02

Aviation Demand Forecasts

The Granbury Regional Airport Master Plan establishes a strategy for the development of the Airport over the next 20 years.

Following completion of the inventory analysis, the forecasting process will determine the need for future capital development. This phase of the Master Planning process will generate forecasts and projected increases in airport activity which ultimately provide a means for determining the feasibility of future capital improvements.

Activity at Granbury Regional Airport has fluctuated in recent history. This is not an uncommon theme at many U.S. airports as economic uncertainty and increased travel costs have impacted travel behavior.

GRANBURY REGIONAL AIRPORT
WHERE TEXAS HISTORY LIVES

INTRODUCTION

The demand forecast element of the Master Plan is used as a method to determine the need for future capital development, as well as investment in the airport facility itself. Essential to this determination is the generation of forecasts and projected increases in airport activity. Demand forecasts provide a means of determining the type, extent, size, location, timing, and financial feasibility of future capital improvements. Consequently, demand forecasts influence the remaining phases of the Master Plan process.

Forecasting aviation activity requires more than an extrapolation of past trends; it requires the application of statistical measures to correlate future demand with population projections, economic performance, and demographic data. Because demand forecasting is not an exact science, it requires the application of professional judgment and experience, as well as an understanding of the market forces that tend to promote or limit aviation growth.

Demand forecasts have been prepared and are presented in this chapter to assist the city in the evaluation of the performance-based needs of the airport during the next 20-years. Additionally, the Federal Aviation Administration (FAA) will review and accept the forecasts to ensure they are reasonable when compared to existing FAA forecasting projections. The forecasts are organized to include a range of activity to include: based aircraft; operational fleet mix; annual operations (itinerant and local); and ultimate critical aircraft.

B.2 DATA SOURCES

The forecasting process begins by obtaining recorded data pertinent to the operation and administration of Granbury Regional Airport. Generally, aviation activity forecasting commences by utilizing the present time as an initial point, supplemented with historical trends obtained from previous years' activity and recorded information. This data has evolved from a comprehensive examination of historical airport records provided by airport personnel, FAA Form 5010-1, *Airport Master Record*, *FAA Terminal Area Forecasts*, and the *FAA Aerospace Forecasts Fiscal Years, 2020-2040*. Supplemental publications providing trends and conditions of the aviation industry include the *General Aviation Statistical Databook Industry Outlook* and *Business Aviation Fact Book, 2018*. These documents were assembled in different years, making the base year data quite variable, and emphasizing the need for establishing a well-defined and well-documented set of historical information from which to project future aviation activity trends.

Prior to examination of future activity, several assumptions and conditions which help form the basis or foundation for the development of forecasts should be noted. These statements cover a wide variety of physical, operational, industry, and socio-economic considerations.

INTRODUCTION

DEMOGRAPHICS

The existing socio-economic condition of a particular region historically impacts aviation within an area and is often analyzed in the forecasts of aviation activity. Provided by *Woods and Poole*, the most current demographic data for Hood County across the board shows average annual increases to the year 2050 anticipated for population at 1.4 percent, per capita income at 2.0 percent, and employment at 2.1 percent.

COMMUNITY SUPPORT

Granbury Regional Airport benefits from the support of the surrounding community and government, local industry, and citizens. The airport is recognized as a vital asset to both the City of Granbury and Hood County, which contributes to the stability and future of the area's economy. Additionally, much of the region benefits from the proximity of a regional aviation facility, and, in turn, provide an economic base that can attract additional based aircraft, as well as industrial / business development to the airport.

NEGATIVE OR NEUTRAL FACTORS

COVID-19

Nothing has impacted the global or national aviation industry since the 2008/09 great recession as the existing COVID-19 pandemic. This virus outbreak has led to major declines in demand for both air carrier and general aviation activity and led those in the industry to announce severe cost-cutting measures, request government funding assistance, and / or ground fleets. Spread of the virus has created a concern for both short- and long-term effects within the aviation industry nationally and globally.

Similar to the well-known and stated declines with airlines, the general aviation sector has not been immune to similar impacts. General Aviation provides more than one (1) percent, or $247 billion, of the GDP in the U.S. and accounts for over 1.3 million jobs. Typically, the GA sector strength is based on sales and deliveries of aircraft to various purchasers across the globe. When analyzing details provided by the *General Aviation Manufacturers Association (GAMA)*, 2020 started off strong and was on par to replicate or exceed 2019; however, when health and safety restrictions were put in place to respond to COVID-19, supply chains and deliveries were shut down and negatively impacted. The following table, **Table B.1**, compares general aviation aircraft sales and deliveries from first quarter 2019 to first quarter of 2020. As reflected, decreases are exhibited across the board for all aircraft sectors.

TABLE B.1 – GAMA THIRD QUARTER SALES COMPARISON

Aircraft Type	2019	2020	% Change
Piston Airplanes	877	889	1.4%
Turboprop Airplanes	348	254	-27.0%
Business Jets	516	378	-26.7%
Total Airplanes	1,741	1,521	-12.6%
Total Airplane Billings	$14.9B	$11.9B	-20.1%
Piston Helicopters	141	105	-25.5%
Turbine Helicopters	434	333	-23.3%
Total Helicopters	575	438	-23.8%
Total Helicopter Billings	$2.2B	$1.9B	-16.2%

Source: General Aviation Manufacturers Association (GAMA).

While overall shipments are down, discussions provided by the National Business Aviation Association indicate the industry is on a trajectory that is turning the corner and headed back in the right direction. Fractional aircraft owner shares have witnessed significant increases in the customer base who understand the "inherent advantages of business aviation: going more places in less time, reaching destinations they didn't think they could reach, and flying in a safe, secure, and healthy manner" and "clients see business aviation as an option to eliminate concerns about airline cabins packed with people". These statements, along with the approval and dissemination of COVID-19 vaccines, are providing a framework to help put general aviation back on course for growth and potential record breaking activity.

GENERAL AVIATION TRENDS

At the national level, fluctuating trends related to general aviation usage and economic uncertainty resulting from the nation's and international business cycles all have significant impacts on general aviation demand levels. General aviation aircraft are classified as all aircraft not flown by commercial airlines or the military. This includes an incredibly diverse array of flying that ranges from a personal vacation get away in a small single-engine plane to an overnight package delivery to an emergency medical evacuation to a morning sightseeing flight to flight instruction that trains new pilots to helicopter traffic reports that keep drivers informed of rush-hour delays. Simply stated, general aviation encapsulates all of those individual unscheduled aviation activities that enrich, enhance, preserve, and protect our lives.

As defined by the FAA, general aviation activities are divided into six use categories:

- Personal - About a third of all private flying in the United States is for personal reasons, which may include practicing flight skills, personal or family travel, personal enjoyment, or personal business.
- Instructional - All private flight instruction for purposes ranging from private pilot to airline pilot is conducted through general aviation.
- Corporate - About 12 percent of the total private flying in the U.S. is done in aircraft owned by a business and piloted by a professional. The majority of these flights are in jets and cover long distances, with some flying to intercontinental and international destinations. Businesses elect to fly these trips to save time and expand their geographic and operational networks.
- Business - About 11 percent of the total private flying in the U.S. is done by business persons flying themselves to meetings or other events, primarily in piston or turboprop aircraft. Most of the pilots own or work for relatively small businesses and use the aircraft to accomplish missions that would otherwise take more time or would be infeasible.
- Air Taxi - When scheduled air service either is not available or inconvenient, businesses and individuals use charter aircraft from air taxi service providers. These flights save time and make it possible to fly directly to places that cannot be reached by scheduled service. (Note that "air taxi" is also utilized as a charter or on-demand commercial air service classification.)
- Other - All other activities are classified as being "other." Given the diverse nature general aviation, this includes disaster relief, search and rescue, police operations, news reporting, border patrol, forest firefighting, aerial photography and surveying, crop dusting, and tourism activities, among many others.

BUSINESS USE OF GENERAL AVIATION

Business and corporate aviation are the fastest growing facets of general aviation. Companies and individuals use aircraft as a tool to improve the efficiency and productivity of their business and personnel. Use of general aviation aircraft afford businesses direct control of their travel itineraries, destinations, and significantly reduce travel times and inconveniences often associated with scheduled airline service.

According to the NBAA's *Business Aviation Fact Book*, only 3 percent of the approximately 15,000 business aircraft registered in the U.S. are flown by large, Fortune 500 companies. The remaining 97 percent are operated by a broad cross-section of organizations, including government, universities, charitable organizations and businesses of all sizes. The vast majority of U.S. companies that utilize business aircraft (85 percent) are small and mid-size businesses, many of which are based in the dozens of communities across the country where the airlines have reduced or eliminated service. The benefits of corporate general aviation are evidenced by the significant growth that business/corporate general aviation has recently experienced.

Business use of general aviation aircraft ranges from small, single-engine aircraft rentals to multiple aircraft corporate fleets supported by dedicated flight crews and mechanics. Business aircraft usage by smaller companies has also escalated dramatically as various chartering, leasing, fractional ownership, interchange agreements, partnerships, and management contracts have emerged.

Of particular note is the immense popularity of fractional ownership operations, which began in 1986 with the creation of a program that offered aircraft owners increased flexibility in the ownership and operation of aircraft. The program uses current aircraft acquisition concepts, including shared or joint aircraft ownership, and provides for the management of the aircraft by an aircraft management company. The aircraft owners participating in the program agree not only to share their own aircraft with others having a shared interest in that aircraft, but also to lease their aircraft to other owners in the program. The aircraft owners use a common management company to provide aviation management services including maintenance of the aircraft, pilot training and assignment, and leasing management of the aircraft.

Even in an unsteady economy, fractional operators say business has continued to improve as existing customers re-enter the market or increase their fractional aircraft usage. In addition, they say an increasing number of new prospects are making the move to fractional ownership as an alternative to flying commercially or owning a business jet outright. In the U.S., fractional-share ownership makes up 15% of business-aviation flights.

Growing segments of the business aircraft fleet mix include business liners and very light jets (VLJ). Business liners are large business jets, such as the Boeing Business Jet and Airbus ACJ, which are reconfigured versions of passenger aircraft flown by large commercial airlines. Labeled as "personal jets," VLJs are small, six-seat jets costing substantially less than typical business jet aircraft. Popular aircraft models in this category include the Eclipse 500 and 550, Embraer Phenom 100 and 300, Cessna Mustang and HondaJet.

GENERAL AVIATION OUTLOOK

National general aviation activity trends are monitored and forecasted by the FAA on an annual basis in the *FAA Aerospace Forecasts* publication. The most current addition covers *Fiscal Years 2020-2040*.

Single- and multi-engine piston aircraft experienced a decline in the number of total aircraft between 2010 and 2019. Although still the largest portion of aircraft in the active fleet, the number of single-engine aircraft fell from 139,500 in 2010 to 129,500 in 2019, a 0.8 percent average annual decline. During that same period, multi-engine piston aircraft had a much steeper decline, falling from 15,900 aircraft to 12,800, a 2.4 percent annual decrease. In total, active piston aircraft decreased at 1.0 percent annually over the last nine years. In its annual aviation forecast, the FAA indicates that it expects the number of active piston general aviation aircraft to continue to decline, but by a lower rate than in the past decade. Over the next decade, the decrease in the number of piston aircraft is expected to be 0.8 percent per year over the next two decades. The result of these predictions show total piston aircraft (combined single- and multi-engine) falling from 142,335 in 2019 to 115,970 in 2040.

Conversely, turboprop and jet aircraft experienced substantial growth between 2010 and 2019, increasing from approximately 20,800 to 25,000 aircraft, a 2.0 percent average annual increase over that period. One of the most important trends identified by the FAA in their forecasts is the growth anticipated in active general aviation jet aircraft. The active general aviation turboprop and jet aircraft fleet is anticipated to continue to increase dramatically over the projection period, to 36,595 aircraft in 2040, with jet aircraft almost doubling in numbers within this same time period.

The FAA also tracks and projects a valuable metric known as active general aviation and air taxi hours flown. This measurement captures a number of activity-related data including aircraft utilization, frequency of use, and duration of use. Hours flown in general aviation piston aircraft experienced a decrease of .01 percent annually, from 2010 to 2019, while turboprop and jet aircraft, hours flown reflected a 2.0 percent average annual growth for the same time period. Combined, general aviation hours flown are expected to grow at a rate of 0.8 percent per year through 2040.

SUMMARY

The aviation industry has navigated significant challenges (9/11 and 2008 global financial crisis), after which passenger numbers flat lined for 2-3 years before continuing the upward trajectory. Following these crises, many companies and their supply chains emerged and restructured to thrive. While there is no crystal ball on predicting when the turnaround will be felt, the *International Air Transport Association (IATA)* is postulating full recovery not occurring until at least 2023, with a worst case of 2025, assuming a vaccine has been developed, restrictions for international travel have relaxed, the global economy rebuilds, and passenger confidence increases. This sentiment is echoed by the airline data analytics firm, *OAG*, which states "several years of industry growth has been lost and it could take until 2022 or 2023 before the volume of fliers returns to levels expected in 2020".

Additionally, it is anticipated general aviation will witness the same rebound as that of the airlines, with a more expedited timeframe. Increases in general aviation activity have already shown signs of started to rebound and are expected to hit pre-COVID levels sooner than anticipated. Based on this information, the forecasting outcomes for GDJ in the following sections will be based on a combination of industry trends pre- and post- COVID. Ultimately, the forecasts will be based on lower baseline numbers or reflect slower demand in the short-term while the long-term will be unaffected.

B.4 AVIATION FORECAST METHODOLOGY

DEMAND FORECAST APPROACH

In an effort to garner FAA approval and acceptance of aviation demand forecasts, certain methods of forecast development are necessary for evaluation. Choosing the appropriate forecasting methodology is as important as developing forecasting scenarios to properly plan for the future. Forecast scenarios developed for GDJ will consider historical operational data but will also rely largely upon expert judgment. It is important to emphasize the fact that aviation forecasting is not an "exact science", so experienced aviation judgment and practical considerations will influence the level of detail and effort required to establish a reasonable forecast and the development of decisions that result from them.

A qualitative forecast will give an explanation, understanding, or interpretation of current airport conditions and also explain why future development scenarios are justifiable. Forecasting scenarios for GDJ will be developed by examining the meaningful and symbolic content of qualitative data; coupling it with available historical data. Sources and methods for forecasting are provided by several FAA documents including: Federal Aviation Administration Advisory Circular 150/5070-6B, *Airport Master Plans*, FAA Office of Aviation Policy and Plans, *Forecasting Aviation Activity by Airport*, *Review, and Approval of Aviation Forecasts, 2008.*

Projections of aviation demand incorporate local and national industry trends in assessing current and future demand. Therefore, socio-economic factors such as local population, income, and employment are also analyzed for the effect they may have on historical and future levels of activity. The comparison of relationships among these various indicators provides the initial step in the development of realistic forecasts of aviation demand. Methodologies used to develop forecasts described in this section include:

- Time-Series Methodologies
- Market Share Methodologies
- Socio-economic Methodologies

TIME SERIES METHODOLOGY

Historical trend lines and linear extrapolation are widely used methods of forecasting. These techniques utilize time-series types of data and are most useful for a pattern of demand that demonstrates a historical relationship with time. Linear extrapolation establishes a linear trend by fitting a straight line using the least squares method to known historical data. Historical trend lines used in this chapter examine historical compounded annual growth rates (CAGR) and extrapolate future data values by assuming a similar compounded annual growth rate for the future.

MARKET SHARE METHODOLOGY

Market share, ratio, or top-down models compare local levels of activity with a larger entity. Such methodologies imply that the proportion of activity that can be assigned to the local level is a regular and predictable quantity. This method has been used extensively in the aviation industry to develop forecasts for the local level. It is most commonly used to determine the share of total national traffic activity that will be captured by a particular region or airport. Historical data is examined to determine the ratio of local airport traffic to total national traffic. The FAA develops national forecasts annually in its FAA Aerospace Forecasts document. This data source is compared with historical levels of activity reported by Granbury Regional Airport.

SOCIO-ECONOMIC METHODOLOGY

Though trend line extrapolation and market share analysis may provide mathematical and formulaic justification for demand projections, there are many factors beyond historical levels of activity that may identify trends in aviation and impact on aviation demand locally. Socio-economic or correlation analysis examines the direct relationship between two or more sets of historical data. Local conditions that are examined in this chapter include population, per capita income, and total retail sales. Based upon the observed and projected correlation between historical aviation activity and the socio-economic data sets, future aviation activity projections are developed.

B.5 GENERAL AVIATION ACTIVITY FOREACSTS

BASED AIRCRAFT

Based aircraft are defined as those aircraft that are permanently stored at an airport either in a hangar or on an aircraft parking apron. Estimating the number and types of aircraft expected to be based at GDJ over the 20-year study period will impact the planning for its future facility and infrastructure requirements. Generally speaking, as the number of aircraft based at an airport increases, so too does the aircraft storage requirements at the facility.

There are many factors that determine the number of general aviation aircraft that can be expected to be based at an airport, such as available facilities and services, proximity and access to the airport, amenities and facilities at adjacent, nearby airports. General aviation aircraft owners and operators are particularly sensitive to both the quality and location of their basing facilities. Generally speaking, owners would rather be in close proximity to their home and / or work, and typically weigh this need as a primary need when considering aircraft storage needs. According to airport personnel, a total of 100 aircraft, including ten (10) helicopters and eight (8) gliders/experimental aircraft are stored on the field. GDJ's based aircraft have fluctuated and varied since 2010 with a low of 59 in 2011 to a current high of 100.

According to *FAA Aerospace Forecasts, Fiscal Years 2020-2040*, between 2010 and 2019, the active general aviation aircraft in the U.S. decreased at a CAGR of -0.6 percent. During this same time frame, the number of piston aircraft (single-engine and multi-engine) in the U.S. fleet decreased at an average annual rate of 1.0 percent while turbine (turbo-prop and turbo-jet) aircraft increased at an average CAGR of 2.0 percent. As has been the trend, piston aircraft continue to see year over year decreases while turbine aircraft remain in a positive growth mode. Conversely, for the projected years 2020-2040, the FAA projects a negative growth rate of 1.0 percent for piston aircraft and positive rate of 1.8 percent for turbine aircraft. Overall, the total general aviation fleet (including rotorcraft, experimental, and light sport aircraft) is projected with a flat CAGR of 0.0 percent.

MARKET SHARE METHODOLOGY

Granbury Regional Airport's market share of the total U.S. general aviation fleet between 2010 and 2020 has fluctuated from a low 0.0264% to a high of 0.0471 percent, with the average calculated at 0.037 percent. For the constant market share, the 2020 value of 0.0471 percent will be utilized for the 20-year planning period while the increasing market share adjusts the market share upwards to 0.0600 percent by 2040. Based on these percentages, based aircraft growth based on the constant market share provides a CAGR of 0.0 percent and the increasing market share reflects a CAGR value of 1.2 percent. **Table B.2** shows both market share scenarios.

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TABLE B.2 – MARKET SHARE BASED AIRCRAFT FORECASTS

Year	GDJ Based Aircraft	Total U.S. Active Aircraft	GDJ Market Share
2011	59	223,370	0.0264%
2012	59	220,703	0.0267%
2013	72	218,036	0.0271%
2014	88	215,369	0.0334%
2015	85	212,702	0.0414%
2016	84	210,031	0.0405%
2017	70	211,794	0.0397%
2018	70	211,757	0.0331%
2019	71	211,749	0.0331%
2020	100	212,335	0.0471%
Constant Market Share Projection			
2025	100	211,400	0.0471%
2030	99	210,440	0.0471%
2035	99	209,960	0.0471%
2040	99	210,380	0.0471%
CAGR (2020-2040) = 0.0%			
Increasing Market Share Projection			
2025	106	211,400	0.0500%
2030	110	210,440	0.0525%
2035	121	209,960	0.0575%
2040	126	210,380	0.0600%
CAGR (2020-2040) = 1.2%			

Source: KSA; *FAA Aerospace Forecasts, 2020-2040*.

SOCIO-ECONOMIC – INCOME METHODOLOGY

Income can often be a strong indicator of one's propensity to own an aircraft. The socio-economic income variable methodology compares historical based aircraft at Granbury Regional Airport to per capita income in Hood County. According to data obtained by *Woods and Poole, Inc*. per capita income in Hood County has increased steadily from 2011 to 2020 and is anticipated to increase to $71,023 by 2040. The 2020 figure of 0.0021 based aircraft per $100 income is applied to projections of per capita income and shown in **Table B.3**. This forecast posits a CAGR of 2.0 percent for a total of 149 based aircraft by the end of the planning period.

TABLE B.3 – SOCIO-ECONOMIC – INCOME VARIABLE BASED AIRCRAFT FORECASTS

Year	GDJ Based Aircraft	Hood County Per Capita Income	Based A/C per $100 Income
2011	59	$42,759	0.0014
2012	59	$43,666	0.0014
2013	72	$43,684	0.0016
2014	88	$44,779	0.0020
2015	85	$44,791	0.0019
2016	84	$44,560	0.0019
2017	70	$46,247	0.0015
2018	70	$46,920	0.0015
2019	71	$46,648	0.0015
2020	100	$47,719	0.0021
Socio-Economic – Income Variable			
2025	112	$53,185	0.0021
2030	124	$58,843	0.0021
2035	136	$64,783	0.0021
2040	149	$71,023	0.0021
CAGR (2020-2040) = 2.0%			

Source: KSA; *FAA Aerospace Forecasts, 2020-2040*.

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SOCIO-ECONOMIC – POPULATION METHODOLOGY

The socio-economic population variable methodology compares historical based aircraft at the Airport with the population of Hood County. Between 2011 and 2020, the population of Hood County increased from 51,588 to approximately 62,244. The 2020 figure of 0.0016 is applied to population projections of Hood County and reflected in **Table B.4**.

TABLE B.4 – SOCIO-ECONOMIC – INCOME VARIABLE BASED AIRCRAFT FORECASTS

Year	GDJ Based Aircraft	Hood County Population	Based A/C per capita
2011	59	51,558	0.0011
2012	59	52,129	0.0011
2013	72	52,866	0.0014
2014	88	53,820	0.0016
2015	85	55,290	0.0015
2016	84	56,703	0.0015
2017	70	58,154	0.0012
2018	70	60,537	0.0012
2019	71	61,385	0.0012
2020	100	62,244	0.0016
Socio-Economic – Population Variable			
2025	107	66,725	0.0016
2030	114	71,528	0.0016
2035	123	76,677	0.0016
2040	132	82,197	0.0016
CAGR (2020-2040) = 1.4%			

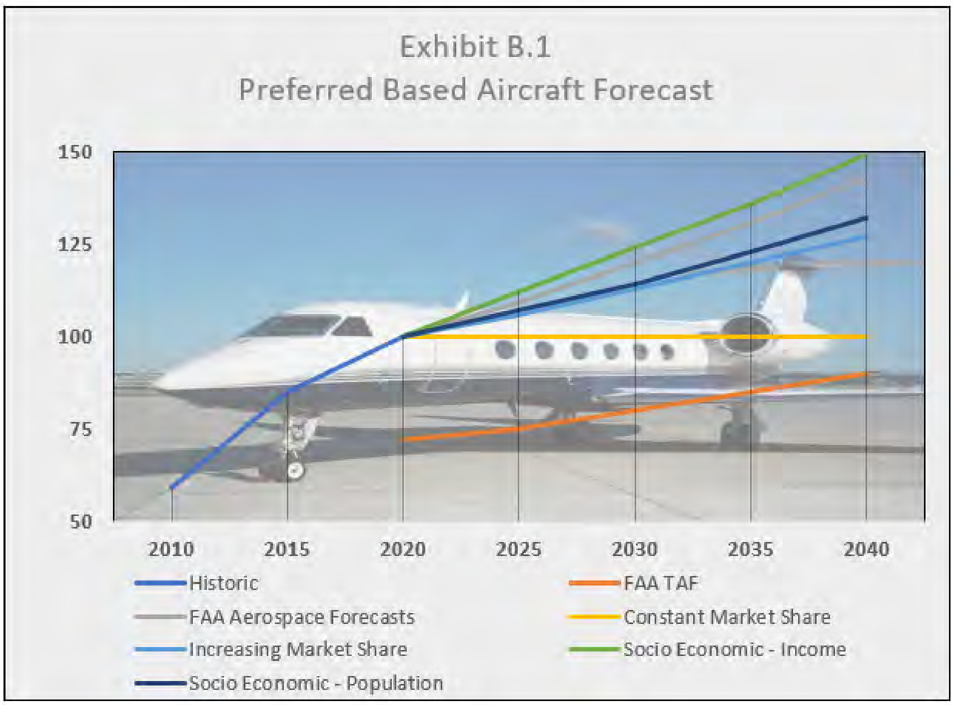
Source: KSA; *FAA Aerospace Forecasts, 2020-2040.*

TABLE B.5 – PREFERRED BASED AIRCRAFT FORECASTS, 2020-2040

Year	FAA TAF Summary	FAA Aerospace Forecasts	Constant Market Share	Increasing Market Share	Socio-Economic – Income	Socio-Economic – Population
2020	72	100	100	100	**100**	100
2025	75	109	100	106	**112**	107
2030	80	120	100	113	**124**	115
2035	85	131	100	120	**136**	123
2040	90	143	100	127	**149**	132
CAGR	1.2%	1.8%	0.0%	1.2%	2.0%	1.4%

Source: KSA; *FAA Aerospace Forecasts, 2020-2040.*

EXHIBIT B.1: PREFERRED BASED AIRCRAFT FORECAST



PREFERRED BASED AIRCRAFT FORECAST

A comparison of projected based aircraft using the methodologies described in previous sections is shown above in **Table B.1**. All the methodologies anticipate either a retention of the existing or increase in based aircraft demand over the next 20-years. With the airport exhibiting a current hangar waitlist of 35 individuals, one (1) T-hangar which will accommodate eight (8) aircraft currently under construction and leased, and two (2) additional hangars with existing land leases slated for construction by the end of 2021, the preferred based aircraft forecast follows course with the Socio Economic – Income methodology. This scenario increases based aircraft from the current level of 100 to 149 by 2040, an approximate CAGR of 2.0 percent. It should be noted this preferred forecast CAGR of 2.0 percent similarly parallels the CAGR of 1.8 percent reflected in the *FAA Aerospace Forecast*, *2020-2040* for national fleet mix growth overall.

BASED AIRCRAFT FLEET MIX

The current based aircraft fleet mix at GDJ consists of 65 single-engine piston aircraft, five (5) multi-engine piston aircraft, five (5) turbo-prop (SE), two (2) turbo-prop (ME), three (3) business jets, two (2) military, ten (10) helicopters, and eight (8) gliders/experimental. FAA's anticipated average annual growth rates for various components of the national general aviation fleet were considered when determining a projected based aircraft fleet mix for the airport. As reflected in **Table B.6**, it is anticipated the number of piston aircraft (single- and multi-) based at the airport as a percent of total will decrease over the 20-year forecast period while turbine will increase, which is on par with national trends.

TABLE B.6 – GENERAL AVIATION BASED AIRCRAFT FLEET MIX, 2020-2040

Aircraft Type	2020	2025	2030	2035	2040
Single-Engine Piston	65	72	78	84	89
Multi-Engine Piston	5	6	6	7	7
Turbo-prop – SE	5	7	9	10	12
Turbo-prop – ME	2	3	5	7	9
Jet	3	3	4	5	7
Military	2	2	2	2	2
Helicopter	10	10	11	11	12
Other	8	9	9	10	10
Total	100	112	124	136	149

Source: KSA; Granbury Regional Airport

GENERAL AVIATION OPERATIONS FORECASTS

General aviation operations are those which are not categorized as commercial or military. Several forecast scenarios were developed to appropriately reflect current general aviation operational activity and provide realistic projections for the 20-year planning period. The forecast scenarios generated assume, for the most part, straight-line growth. While it is recognized that straight-line (consistent) growth never occurs year after year, average annual growth methodologies often serve to illustrate intermediate- and long-range planning. It should be noted that it is not actual numbers that are most important, but the reasoning, assumptions, and trends the numbers represent. The following methodologies were considered in determining projections of general aviation demand.

- **FAA Terminal Area Forecasts (TAF)** – Data from the December 2020 FAA Terminal Area Forecasts (TAF) is shown (0.0 percent)
- **FAA Aerospace Forecasts –** As indicated in this projection and according to the *FAA Aerospace Forecasts, Fiscal Years, 2020-2040*, general aviation operations nationwide are expected to increase at an average annual rate of 0.8 percent.
- **FAA Aerospace Forecasts (turbine growth) –** As reflected in the *FAA Aerospace Forecasts, Fiscal Years, 2020-2040*, turbine type aircraft are anticipated to grow at an average annual growth rate of 2.2 percent. This growth reflects increased flying by business and corporate aircraft overall.
- **FAA Aerospace Forecasts (avg. general aviation and turbine growth) –** This methodology assumes a CAGR of 1.5 percent, reflecting the combined average annual growth rates in the *FAA Aerospace Forecasts, Fiscal Years, 2020-2040*, for both the general aviation and turbine fleets. This growth rate is the preferred option for anticipated general aviation operations for the planning period.
- **Operations Per Based Aircraft** – Generally, there is a relationship between aviation activity and based aircraft, stated in terms of Operations Per Based Aircraft (OPBA). At times, a trend can be established from historical information on OPBA. The national trend has been changing with more aircraft being used for business purposes and less for leisure. This impacts the OPBA in that business aircraft are usually flown more often than recreational or leisure aircraft. It is anticipated the OPBA will provide a CAGR of 1.2 percent.
- **Demographics (Population and Income)** – As previously mentioned, socioeconomic conditions of a particular area or region can affect aviation activity. This methodology utilizes the combined average annual population and income growth for Hood County of 1.7 percent as a projection basis.

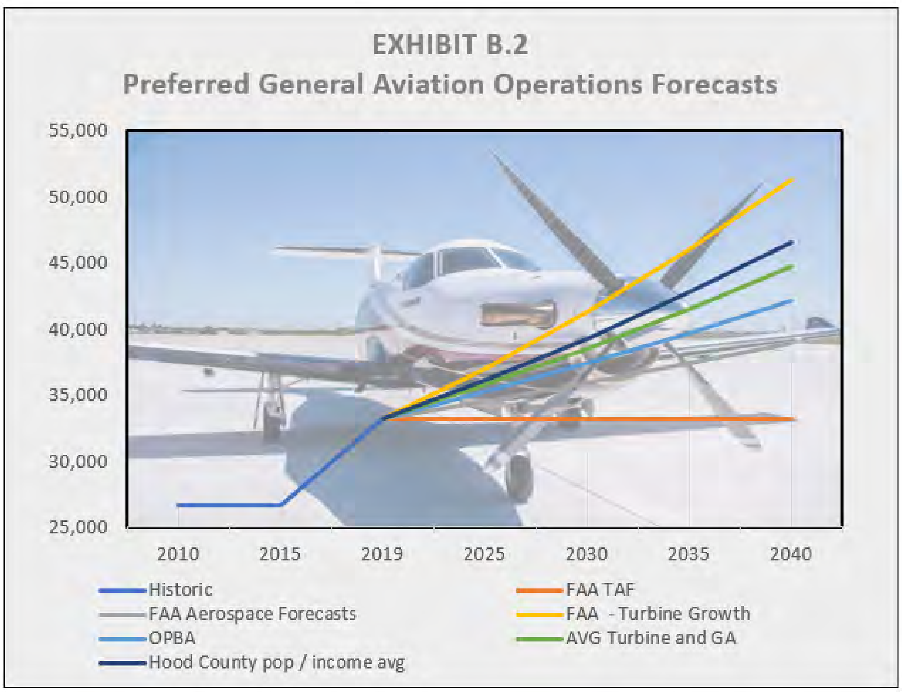
Table B.7 shows the results of the various general aviation operations forecasts. Based on the long-term trends previously mentioned for the general aviation industry, as well as the opportunity to attract additional business to the area, it is anticipated, at a minimum, the airport is capable of achieving operational growth similar to national trend levels for general aviation at 0.8 percent annually. However, as previously shown, data for the general fleet and operations is increasing at a more rapid pace within the turbine sector of aviation. This factor, coupled with the previously described increases in population and income for Hood County and newly constructed 5,200 foot runway, postulate a CAGR of 1.5 percent as the preferred general aviation operations forecast.

TABLE B.7 – PREFERRED GENERAL AVIATION FORECASTS, 2020-2040

Year	FAA TAF Summary	FAA Aerospace Forecasts	FAA Aerospace Forecasts (Turbine Growth)	FAA Aerospace Forecasts (avg. GA and Turbine)	OBPA	Hood County Population / Income Avg.
2020	33,200	33,200	33,200	**33,200**	33,200	33,200
2025	33,200	34,500	37,000	**35,700**	35,200	36,100
2030	33,200	35,900	41,200	**38,500**	37,400	39,300
2035	33,200	37,400	46,000	**41,500**	39,700	42,700
2040	33,200	38,900	51,300	**44,700**	42,100	46,500
CAGR	0.0%	0.8%	2.2%	1.5%	1.2%	1.7%

Source: KSA,

EXHIBIT B.2: PREFERRED GENERAL AVIATION OPERATIONS FORECASTS



MILITARY OPERATIONS

Historically, military operations have not been conducted at the airport. No factors have been identified that would alter the number of military operations at the airfield in the future. Thus, the number of military aircraft operations is projected to remain at this level throughout the planning period.

OPERATIONS FORECAST BY AIRCRAFT TYPE

As indicated in the following table, **Table B.8**, total aircraft movements and operations are expected to increase an average 1.4 percent annually from the current level of 21,459 to approximately 29,340 by the end of the planning period with general aviation operations representing the majority percentage of activity through the planning timeframe.

TABLE B.8 – SUMMARY OF OPERATIONS BY AIRCRAFT TYPE, 2020-2040

Aircraft Type	2020	2025	2030	2035	2040
Single-Engine Piston	26,580	28,400	29,000	30,350	31,400
Multi-Engine Piston	660	700	800	850	900
Turbo-prop (SE)	660	1,100	2,100	2,900	4,000
Turbo-prop (ME)	1,300	1,400	1,500	1,700	1,800
Business Jet	1,000	1,100	2,100	2,700	3,500
Helicopter	3,000	3,000	3,000	3,000	3,100
Total	33,200	35,700	38,500	41,500	44,700

Source: KSA, Gliders/Experimental are included in the single-engine portion of operations.

LOCAL / ITINERANT OPERATIONS FORECAST

The FAA defines a local operation as any operation performed by an aircraft operating in the local traffic pattern or within sight of the tower, or aircraft known to be operating in local practice areas, or aircraft executing practice instrument approaches. According to airport records, itinerant operations constituted approximately 25 percent of the overall operations total with local operations contributing the remaining 75 percent. The airport will continue to serve as a center for business and other related general aviation operations, with the forecast percentage of itinerant operational activity increasing to 30 percent by the end of the planning period. **Table B.9** reflects the total local and itinerant operations for the planning period.

TABLE B.9 – LOCAL AND ITINERANT OPERATIONS FORECAST, 2020-2040

Year	Itinerant Operations	Local Operations	Total Operations
2020	8,300	24,900	33,200
2025	9,400	26,300	35,700
2030	10,600	27,900	38,500
2035	11,700	29,800	41,500
2040	13,400	31,300	44,700

Source: KSA; Airport Master Record 5010-1; Granbury Regional Airport personnel

B.8 CRITICAL AIRCRAFT ANALYSIS

CRITICAL AIRCRAFT

The development of airport facilities is impacted by both the demand for those facilities, typically represented by total based aircraft and operations at an airport, and the type of aircraft that will use those facilities. In general, airport infrastructure components are designed to accommodate the most demanding aircraft, referred to as the critical aircraft, which will utilize the infrastructure on a regular basis. The factors used to determine an airport's critical aircraft are the approach speed and wing span / tail height of the most demanding class of aircraft that is anticipated to perform at least 500 annual operations at the airport during the planning period. These 500 operations can be conducted by a single aircraft type or composite aircraft representing a collection of aircraft with similar qualities.

RUNWAY DESIGN CODE (RDC)

The RDC is a three component code that defines the applicable design standards that apply to a specific runway. The first component, depicted by a letter (A-E) is the Aircraft Approach Category (AAC) and relates to the approach speed of the design aircraft. Generally, the AAC 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. The second component, Airport Design Group (ADG), depicted by a Roman numeral (I-VI), relates to the greatest wingspan or tail height of the design aircraft, whichever is most restrictive. The ADG influences design standards for taxiways, aircraft wingtip clearances, and separation distances. The third component relates to runway visibility minimums as expressed in Runway Visual Range (RVR) equipment measurements. RVR-derived values represent feet of forward visibility that have statute mile equivalents (e.g. 2400 RVR = ½-mile). RDC classifications are summarized in **Table B.10**.

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TABLE B.10 – RUNWAY DESIGN CODE

Aircraft Approach Category (AAC)	
AAC	**Approach Speed**
A	Less than 90 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'

Approach Visibility Minimums	
RVR (ft)	**Flight Visibility Category (statute mile)**
5000	Not lower than 1-mile
4000	Lower than 1-mile but not lower than ¾-mile
2400	Lower than ¾-mile but not lower than ½-mile (CAT-I)
1600	Lower than ½-mile but not lower than ¼-mile CAT-II)
1200	Lower than ¼-mile (CAT-III)

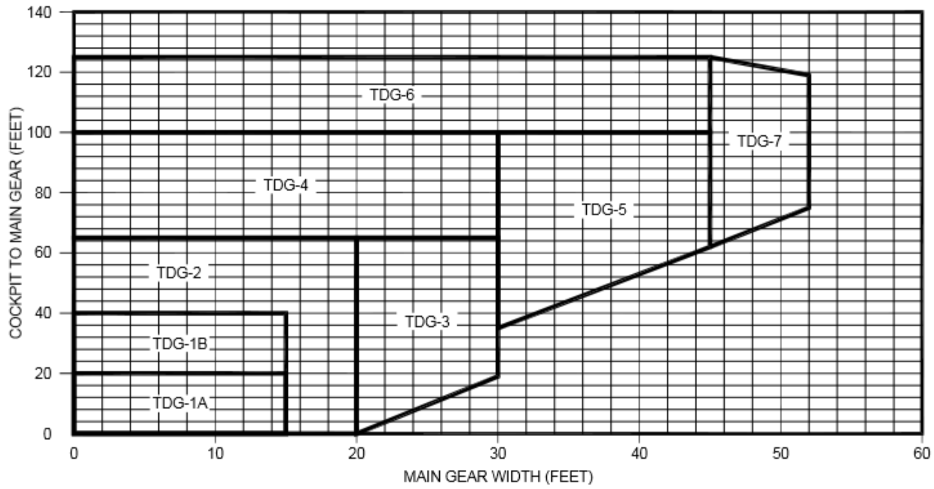
RVR – Runway Visual Range. The approximate visibility (in feet) as measured by the RVR light transmission/reception equipment or equivalent weather observer report.

Source: FAA A/C 150/5300-13A, *Airport Design*, Change 1

TAXIWAY DESIGN CODE (TDG)

Separation between runways, taxiways, taxilanes, and objects is related to the aircraft characteristics encompassed by the ADG wingspan or tail height restriction. The Taxiway Design Group (TDG) takes into account the dimensions of the aircraft undercarriage or landing gear to determine taxiway widths and pavement fillets to be provided at taxiway intersections. Other taxiway elements such as taxiway safety and object free areas (TSA and TOFA), taxiway / taxilane separation standards, and taxiway / taxilane wingtip clearances are based solely on ADG.

EXHIBIT B.3: TAXIWAY DESIGN GROUP DETERMINATION



Source: FAA A/C 150/5300-13A, *Airport Design*

AIRPORT REFERENCE CODE (ARC)

The Airport Reference Code (ARC) is a coding system used to relate and compare airport design criteria to the operational and physical characteristics of the aircraft intended to operate at the airport. The ARC is similar in scope to the RDC, minus the third element of visibility. Based on examination of the operational information and existing airport plans, it has been determined to maintain the B-I designation on Runway 14 / 32 for existing and B-II for ultimate conditions upon completion of Runway 01 / 19 and closure of Runway 14 / 32. **Table B.11** summarizes the critical aircraft and design aircraft components for each runway at the airport.

TABLE B.11 – CRITICAL AIRCRAFT PARAMETERS

Existing				
Runway	**Critical Design Aircraft**	**RDC**	**ARC**	**TDG**
14 / 32	King Air B100	B-I-4000	B-I	2
01 / 19	Under Construction	N/A	N/A	N/A
Ultimate				
Runway	**Critical Design Aircraft**	**RDC**	**ARC**	**TDG**
14 / 32	Closed/ Converted to Taxiway	N/A	N/A	N/A
01 / 19	Cessna Citation 550	B-II-5000	B-I	2

Source: KSA,

B.6 SUMMARY

Aircraft activity at Granbury Regional Airport has fluctuated in recent history. This is not an uncommon theme at many U.S. airports as economic uncertainty and increased travel costs have impacted travel behavior. Despite rapid volatility in fuel cost, airline bankruptcies, system-wide route restructuring, aircraft fleet overhauls, and impacts and uncertainty associated with COVID-19, the forecasts developed for this Master Plan Update suggest positive growth in the number of based aircraft and total aircraft operations at the Airport over the next 20 years.

The following tables summarize the forecasts of aviation activity that have been presented in this chapter. This information will be utilized in the next chapter, *Facility Requirements*, to document, analyze, and quantify airside and landside needs. Therefore, the forecasts of aviation activity are an important part of the information base which will be used to develop ultimate plans for the airport and formulate implementation decisions relating to airport development.

To secure approval for these projections, the FAA requires a comparison of Master Plan forecasts to the annually produced TAF, which are completed for each airport in the NPIAS and updated each year. The FAA prefers that airport planning forecasts not vary significantly from the TAF and looks for forecasts to be within 10 percent of their five-year forecasts and 15 percent of their ten-year forecasts. The FAA templates for summarizing and documenting airport planning forecasts and for comparing projections with the FAA TAF Forecasts are presented in Table B.13 and Table B.14.

TABLE B.12 – SUMMARY OF OPERATIONS BY AIRCRAFT TYPE, 2020-2040

Operations	2020	2025	2030	2035	2040
Single-Engine Piston	26,580	28,400	29,000	30,350	31,400
Multi-Engine Piston	660	700	800	850	900
Turbo-prop (SE)	660	1,100	2,100	2,900	4,000
Turbo-prop (ME)	1,300	1,400	1,500	1,700	1,800
Business Jet	1,000	1,100	2,100	2,700	3,500
Helicopter	3,000	3,000	3,000	3,000	3,100
TOTAL OPERATIONS	33,200	35,700	38,500	41,500	44,700
Local Operations	24,900	26,300	27,900	29,800	31,300
Itinerant Operations	8,300	9,400	10,600	11,700	13,400
Based Aircraft					
Single-Engine	65	72	78	84	89
Multi-Engine	5	6	6	7	7
Turbo-prop (SE)	5	7	9	10	12
Turbo-prop (ME)	2	3	5	7	9
Jet	3	3	4	5	7
Military	2	2	2	2	2
Helicopter	10	10	11	11	12
Other	8	9	9	10	10
TOTAL	100	112	124	136	149

Source: KSA

TABLE B.13 – COMPARISON OF ACTIVITY FORECASTS AND TAF FORECASTS, 2020-2040 (FAA FORMAT)

Operations	Airport Forecasts	TAF Forecast	AF / TAF % Difference
TOTAL OPERATIONS			
Base Year (2020)	33,200	33,200	0.0%
2025	35,700	33,200	7.5%
2030	38,500	33,200	16.0%
2035	41,500	33,200	25.0%
2040	44,700	33,200	34.6%

Source: KSA

TABLE B.14 – SUMMARY OF AIRPORT PLANNING FORECASTS, 2020-2040 (FAA FORMAT)

	2020	2025	2030	2035	2040	Average Annual Compound Growth Rate 2025	2030	2035	2040
Operations – Itinerant									
General Aviation	8,300	9,400	10,600	11,700	13,400	2.5%	2.4%	2.0%	2.8%
Military	0	0	0	0	0	0.0%	0.0%	0.0%	0.0%
Operations – Local									
General Aviation	24,900	26,300	27,900	29,800	31,300	1.1%	1.2%	1.3%	1.0%
Military	0	0	0	0	0	0.0%	0.0%	0.0%	0.0%
TOTAL OPERATIONS	**33,200**	**35,700**	**38,500**	**41,500**	**44,700**	**1.5%**	**1.5%**	**1.5%**	**1.5%**
Instrument Operations	3,300	3,500	3,800	4,100	4,400	1.2%	1.7%	1.5%	1.4%
Peak Hour Operations	11	14	17	19	22	4.9%	4.0%	2.2%	3.0%
Based Aircraft									
Single-Engine	65	72	78	84	89	2.1%	1.6%	1.5%	1.2%
Multi-Engine	5	6	6	7	7	3.7%	0.0%	3.1%	0.0%
Turbo Prop (SE)	5	7	9	10	12	7.0%	5.2%	2.1%	3.7%
Turbo-prop(ME)	2	3	5	7	9	8.4%	10.8%	7.0%	5.2%
Jet	3	3	4	5	7	0.0%	5.9%	4.6%	7.0%
Military	2	2	2	2	2	0.0%	0.0%	0.0%	0.0%
Helicopter	10	10	11	11	12	0.0%	1.9%	0.0%	1.8%
Other	8	9	9	10	10	2.4%	0.0%	2.1%	0.0%
TOTAL BASED AIRCRAFT	**100**	**112**	**124**	**136**	**149**	**2.3%**	**2.1%**	**1.9%**	**1.8%**