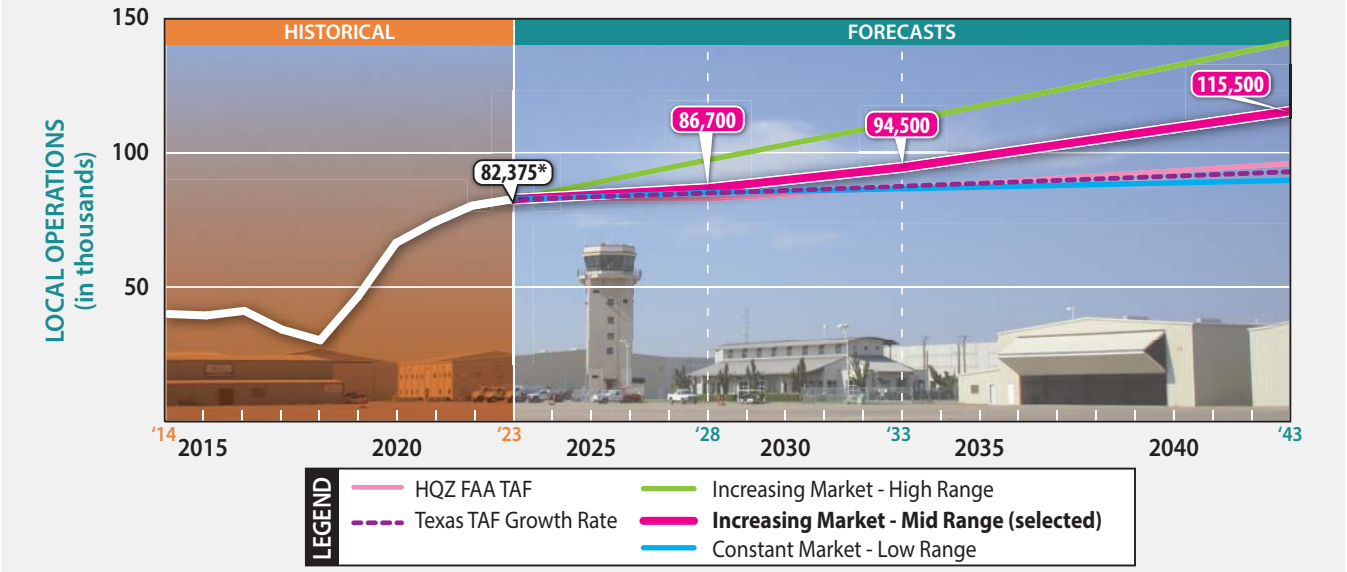
Several forecasts were prepared utilizing historical operations data and the regression model. Independent variables examined included national general aviation operations; population; employment; income; GRP; and time series regressions. The regression that produced the best correlation was a time series regression of local general aviation operations, which had a r^2 value of 0.744. As described previously, correlation values over 0.95 indicate good predictive reliability. Since none of the regressions produced a correlation value over 0.95, the regression forecasts have been excluded from consideration.

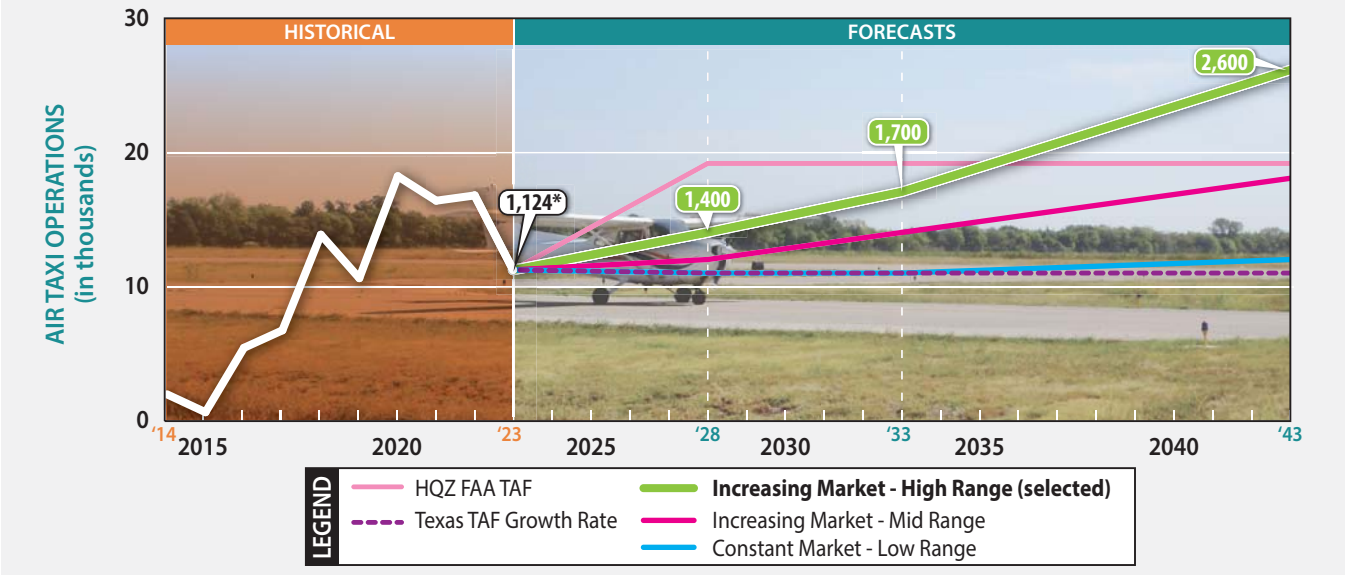
General Aviation and Air Taxi Operations Forecast Summary

Table 2Q summarizes each of the projections prepared for itinerant and local general aviation operations and air taxi operations at HQZ. Operations at HQZ have historically experienced some fluctuation but have had an overall growing trend. Although the COVID-19 pandemic has had a major impact on the economy (and thus on aviation), HQZ has experienced strong operational growth since 2020, particularly in local general aviation operations.

The selected forecasts take a realistic approach to growth and anticipate moderate operations growth levels over the planning period. Historical trends indicate HQZ's market share of operations is increasing, and there is no reason to expect that trend to change in the future. A new flight training operation is anticipated to start activity at HQZ in the short term, which will boost local general aviation operations. As discussed in the based aircraft section, there is strong demand for new based aircraft at HQZ, including small aircraft up to large corporate aircraft, which would support itinerant general aviation and air taxi operations. For these reasons, the mid range increasing market share projections of local and itinerant general aviation operations and the high range market share of air taxi operations have been selected. These projections are above the FAA TAF projections for HQZ, but still within a reasonable range considering the development potential of the airport. **Exhibit 2D** graphically represents the operations projections that comprise the planning envelope.







*2023 data represents 12 months ending September 2023

TABLE 2Q | Operations Forecast Summary

Projection	2023	2028	2033	2043	CAGR 2023-2043
Itinerant General Aviation					
10-Year Growth Rate	25,985	28,900	32,200	39,800	2.15%
Constant Market Share – Low Range		28,600	29,000	29,800	0.69%
Increasing Market Share – Mid Range		**29,700**	**31,600**	**35,700**	**1.60%**
Increasing Market Share – High Range		31,500	34,800	41,800	2.41%
Texas 2023 TAF Growth Rate		26,600	27,300	28,600	0.48%
HQZ 2023 TAF		27,424	27,770	28,475	0.46%
Local General Aviation					
Constant Market Share – Low Range	82,375	85,100	86,500	89,700	0.43%
Increasing Market Share – Mid Range		**86,700**	**94,500**	**115,500**	**1.70%**
Increasing Market Share – High Range		97,300	111,500	141,300	2.73%
Texas 2023 TAF Growth Rate		84,900	87,500	92,900	0.60%
HQZ 2023 TAF		82,650	86,865	95,951	0.77%
Air Taxi					
Constant Market Share – Low Range	1,124	1,100	1,100	1,200	0.33%
Increasing Market Share – Mid Range		1,200	1,400	1,800	2.38%
Increasing Market Share – High Range		**1,400**	**1,700**	**2,600**	**4.28%**
Texas 2023 TAF Growth Rate		1,100	1,100	1,100	-0.11%
HQZ 2023 TAF		1,910	1,910	1,910	2.69%

Boldface indicates selected forecast.
CAGR = Compound Annual Growth Rate

Source: Coffman Associates analysis

Military Operations Forecast

Military aircraft can and do utilize civilian airports across the country. HQZ occasionally experiences activity by military aircraft. Forecasts of military activity are inherently difficult to predict because of the national security nature of their operations and the fact that their missions can change without notice. Thus, it is typical for the FAA to use a flatline forecast for military operations. For HQZ, the FAA TAF projects itinerant and local military operations to remain static at 95 and 186, respectively, over the forecast period. These TAF estimates are also utilized for the master plan forecast.

Instrument Operations Forecast

An instrument operation is a takeoff or a landing conducted during IFR conditions, or operations aboard aircraft that enter Class A airspace during a flight (18,000 feet above mean sea level). Aircraft that can operate in Class A airspace are typically commercial- or corporate-type turboprops and jets. Instrument operations are reported in the FAA's OPSNET database. Between 2018 and the end of September 2023, the number of instrument operations at HQZ has averaged approximately 3.5 percent. The forecast applies the five-year average to total operations through 2043. As shown in **Table 2R**, this methodology projected 5,393 instrument operations by the end of the planning period.

Table 2R | Instrument Operations Forecast

Year	Total Operations	Instrument Operations	% Instrument Operations	Visual Operations	% Visual
Historical					
2018	52,081	2,757	5.29%	49,324	94.71%
2019	69,404	2,627	3.79%	66,777	96.21%
2020	91,203	3,077	3.37%	88,126	96.63%
2021	102,503	3,600	3.51%	98,903	96.49%
2022	108,057	2,839	2.63%	105,218	97.37%
2023	109,617	2,916	2.66%	106,701	97.34%
Forecast					
2028	118,081	4,133	3.50%	113,948	96.50%
2033	128,081	4,483	3.50%	123,598	96.50%
2043	154,081	5,393	3.50%	148,688	96.50%
CAGR (2023-2043)	**1.72%**	**3.12%**	-	**1.67%**	-

CAGR = Compound Annual Growth Rate
2023 total operations are represented by the last 12 months of data collected, ending July 2023.

Sources: FAA OPSNET; Coffman Associates, 2023

Total Operations Forecast Summary

Table 2S presents the summary of the selected operations forecasts. The summary table details the culmination of each selected operations forecast. Over the planning horizon, total operations at HQZ are projected to grow from 109,617 in 2023 to 154,081 by 2043 with a CAGR of 1.72%.

TABLE 2S | Total Operations Forecast Summary

	ITINERANT					LOCAL			
Year	Air Carrier	Air Taxi	General Aviation	Military	Total	General Aviation	Military	Total	Total Operations
2023*	2	1,124	25,985	73	27,184	82,375	58	82,433	109,617
2028	0	1,400	29,700	95	31,195	86,700	186	86,886	118,081
2033	0	1,700	31,600	95	33,395	94,500	186	94,686	128,081
2043	0	2,600	35,700	95	38,395	115,500	186	115,686	154,081
CAGR	**0.00%**	**4.28%**	**1.60%**	**1.33%**	**1.74%**	**1.70%**	**6.00%**	**1.71%**	**1.72%**

CAGR = Compound Annual Growth Rate
*Base year for forecast

Source: Coffman Associates analysis

PEAKING CHARACTERISTICS

Many aspects of facility planning relate to levels of peaking activity: times when an airport is busiest. For example, the appropriate size of terminal facilities can be estimated by determining the number of people who could reasonably be expected to use the facility at a given time. The following planning definitions apply to the peak periods:

- **Peak Month –** The calendar month when peak aircraft operations occur
- **Busy Day –** The busy day of a typical week in the peak month
- **Design Day –** The average day in the peak month
- **Design Hour –** The peak hour within the design day

The peak month is an absolute peak within a given year. All other peak periods will be exceeded at various times during the year. The peak period forecasts represent reasonable planning standards that can be applied without overbuilding or being too restrictive.

Tower operations data provide an understanding of the peak operational periods for the airport. Over the last four years, the peak month has averaged 10.79 percent of annual operations. The design day is the peak month average divided by the number of days in the peak month. The peak months for three of the last four years have been months with 31 days; thus, the peak month is divided by 31 days. The busy day operations count during the average week of the peak month was 150.1 percent more than the design day. The design hour averaged 4.17 percent of design day operations. **Table 2T** summarizes the peaking operational characteristics for the airport.

TABLE 2T | Peaking Characteristics

Peak Period	2023	2028	2033	2043
Annual Operations	109,617	118,081	128,081	154,081
Peak Month	11,830	12,743	13,823	16,629
Busy Day	640	689	746	899
Design Day	389	419	454	547
Design Hour	16	17	19	23

Source: Coffman Associates analysis

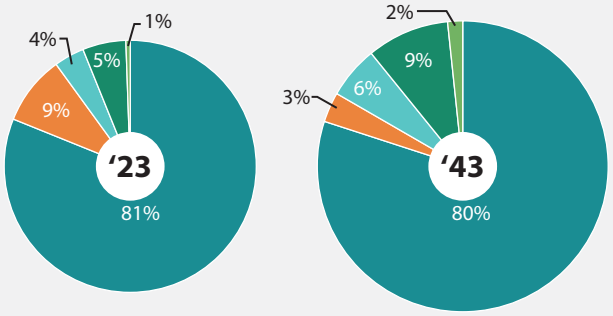
FORECAST SUMMARY

This chapter has outlined the various activity levels that might reasonably be anticipated over the planning period. **Exhibit 2E** presents a summary of the aviation forecasts prepared in this chapter. The base year for these forecasts is 2023, with a 20-year planning horizon to 2043. The primary aviation demand indicators are based aircraft and operations. Based aircraft are forecast to increase from 181 in 2023 to 241 by 2043 (1.44% CAGR). Total operations are forecast to increase from 109,617 in 2023 to 154,081 by 2043 (1.72% CAGR).

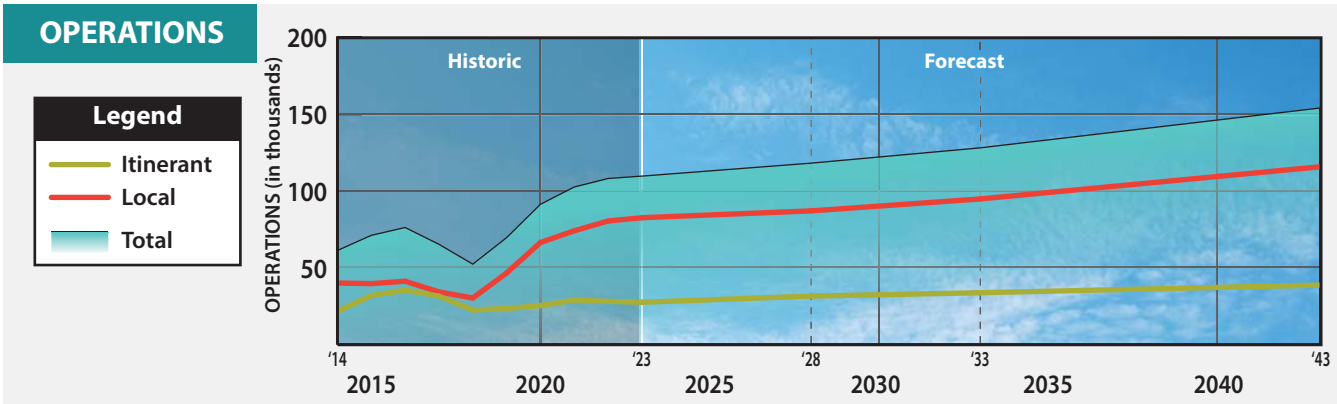
Projections of aviation demand will be influenced by unforeseen factors and events in the future; therefore, it is not reasonable to assume that future demand will follow the exact projection line, but forecasts of aviation demand tend to fall within the planning envelope over time. The forecasts developed for this master planning effort are considered reasonable for planning purposes. The need for additional facilities will be based on these forecasts; however, implementation of facility construction can be slower if demand does not materialize as projected. Likewise, if demand exceeds these forecasts, facility construction can be accelerated.

	Base	Forecast		
	2023	2028	2033	2043
OPERATIONS				
Itinerant				
Air Carrier	2	-	-	-
Air Taxi	1,124	1,400	1,700	2,600
General Aviation	25,985	29,700	31,600	35,700
Military	73	95	95	95
Subtotal	***27,184***	***31,195***	***33,395***	***38,395***
Local				
General Aviation	82,375	86,700	94,500	115,500
Military	58	186	186	186
Subtotal	***82,433***	***86,886***	***94,686***	***115,686***
TOTAL OPERATIONS	109,617	118,081	128,081	154,081
PEAKING				
Peak Month	11,830	12,743	13,823	16,629
Busy Day	640	689	746	899
Design Day	389	419	454	547
Design Hour	16	17	19	23
BASED AIRCRAFT				
Single-Engine Piston	147	159	170	193
Multi-Engine Piston	16	14	10	8
Turboprop	7	8	11	14
Jet	10	12	15	22
Helicopter	1	2	2	4
TOTAL BASED AIRCRAFT	181	194	209	241

BASED AIRCRAFT



OPERATIONS



FORECAST COMPARISON TO THE TAF

The FAA reviews the forecasts presented in this aviation planning study for comparison to the *Terminal Area Forecast*. The forecasts are considered consisted with the TAF if they meet one of the following criteria:

- Forecasts differ by less than 10 percent in the five-year forecast period and less than 15 percent in the 10-year forecast period;
- Forecasts do not affect the timing or scale of an airport project; or
- Forecasts do not affect the role of the airport as defined in the current version of FAA Order 5090.3, *Field Formulation of the National Plan of Integrated Airport Systems.*

If the forecasts exceed these parameters, they may be sent to FAA Headquarters in Washington, D.C., for further review. **Table 2U** presents the direct comparison of the master planning forecasts with the TAF published in February 2023.

TABLE 2U | Forecast Comparison to the *Terminal Area Forecast*

	BASE YEAR	FORECAST		
	2023	2028	2033	2043
Operations				
Master Plan Forecast	109,617	118,081	128,081	154,081
2023 HQZ TAF	107,913	112,265	116,826	126,617
% Difference	**1.57%**	**5.05%**	**9.19%**	**19.57%**
Based Aircraft				
Master Plan Forecast	181	194	209	241
2023 HQZ TAF	187	187	187	187
% Difference	**3.26%**	**3.67%**	**11.11%**	**25.23%**

TAF = *Terminal Area Forecast* (February 2023)

In examining the master plan and FAA TAF projections of operations, the master plan forecast differs from the TAF by 5.05 percent in the five-year forecast and 9.19 percent in the 10-year forecast. It should be noted that operational counts for the master plan forecast base year (2023) are higher than reported in the TAF. The difference between the TAF and base year operations count conducted for the master plan is 1.57 percent. For based aircraft, the TAF identifies a total of 187 based aircraft in 2023; however, the FAA-validated based aircraft count for HQZ is 181 aircraft. As a result, the master plan base year count has a 3.26 percent difference compared to the TAF. Ultimately, the master plan based aircraft forecast differs from the TAF by 3.67 percent in the five-year forecast and by 11.11 percent in the 10-year forecast; thus, the master plan forecast of operations and based aircraft are ultimately considered to be consistent with the FAA TAF.

AIRCRAFT/AIRPORT/RUNWAY CLASSIFICATION

The FAA has established several aircraft classification systems that group aircraft types based on their performance (approach speed during landing operations) and design characteristics (wingspan and landing gear configuration). These classification systems are used to determine the appropriate airport design standards for specific airport elements, such as runways, taxiways, taxilanes, and aprons.

AIRCRAFT CLASSIFICATION

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

Aircraft Approach Category (AAC): A grouping of aircraft based on a reference landing speed (V_{REF}), if specified, or – if V_{REF} is not specified – 1.3 times the stall speed (V_{SO}) at the maximum certified landing weight. V_{REF}, V_{SO}, and the maximum certified landing weight are those values as established for the aircraft by the certification authority of the country of registry (the FAA in the United States).

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

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

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

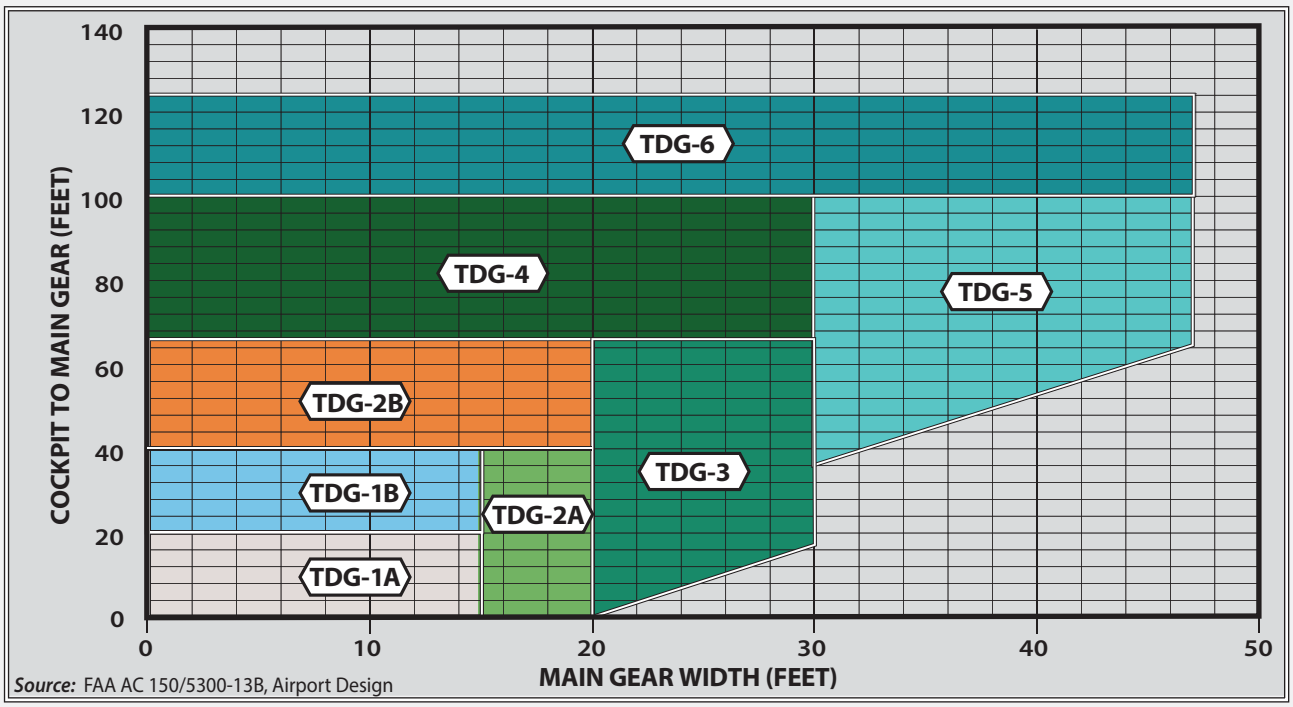
AIRCRAFT APPROACH CATEGORY (AAC)	
Category	**Approach Speed**
A	less than 91 knots
B	91 knots or more but less than 121 knots
C	121 knots or more but less than 141 knots
D	141 knots or more but less than 166 knots
E	166 knots or more

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

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

***RVR**: Runway Visual Range

TAXIWAY DESIGN GROUP (TDG)



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

A-I

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

B-I

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

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

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

B-II *over 12,500 lbs.*

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

A/B-III

• Bombardier Dash 8	3
• Bombardier Global 5000, 6000, 7000, 8000	2
• Falcon 6X, 7X, 8X	2

Note: Aircraft pictured is identified in bold type.

C/D-I

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

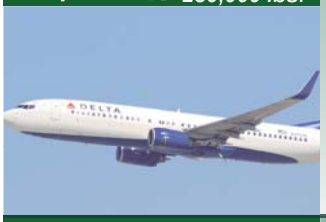
C/D-II

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

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

• Gulfstream V	2
• Gulfstream G500, 550, 600, 650 (D-III)	2

C/D-III *over 150,000 lbs.*



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

C/D-IV

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

D-V

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

The reverse side of **Exhibit 2F** summarizes the classifications of the most common aircraft in operation today. Generally, recreational and business piston and turboprop aircraft will fall in AAC A and B, and ADG I and II. Business jets typically fall in AAC B and C, while larger commercial aircraft will fall in AAC C and D.

AIRPORT AND RUNWAY CLASSIFICATIONS

Airport and runway classifications – along with the previously defined aircraft classifications – are used to determine the appropriate FAA design standards to which the airfield facilities are to be designed and built.

Runway Design Code (RDC): A code signifying the design standards to which the runway is to be built. The RDC is based on planned development and has no operational component.

The AAC, ADG, and runway visual range (RVR) are combined to form the RDC of a runway. The RDC provides the information needed to determine certain applicable design standards. The first component, depicted by a letter, is the AAC and relates to aircraft approach speeds (operational characteristic). The second component, depicted by a Roman numeral, is the ADG and relates to either the aircraft wingspan or tail height (physical characteristic), whichever is more restrictive. The third component relates to the available instrument approach visibility minimums, expressed by RVR values in feet of 1,200 (1/8-mile); 1,600 (1/4-mile); 2,400 (1/2-mile); 4,000 (3/4-mile); and 5,000 (1-mile). The RVR values approximate standard visibility minimums for instrument approaches to the runways. A runway designed for visual approaches only will use “VIS” in place of a numerical value for the RVR.

Approach Reference Code (APRC): A code signifying the current operational capabilities of a runway and associated parallel taxiway regarding landing operations. Like the RDC, the APRC is composed of the same three components: the AAC, ADG, and RVR. The APRC describes the current operational capabilities of a runway under meteorological conditions where no special operating procedures are necessary, as opposed to the RDC, which is based on planned development with no operational component. The APRC for a runway is established based on the minimum runway-to-taxiway centerline separation.

Departure Reference Code (DPRC): A code signifying the current operational capabilities of a runway and associated parallel taxiway regarding takeoff operations. The DPRC represents those aircraft that can take off from a runway while any aircraft are present on adjacent taxiways, under meteorological conditions with no special operating conditions. The DPRC is like the APRC but is composed of only the AAC and ADG. A runway may have more than one DPRC, depending on the parallel taxiway separation distance.

Airport Reference Code (ARC): An airport designation that signifies the airport’s highest runway design code (RDC), minus the third component (visibility) of the RDC. The ARC is used for planning and design only and does not limit the aircraft that may be able to operate safely at an airport. The current airport layout plan (ALP) for HQZ identifies the ARC as C-II based on the Bombardier Challenger 300/600 as the critical design aircraft.

CRITICAL DESIGN AIRCRAFT

The selection of appropriate FAA design standards for the development and location of airport facilities is primarily based on the characteristics of the aircraft that are currently using, or are expected to use, the airport. The critical design aircraft is used to define the design parameters for an airport. The design aircraft may be a single aircraft type or a group of aircraft with similar characteristics defined by the three parameters: AAC, ADG, and TDG.

The first consideration is the safe operation of aircraft likely to use an airport. Any operation of an aircraft that exceeds the design criteria of an airport may result in a lesser safety margin; however, it is not the usual practice to base the airport design on an aircraft that uses the airport infrequently.

The design aircraft is defined as the most demanding aircraft type, or grouping of aircraft with similar characteristics, that makes regular use of the airport, defined as 500 annual operations (excluding touch-and-go operations). Planning for future aircraft use is of importance since the design standards are used to plan separation distances between facilities. These future standards must be considered now to ensure that short-term development does not preclude the reasonable long-range potential needs of the airport.

According to FAA AC 150/5300-13B, *Airport Design*, "airport designs based only on existing aircraft can severely limit the ability to expand the airport to meet future requirements for larger, more demanding aircraft. Airport designs that are based on large aircraft never likely to be served by the airport are not economical." Selection of the current and future critical design aircraft must be realistic in nature and supported by current data and realistic projections.

AIRPORT DESIGN AIRCRAFT

There are three elements for classifying the airport design aircraft: the AAC, ADG, and TDG. The AAC and ADG are examined first, followed by the TDG.

The FAA's Traffic Flow Management System Count (TFMSC) database captures an operation when a pilot files a flight plan and/or when flights are detected by the National Airspace System, usually via radar. It includes documentation of commercial (air carrier and air taxi), general aviation, and military aircraft traffic. Due to factors such as incomplete flight plans, limited radar coverage, and VFR operations, TFMSC data does not account for all aircraft activity at an airport by a given aircraft type; however, the TFMSC does provide an accurate reflection of IFR activity. Operators of high-performance aircraft, such as turboprops and jets, tend to file flight plans at a high rate. **Exhibit 2G** presents the TFMSC operational mix at the airport for turboprops and jets since 2013. According to these data, operations conducted by aircraft with an AAC/ADG of B-II have consistently exceeded 500 annual operations over the past 10 years, which was the most demanding designation with activity that exceeded the 500-operation threshold. As such, **the historical operational activity indicates HQZ's existing ARC is B-II.** Of the 920 operations conducted by ARC B-II aircraft in 2022, 676 operations were conducted by varying models of the Cessna Citation family. With nearly 300 operations, the Citation CJ2/CJ3/CJ4 variants have conducted the highest number of operations within the ARC B-II category. As such, HQZ's existing design aircraft is considered the Cessna CJ2+.

To determine HQZ's future ARC, annual operations by ARC were forecast through 2043 using a growth rate forecast based on historical growth and future fleet mix forecasts. **This analysis identified a future HQZ ARC of C-II.** The change from B-II to C-II could occur sometime between 2028 and 2033. Historical and forecast operations by ARC are depicted in **Table 2V**.

TABLE 2V | Historical and Forecast Operations by Airport Reference Code

Year	B-I	B-II	B-III	C-I	C-II	C-III	D-I	D-II	D-III
Historical									
2018	364	592	6	40	84	0	8	6	0
2019	428	662	10	32	68	0	6	10	4
2020	358	742	2	28	98	0	0	4	38
2021	464	956	10	30	144	2	4	10	20
2022	396	920	6	40	128	0	6	10	6
Forecast									
2028	591	1,057	23	62	233	16	16	23	31
2033	835	1,252	83	134	584	33	50	67	83
2043	1,149	1,915	191	230	957	77	115	134	191

A-I and A-II are not shown as smaller/slower aircraft are unlikely to impact critical design aircraft.
C-IV through C-V and D-IV and above are not shown due to minimal activity at HQZ.

Sources: FAA TFMSC; Coffman Associates analysis

A growth rate forecast was conducted for individual aircraft types with ARCs of B-II and C-II that currently operate at the airport to determine the future critical aircraft. Aircraft representing the ARC B-II category include several variants of the Cessna Citation and Beechcraft King Air families, while aircraft representing ARC C-II include the Cessna Citation III/VI, Challenger 300, and Hawker 800. The analysis examined operational data from 2018 through 2022 and projected activity through 2043. Consistent with the operations data by ARC presented in **Table 2V**, the forecast estimates that the combined total for ARC C-II aircraft would exceed 500 operations by 2033. As such, the airport's ultimate design aircraft was determined to be the Challenger 300, which is currently the most frequent C-II aircraft operating at HQZ and was identified as the critical aircraft on the previous ALP update for HQZ. This ultimate ARC is consistent with the fleet mix forecast for large jet aircraft and the increase in national business jet operations, as well as regional growth in the Dallas-Fort Worth Metroplex that supports the growth of business aviation.

Additionally, the FAA national aerospace forecast indicated a 46 percent increase in business jet hours flown over the last year, despite the impacts of the pandemic. Business jet deliveries have increased by 20.5 percent from 2022 to 2023. The increase in future business jet operations is further supported by the potential for more business jets based at HQZ, as outlined in the based aircraft fleet mix forecast. It should be noted that operational activity could trigger this change sooner based on existing and potential future tenant demand. A summary of historical and forecasted operations by design aircraft is shown in **Table 2Q**.

ARC	Aircraft	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
A-I	Cirrus Vision Jet	0	0	0	0	0	0	2	2	18	100
	Eclipse 400/500	4	12	2	20	44	34	12	2	0	18
	Epic Dynasty	2	0	0	0	0	0	0	0	0	0
	Kodiak Quest	0	0	0	0	0	0	0	0	0	2
	Lancair Evolution/Legacy	0	4	10	12	18	12	12	12	6	4
	Piper Malibu/Meridian	48	90	120	144	202	114	62	88	70	78
	Socata TBM 7/850/900	176	162	48	12	14	12	10	6	22	26
	Total	**230**	**268**	**180**	**188**	**278**	**172**	**98**	**110**	**116**	**228**
A-II	Cessna Caravan	8	6	12	18	0	22	24	12	10	8
	Pilatus PC-12	14	22	52	16	24	66	88	112	176	136
	Total	**22**	**28**	**64**	**34**	**24**	**88**	**112**	**124**	**186**	**144**
B-I	Beech 99 Airliner	2	0	2	0	0	0	0	0	0	0
	Beechjet 400	8	14	6	24	50	74	78	26	38	44
	Cessna 425 Corsair	10	4	6	4	4	2	18	22	6	16
	Citation CJ1	28	36	42	56	38	14	52	24	36	60
	Citation I/SP	72	80	12	18	10	6	26	20	8	0
	Citation M2	0	0	0	0	26	28	36	62	120	68
	Citation Mustang	24	22	32	8	0	2	0	2	20	20
	Falcon 10	0	4	0	4	0	6	2	0	4	2
	Hawker 1000	0	0	0	2	0	0	0	0	0	2
	Honda Jet	0	0	0	0	0	4	0	2	2	8
	King Air 90/100	304	408	262	328	238	166	98	126	24	8
	L-39 Albatross	4	0	0	0	0	0	0	0	0	0
	Mitsubishi MU-2	2	0	4	10	14	10	4	6	32	12
	Phenom 100	36	34	30	42	14	10	2	4	0	0
	Piaggio Avanti	2	10	6	0	0	4	0	2	0	68
	Piper Cheyenne	46	54	14	30	24	6	26	6	8	18
	Premier 1	32	8	8	2	40	30	86	54	166	70
	Rockwell Sabre 40/60	0	2	0	0	0	0	0	0	0	0
	T-6 Texan	0	0	0	4	0	2	0	2	0	0
	Total	**570**	**676**	**424**	**532**	**458**	**364**	**428**	**358**	**464**	**396**

ARC	Aircraft	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
B-II	Aero Commander 690	0	0	8	2	6	2	2	0	0	0
	Beech 1900	0	2	0	0	0	0	0	0	0	0
	Cessna Conquest	4	0	4	4	6	2	0	4	2	0
	Citation CJ2/CJ3/CJ4	8	26	168	248	280	212	278	296	396	296
	Citation II/SP/Latitude	24	6	4	18	16	24	16	36	134	178
	Citation Longitude	0	0	0	0	0	0	0	0	2	0
	Citation V/Sovereign	22	36	32	122	92	50	38	46	86	100
	Citation X	136	14	0	0	18	0	8	2	14	20
	Citation XLS	16	6	14	20	22	32	56	66	74	82
	Dornier 328	0	0	0	0	0	0	0	8	0	4
	Falcon 20/50	10	4	6	10	6	10	10	2	6	0
	Falcon 2000	4	2	6	4	6	8	6	4	10	0
	Falcon 900	0	4	2	0	6	0	30	40	20	26
	Hawker 4000	0	0	0	0	0	0	2	0	0	0
	King Air 200/300/350	290	376	502	404	514	228	200	212	170	150
	King Air F90	0	16	24	10	12	10	4	0	14	10
	Phenom 300	8	10	16	4	16	6	12	26	22	50
	Pilatus PC-24	0	0	0	0	0	0	0	0	2	0
	Saab 340	0	0	0	0	0	0	0	0	0	2
	Swearingen Merlin	6	2	112	252	90	8	0	0	4	2
	Total	**528**	**504**	**898**	**1,098**	**1,090**	**592**	**662**	**742**	**956**	**920**
B-III	Bombardier Global 5000	0	0	0	0	10	6	4	0	2	2
	Bombardier Global Express	0	0	0	0	0	0	6	0	0	4
	CASA 235	0	0	2	0	0	0	0	0	0	0
	De Havilland Dash 8 Series	4	0	0	0	0	0	0	0	0	0
	Falcon 7X/8X	0	0	2	0	0	0	0	2	4	0
	Saab 2000	0	0	0	0	0	0	0	0	4	0
	Total	**4**	**0**	**4**	**0**	**10**	**6**	**10**	**2**	**10**	**6**
C-I	BAe HS 125 Series	0	0	0	0	0	0	0	2	0	0
	Learjet 20 Series	2	16	0	0	0	0	0	0	0	0
	Learjet 31	4	0	0	2	2	2	4	0	0	4
	Learjet 40 Series	10	30	2	20	18	24	10	16	24	24
	Learjet 50 Series	0	2	0	0	0	0	2	2	0	0
	Learjet 60 Series	4	4	12	10	2	12	10	8	6	10
	Westwind II	18	24	26	2	4	2	6	0	0	2
	Total	**38**	**76**	**40**	**34**	**26**	**40**	**32**	**28**	**30**	**40**

Source: Similar aircraft grouped by ARC Code. Data normalized annually. Source: FAA TFMSC Data from 1/1/2013 thru 12/31/2022

ARC	Aircraft	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
C-II	Challenger 300	4	8	8	6	22	20	14	22	38	40
	Challenger 600/604	12	2	6	2	6	12	0	4	12	6
	Citation III/VI	30	30	14	14	48	36	32	40	44	32
	Embraer 500/450 Legacy	0	0	0	0	2	0	0	4	2	2
	Embraer ERJ-135/140/145	0	0	2	2	2	0	0	2	4	4
	Gulfstream 100/150	2	4	0	8	2	6	6	12	8	4
	Gulfstream 280	4	0	2	0	0	0	0	0	6	14
	Hawker 800 (Formerly Bae-125-800)	14	10	4	2	22	8	16	10	28	16
	Learjet 70 Series	0	0	0	4	0	2	0	4	2	10
	Total	**66**	**54**	**36**	**38**	**104**	**84**	**68**	**98**	**144**	**128**
C-III	Bombardier CRJ 900/1000	0	0	0	0	0	0	0	0	2	0
	Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**0**
C-IV	C-130 Hercules	0	0	0	4	0	0	0	4	0	0
	Total	**0**	**0**	**0**	**4**	**0**	**0**	**0**	**4**	**0**	**0**
D-I	F-22 Raptor	0	0	0	0	0	0	0	0	0	2
	Learjet 35/36	4	6	0	6	4	8	6	0	4	4
	T-38 Talon	0	0	2	0	0	0	0	0	0	0
	Total	**4**	**6**	**2**	**6**	**4**	**8**	**6**	**0**	**4**	**6**
D-II	Gulfstream 200	6	0	0	0	4	0	4	0	0	2
	Gulfstream 450	2	2	4	2	12	6	6	4	10	8
	Total	**8**	**2**	**4**	**2**	**16**	**6**	**10**	**4**	**10**	**10**
D-III	Gulfstream 500/600	0	0	4	0	2	0	4	38	20	6
	Total	**0**	**0**	**4**	**0**	**2**	**0**	**4**	**38**	**20**	**6**
E-I	F-16 Falcon/Viper	0	0	0	2	0	0	0	0	0	0
	Total	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**0**

Source: Similar aircraft grouped by ARC Code. Data normalized annually. Source: FAA TFMSC Data from 1/1/2013 thru 12/31/2022

AIRPORT REFERENCE CODE (ARC) SUMMARY

ARC	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
A-I	230	268	180	188	278	172	98	110	116	228
A-II	22	28	64	34	24	88	112	124	186	144
B-I	570	676	424	532	458	364	428	358	464	396
B-II	528	504	898	1,098	1,090	592	662	742	956	920
B-III	4	0	4	0	10	6	10	2	10	6
C-I	38	76	40	34	26	40	32	28	30	40
C-II	66	54	36	38	104	84	68	98	144	128
C-III	0	0	0	0	0	0	0	0	2	0
C-IV	0	0	0	4	0	0	0	4	0	0
D-I	4	6	2	6	4	8	6	0	4	6
D-II	8	2	4	2	16	6	10	4	10	10
D-III	0	0	4	0	2	0	4	38	20	6
E-I	0	0	0	2	0	0	0	0	0	0
Total	**1,470**	**1,614**	**1,656**	**1,938**	**2,012**	**1,360**	**1,430**	**1,508**	**1,942**	**1,884**

APPROACH CATEGORY

AAC	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
A	252	296	244	222	302	260	210	234	302	372
B	1,102	1,180	1,326	1,630	1,558	962	1,100	1,102	1,430	1,322
C	104	130	76	76	130	124	100	130	176	168
D	12	8	10	8	22	14	20	42	34	22
E	0	0	0	2	0	0	0	0	0	0
Total	**1,470**	**1,614**	**1,656**	**1,938**	**2,012**	**1,360**	**1,430**	**1,508**	**1,942**	**1,884**

DESIGN GROUP

ADG	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
I	842	1,026	646	762	766	584	564	496	614	670
II	624	588	1,002	1,172	1,234	770	852	968	1,296	1,202
III	4	0	8	0	12	6	14	40	32	12
IV	0	0	0	4	0	0	0	4	0	0
Total	**1,470**	**1,614**	**1,656**	**1,938**	**2,012**	**1,360**	**1,430**	**1,508**	**1,942**	**1,884**

TABLE 2Q | Historical and Forecast Design Aircraft Operations

Year	Citation CJ2/ CJ3/CJ4 (B-II)	Citation II/SP/ Latitude(B-II)	Citation V/ Sovereign(B-II)	King Air 200/300/350(B-II)	Challenger 300(C-II)	Citation III/VI(C-II)	Hawker 800 (C-II)
Historical							
2018	212	24	50	228	20	36	8
2019	278	16	38	200	14	32	16
2020	296	36	46	212	22	40	10
2021	396	134	86	170	38	44	28
2022	296	178	100	150	40	32	16
Forecast							
2028	476	264	159	148	112	77	45
2033	564	313	188	175	280	192	112
2043	862	479	287	268	479	297	182

Sources: FAA TFMSC; Coffman Associates analysis, 2023

TAXIWAY DESIGN GROUP (TDG)

The TFMSC also provides a breakdown of aircraft operations by TDG. According to HQZ operations data, presented in **Table 2R**, the highest TDG that exceeds the threshold of 500 annual operations in 2023 is TDG 2A – represented by the Beechcraft King Air 200/300/350 – and several Cessna Citation variants, including the Citation CJ3. As such, TDG 2A is considered the existing TDG critical design aircraft for taxiway planning purposes.

For the ultimate condition, HQZ is not anticipated to move into the TDG 2B or 3 (or higher) categories, which primarily include regional jet aircraft associated with commercial passenger service, and the largest business jets, such as the Global Express and the Gulfstream G600; therefore, TDG 2A is projected to remain the airport's critical group for taxiway planning.

TABLE 2R | HQZ Operations by Taxiway Design Group

TDG	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023*
1A	2,823	2,817	2,070	2,068	1,502	1,495	1,502	1,865	1,598	1,670
1B	151	114	122	216	188	204	315	431	411	618
2	20	50	13	20	59	86	104	175	135	126
2A	625	800	864	974	569	626	616	716	697	524
2B	0	4	6	14	5	13	40	26	16	12
3	0	106	228	69	1	0	0	24	86	82

** 12 months ending September 2023*

Source: TFMSC 2014-2023

RUNWAY DESIGN CODE

The RDC relates to specific FAA design standards that should be met in relation to a runway. The RDC takes into consideration the AAC, ADG, and the RVR. In most cases, the critical design aircraft will also be the RDC for the primary runway.

Current RDC

Current runway design at HQZ should meet the overall airport design aircraft, which has been identified as the Cessna Citation CJ2+, a B-II aircraft. The runway has precision instrument approaches with visibility minimums as low as ¾-mile on Runway 18. The RVR value assigned to a runway with ¾-mile minimums is 4000; therefore, the applicable RDC is **B-II-4000**.

Future RDC

The ultimate critical design aircraft for HQZ is projected to fall within the ARC C-II category. Assuming the RVR value remains unchanged at 4000, the future RDC for Runway 18-36 is **C-II-4000**.

CRITICAL AIRCRAFT SUMMARY

Table 2S summarizes the current and future runway classifications.

TABLE 2S | Airport and Runway Classifications

	Runway 18-36 (existing)	Runway 18-36 (ultimate)
Airport Reference Code (ARC)	B-II	C-II
Critical Aircraft (Typ.)	Cessna CJ2+	Bombardier Challenger 300
Runway Design Code (RDC)	B-II-4000	C-II-4000
Taxiway Design Code (TDG)	2A	2A

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

SUMMARY

This chapter has outlined the various activity levels that might reasonably be anticipated over the planning period, as well as the critical design aircraft for the airport. Based aircraft are forecast to grow from 181 in 2023 to 241 by 2043. Operations are forecast to grow from 109,617 in 2023 to 154,081 by 2043. The projected growth is driven by the FAA's positive outlook for general aviation activity, both for the state of Texas and nationwide, as well as positive outlooks for socioeconomic growth (population, employment, and income/GRP) in the Dallas-Fort Worth Metroplex. Recent growth trends specific to HQZ also factor into the projected growth.

The critical design aircraft for the airport was determined by examining the FAA TFMSC database of flight plans. The current critical design aircraft is represented by the Cessna CJ2+, a twin-engine business jet typically utilized for business operations or air charters. The future design aircraft is projected to fall within the C-II design category and is represented by the Bombardier Challenger 300.

Projections of aviation demand will be influenced by unforeseen factors and events in the future; therefore, it is not reasonable to assume that future demand will follow the exact projection line, but forecasts of aviation demand tend to fall within the planning envelope over time. The forecasts developed for this master planning effort are considered reasonable for planning purposes. The need for additional facilities will be based on these forecasts; however, implementation of facility construction can be slower than planned if demand does not materialize as projected. Likewise, facility construction can be accelerated if demand exceeds these forecasts.

The next step in the planning process is to assess the capabilities of the existing facilities to determine what upgrades may be necessary to meet future demands. The range of forecasts developed here will be taken forward in the next chapter as planning horizon levels which will serve as milestones or activity benchmarks in evaluating facility requirements.