CHAPTER TWO
FORECASTS

The definition of demand that may reasonably be expected to occur during the useful life of an airport's key components (e.g., runways, taxiways, terminal buildings, etc.) is an important factor in facility planning. In airport master planning, this involves projecting potential aviation activity for at least a 20-year timeframe. Aviation demand forecasting for Payson Municipal Airport (PAN) will primarily consider based aircraft, aircraft operations, peak activity periods, and the critical aircraft.

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

When reviewing a sponsor's forecast (from the master plan), the FAA must ensure that the forecast is based on reasonable planning assumptions, uses current data, and is developed using appropriate forecast methods. According to the FAA, 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 upon 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) 150/5070-6B, *Airport Master Plans*, outlines seven standard steps involved in the forecast process, including:

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 *Terminal Area Forecast*, 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**: There are several appropriate methodologies and techniques 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 judgment.
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 FAA's TAF**: Based aircraft and total operations are considered consistent with the TAF if they meet the following criteria:
   - Forecasts differ by less than 10 percent in the five-year forecast period, and 15 percent in the 10-year forecast period, or
   - 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 5090.5, *Field Formulation of the National Plan of Integrated Airport Systems* (NPIAS) *and the Airports Capital Improvement Plan* (ACIP).

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 to serve only 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 historic activity. The historical aviation activity is then examined along with other factors and trends that can affect demand. The intent is to provide 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 2022 with a long-range forecast out to 2042.

NATIONAL AVIATION TRENDS

Each year, the FAA updates and publishes a national aviation forecast. Included in this publication are forecasts for the 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 to 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 Forecasts – Fiscal Years 2022-2042*, published in June 2022. 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 Forecasts*.

Since its deregulation in 1978, the U.S. commercial air carrier industry has been characterized by boom-to-bust cycles. The volatility that was 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 2007-09 marked a fundamental change in the operations and finances of U.S. airlines. Since the end of the recession in 2009, U.S. airlines 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 in 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, with the introduction of vaccines and the lifting of some local restrictions, leisure travel began to rebound. Two new low-cost carriers were formed, and one regional carrier that ceased operations in 2020 was revived. By the third quarter of 2021, industry profitability was nearing the breakeven point. There is confidence that U.S. airlines have transformed from a capital intensive, highly cyclical industry to an industry that can generate sustained profits.

ECONOMIC ENVIRONMENT

According to the FAA forecast, over the next 20 years, the annual gross domestic product (GDP) of the U.S. is expected to increase by 2.3 percent. U.S. carrier profitability is projected to remain under pressure for several years due to depressed demand and competitive fare pressures. As carriers return to levels of capacity consistent with their fixed costs, shed excess debt, and see rising yields, profitability should gradually return. Over the long term, a competitive and profitable aviation industry should emerge, characterized by increasing demand for air travel, with airfares growing more slowly than overall inflation, reflective of growing U.S. and global economies.

Prior to the COVID-19 pandemic, the economy was recovering from the most serious economic downturn and slow recovery since the Great Depression. Fundamentally, demand for aviation is driven by economic activity. As economic growth picks up, so will growth in aviation activity. Overall, the FAA forecast calls for passenger growth over the next 20 years to average 4.7 percent annually, which includes double-digit growth years in 2022 and 2023 as activity climbs out from a very low base. Oil prices averaged $60 per barrel in 2021 and are forecast to rise to $75 in 2022; however, this projection does not take into account Russia's invasion of Ukraine, which will likely push prices even higher in 2022. By the end of the forecast period in 2042, oil is projected to average $87 per barrel.

FAA GENERAL AVIATION FORECASTS

The long-term outlook for general aviation is promising, as growth at the high-end offsets continuing retirements at the traditional low end of the segment. The active general aviation fleet is forecast to remain relatively stable between 2022 and 2024, increasing by just 0.1 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 aircraft, multi-engine piston aircraft, turboprops, business jets, piston and turbine helicopters, light sport, experimental, and others (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	2022	2042	CAGR
General Aviation (GA) Fleet			
Total Fixed Wing Piston	133,815	112,915	-0.8%
Total Fixed Wing Turbine	26,480	38,455	1.9%
Total Helicopters	9,955	13,530	1.5%
Total Other (experimental, light sport, etc.)	34,340	44,005	1.2%
Total GA Fleet	**204,590**	**208,905**	**0.1%**
General Aviation Operations			
Local	13,731,399	15,767,539	0.7%
Itinerant	14,569,014	16,259,605	0.6%
Total GA Operations	**28,300,413**	**32,027,144**	**0.6%**
CAGR: compound annual growth rate (2022-2042)			

Source: FAA Aerospace Forecast - Fiscal Years 2022-2042

General Aviation Aircraft Fleet Mix

For 2022, the FAA estimates there are 133,815 piston-powered, fixed-wing aircraft in the national fleet. That number is forecast to decline by 0.8 percent by 2042, resulting in 112,915 aircraft. This includes a decline of 0.9 percent in single engine aircraft and a decline of 0.3 percent in multi-engine piston aircraft.

Total turbine aircraft are forecast to grow at an annual rate of 1.9 percent through 2042. The FAA estimates there are 26,480 fixed-wing turbine-powered aircraft in the national fleet in 2022, and there will be 38,455 by 2042. Turboprops are forecast to grow by 0.6 percent annually, while business jets are projected to grow by 2.6 percent annually through 2042.

Total helicopters are projected to grow by 1.5 percent annually in the forecast period. There are an estimated 9,955 total helicopters in the national fleet in 2022, and that number is expected to grow to a total of 13,530 by 2042. This includes annual growth rates of 0.6 percent for piston helicopters and 1.9 percent for turbine helicopters.

The FAA also forecasts experimental aircraft, light sport aircraft, and others. Combined, there are an estimated 34,340 other aircraft in 2022 that are forecast to grow to 44,005 by 2042, for an annual growth rate of 1.2 percent.

General Aviation Operations

The FAA also forecasts total operations based upon 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 28.3 million in 2022 to 32.0 million in 2042, with an average increase of 0.6 percent per year as growth in turbine, rotorcraft, and experimental hours offset a decline in fixed-wing piston hours. This includes annual growth rates of 0.7 percent for local general aviation operations and 0.6 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 2021 with a total of 2,646 units delivered around the globe, compared to 2,408 units in 2020, but not quite reaching the 2,658 units delivered in 2019. Worldwide general aviation billings were the highest in 2014. In 2021, there was an increase of new aircraft shipments with more than $21 billion compared to the previous year's $20.0 billion. North America continues to be the largest market for general aviation aircraft and leads the way in the manufacturing of piston, turboprop, and jet aircraft. The Asia-Pacific region is the second largest market for piston-powered, while Latin America is the second leading in the turboprop market, and Europe leads in business jet deliveries.

Business Jets: Business jet deliveries increased from 644 units in 2020 to 710 units in 2021, rebounding from the previous year's drop from 809. The North American market accounted for 66 percent of business jet deliveries, which is a 0.1 percent decrease in market share compared to 2020.

Turboprops: Turboprop shipments were up from 443 in 2020 to 527 in 2021. North America's market share of turboprop aircraft, however, decreased by 2.3 percent in the last year. The European and Asia-Pacific markets also decreased, while Latin America and Middle East & Africa markets increased their market share.

Pistons: In 2021, piston airplane shipments increased to 1,409 units compared to 1,321 units in the prior year. North America's market share of piston aircraft deliveries rose 0.8 percent from the year 2020. The Europe, Latin America, and Middle East & Africa markets experienced a positive rate in market share during the past year, while Asia-Pacific saw a decline.

Table 2B | Annual General Aviation Airplane Shipments Manufactured Worldwide and Factory Net Billings

Year	Total	SEP	MEP	TP	J	Net Billings ($millions)
2001	2,998	1,645	147	422	784	13,868
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

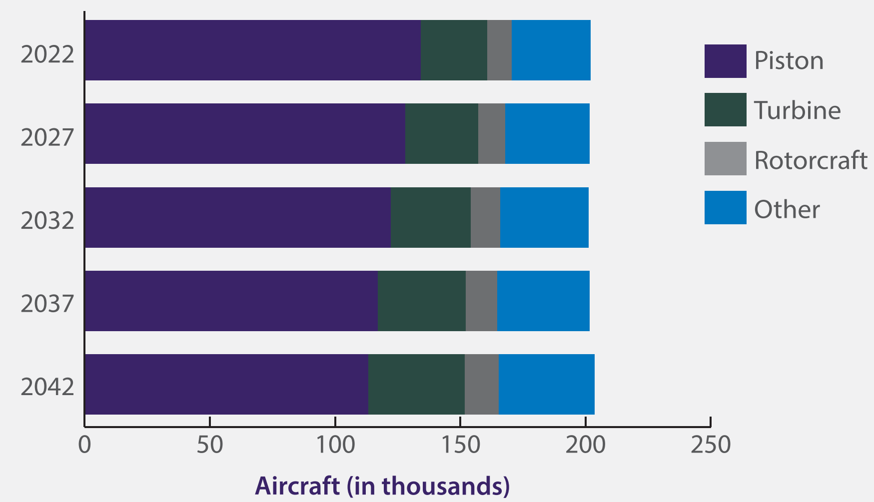
SEP - Single-Engine Piston; MEP - Multi-Engine Piston; TP - Turboprop; J - Turbofan/Turbojet

Source: General Aviation Manufacturers Association, 2020 Annual Report

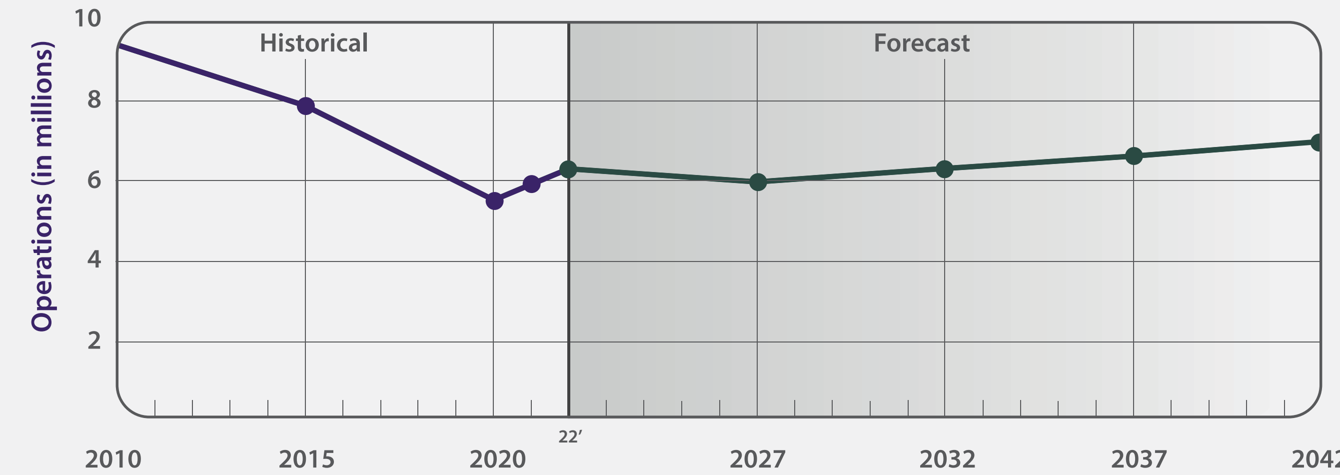
U.S. PILOT POPULATION

There were 470,408 active pilots certificated by the FAA at the end of 2021, with 474,450 active pilots projected in 2022. All pilot categories, except for private and recreational-only certificates, are expected to continue to increase. Excluding student pilots, the number of active general aviation pilots is projected to increase by about 26,270 (up 0.3 percent annually) between 2022 and 2042. The ATP category is forecast to increase by 28,300 (up 0.8 percent annually). Sport pilots and commercial pilots are predicted to

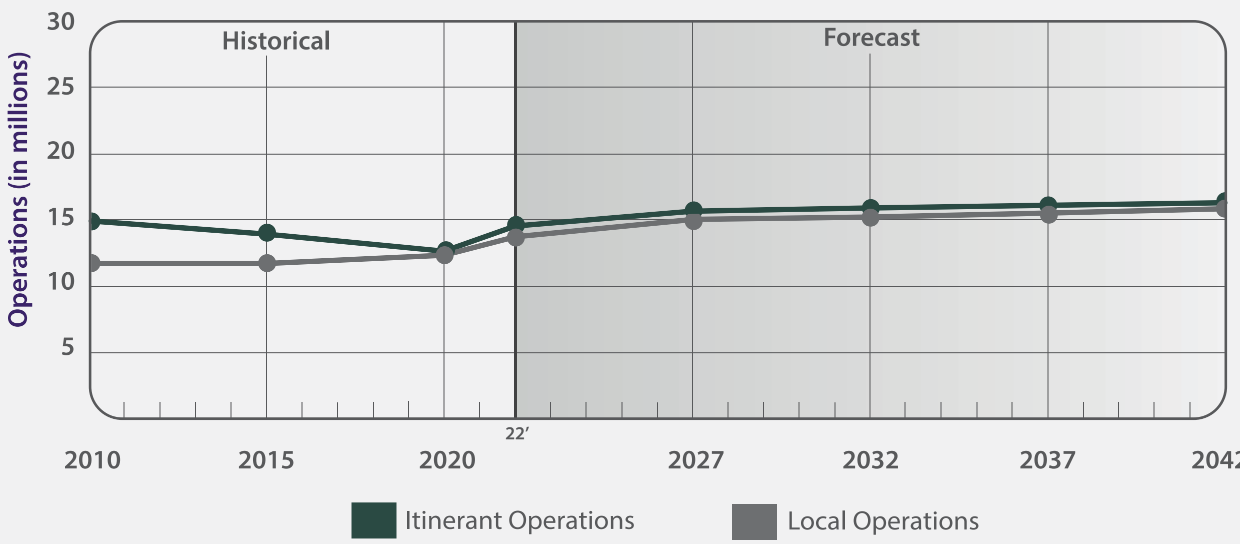
U.S. Active General Aviation Aircraft



U.S. Air Taxi Operations



U.S. General Aviation Operations

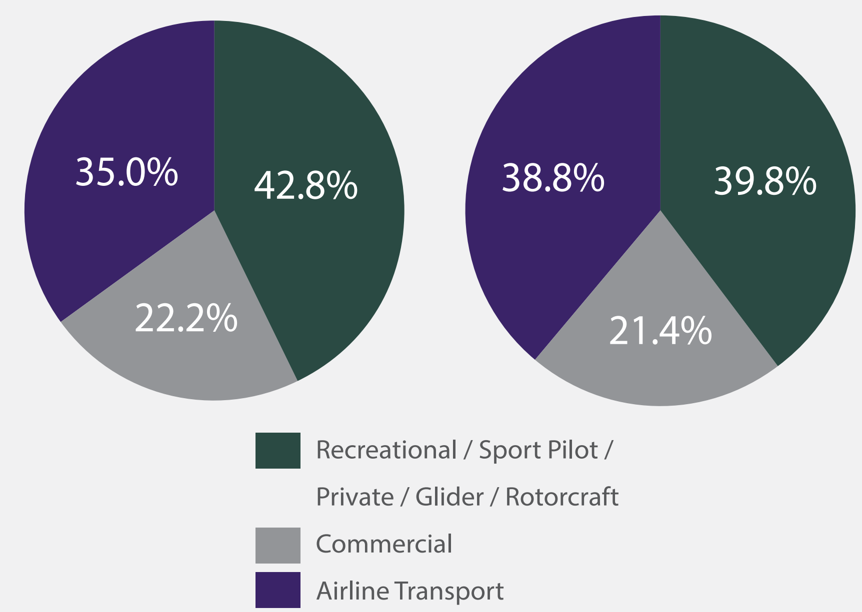


Source: FAA Aerospace Forecasts FY2022-2042

Active Pilots By Certificate

2022
Total Active Pilots: **474,450***

2042
Total Active Pilots: **500,720**



**Excludes Student Pilot Certificates*

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increase by 2.7 percent and 0.1 percent annually, respectively, over the forecast period, while private pilot certificates are projected to decrease at an average annual rate of 0.5 percent through 2042. 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, this is 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 though the industry has rebounded, the threat of future global health pandemics and potential economic fallout remain.

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 determined primarily by evaluating the location of competing airports, their capabilities, their services, and their 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. PAN is classified as a Local General Aviation (GA) airport within the NPIAS, meaning that its primary role is to provide the community with access to local and regional markets. General aviation, which includes all segments of the aviation industry except commercial air carriers and the military, is the largest component of the national aviation system. It includes activities such as pilot training, recreational flying, and the use of sophisticated turboprop and jet aircraft for business and corporate use.

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, that influence aviation demand at an airport. Aviation demand will be impacted by the proximity of competing airports, the surface transportation network, and the strength of general aviation services provided by an airport and competing airports.

As in any business enterprise, the more attractive the facility is in terms of service 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 Local GA airport, PAN's service area is driven by aircraft owners/operators and where they choose to base their aircraft. The primary consideration of aircraft owners/operators when choosing where to base their aircraft is convenience (i.e., easy access and proximity to the airport). As a general rule, an airport's service area can extend up to and beyond 30 miles. The proximity and level of general aviation services are largely a defining factor when describing the general aviation service area. A description of nearby airports was previously completed in Chapter One, as presented on Table 1D. There are no public-use airports within 30 nautical miles (nm) of PAN. When the radius is extended to 50 nm of the airport, there are three public-use facilities offering varying levels of services and amenities.

When discussing the general aviation service area, two primary demand segments need to be addressed. The first component is the airport's ability to attract based aircraft. Under this circumstance, the most effective method of defining the airport's service area is by examining the number of registered aircraft owners in proximity to the airport. As previously mentioned, aircraft owners typically choose to base at an airport near their home or business. Based on the current registered aircraft data, presented on **Exhibit 2B**, there are 90 registered aircraft within 30 nm of PAN. This number increases substantially beyond 30 nm and nearer to airports in Scottsdale and Sedona. Of the 90 aircraft registered within 30 nm of PAN, 49 are based at the airport, with an additional 17 aircraft registered to addresses beyond 30 nm. The majority of aircraft based at PAN are located within 10 nm of the airport.

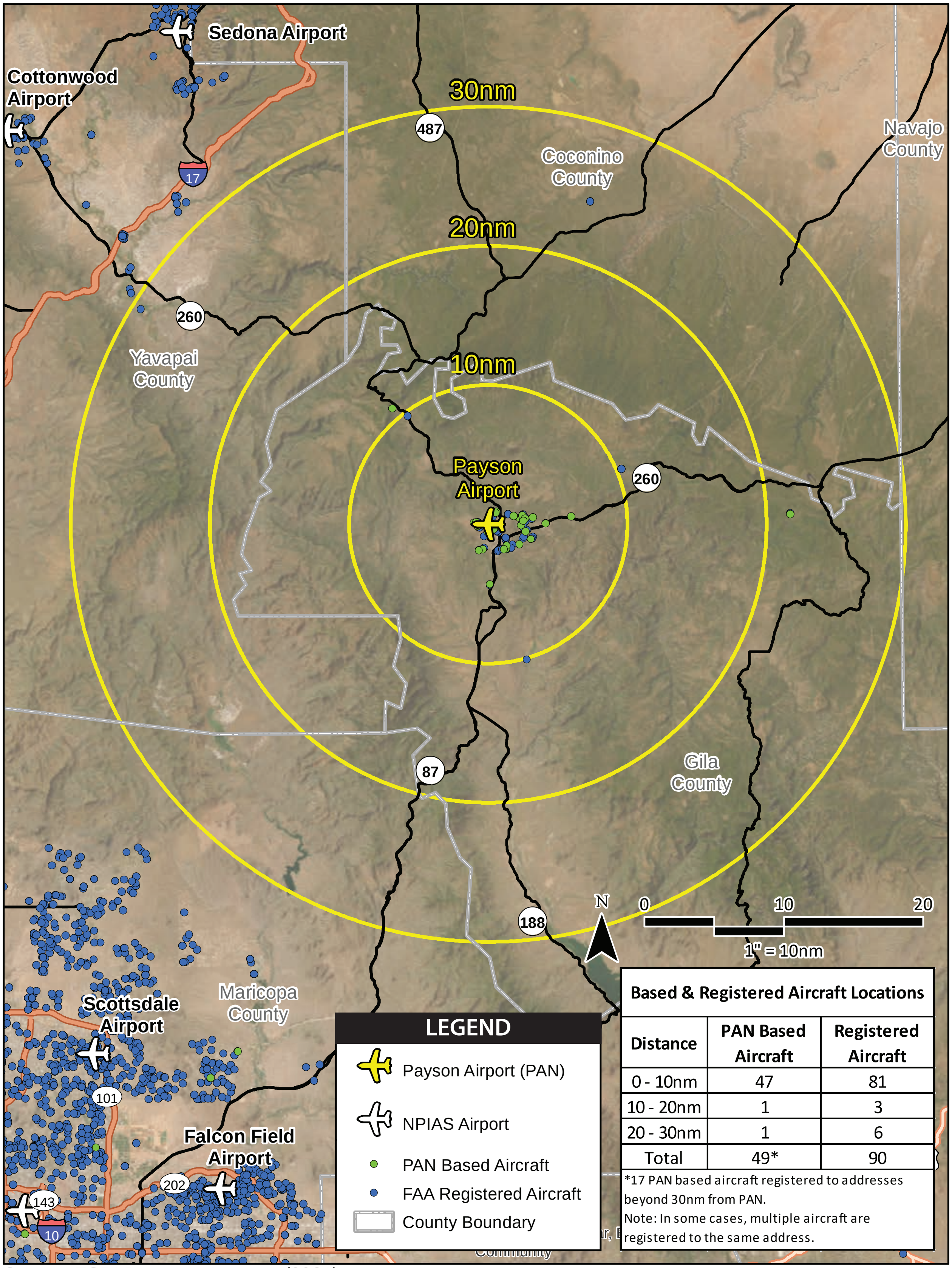
The second demand segment to consider is itinerant aircraft operations. In most instances, pilots will opt to utilize airports nearer their intended destination; however, this is also dependent on the airport's capabilities in accommodating the aircraft operator. As a result, airports offering better services and facilities are more likely to attract itinerant operators in the region.

With few competing airports in the region, Payson Municipal Airport's primary service area is defined by its convenience to its users and its ability to compete for based aircraft. As stated, there are no NPIAS airports located in the vicinity (i.e., 30 nm) of PAN, and the nearest airports are Scottsdale Airport located in Maricopa County, Cottonwood Airport in Yavapai County, and Sedona Airport straddling the Yavapai and Coconino County line. As such, the primary service area for PAN is established as Gila County. Additionally, the airport is centrally located within the county, and the majority of both registered and based aircraft are clustered in the immediate vicinity of the airport.

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 upon 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 not to 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. By fitting growth curves to historical data, then extending them into the future, a basic trend line projection is produced. 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 does serve as a reliable benchmark for comparing other projections.



Based & Registered Aircraft Locations

Distance	PAN Based Aircraft	Registered Aircraft
0 - 10nm	47	81
10 - 20nm	1	3
20 - 30nm	1	6
Total	49*	90

*17 PAN based aircraft registered to addresses beyond 30nm from PAN.
Note: In some cases, multiple aircraft are registered to the same address.

Source: ESRI Basemap Imagery (2021),
Payson Airport, FAA Registered Aircraft Database.

Correlation analysis provides a measure of direct relationship between two separate sets of historical data. Should there be 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 the farther one is from the base year, the less reliable a forecast may become, particularly due to changing local and national conditions. Nonetheless, the FAA requires that a 20-year forecast be developed for long-range airport planning. Facility and financial planning usually require at least a ten-year view since it often takes more than five years to complete a major facility development program; however, it is important to use forecasts which do not overestimate revenue-generating 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. Recessionary periods have been closely followed by declines in aviation activity. Nonetheless, over time, trends emerge and provide the basis for airport planning.

Future facility requirements, such as hangar, apron, and terminal needs, 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

EXISTING FORECASTS

Consideration is given to any forecasts of aviation demand for the airport that have been completed in the recent past. For PAN, the previous forecasts reviewed are those in the FAA *Terminal Area Forecast* (TAF), the 2009 Airport Master Plan, and the 2018 *Arizona State Aviation System Plan* (SASP).

FAA *TERMINAL AREA FORECAST*

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 used by FAA for internal planning purposes primarily. It is available to airports and consultants to use as a baseline projection and important point of comparison while developing local forecasts. The current TAF was published in February 2023 and is based on the federal fiscal year (October-September).

As presented in **Table 2C**, the TAF projects general aviation activity at the airport to remain static over the next 20 years. Given that there is currently no commercial service activity at PAN, the TAF does not reflect any existing and/or forecast air carrier operations; however, the TAF does reflect 1,750 air taxi operations over the forecast period. Operations are projected to be dominated by local and itinerant GA operations, which are estimated to account for approximately 35 percent and 65 percent of operations, respectively, over the planning period. Military operations are projected to account for 1.5 percent of total operations, with 500 projected for each of the plan years. Based aircraft are also projected to remain flat over the next 20 years, at 40. As noted previously, the FAA will compare the new forecasts developed for this master plan to the TAF.

Table 2C | 2023 FAA Terminal Area Forecast – PAN

	2022	2027	2032	2042	CAGR 2022-2042
ANNUAL OPERATIONS					
Itinerant					
Air Carrier	0	0	0	0	0.0%
Air Taxi	1,750	1,750	1,750	1,750	0.0%
General Aviation	20,000	20,000	20,000	20,000	0.0%
Military	500	500	500	500	0.0%
Total Itinerant	*22,250*	*22,250*	*22,250*	*22,250*	*0.0%*
Local					
General Aviation	12,000	12,000	12,000	12,000	0.0%
Military	0	0	0	0	0.0%
Total Local	*12,000*	*12,000*	*12,000*	*12,000*	*0.0%*
Total Operations	***34,250***	***34,250***	***34,250***	***34,250***	0.0%
BASED AIRCRAFT					
Based Aircraft	***40***	***40***	***40***	***40***	0.0%

Source: FAA Terminal Area Forecast (TAF), February 2023

PREVIOUS FORECASTS

Forecasts of aviation activity at PAN were previously prepared within the 2009 Airport Master Plan and the 2018 SASP. **Table 2D** summarizes the forecasts of operations and based aircraft at PAN that were prepared for these studies. The based aircraft count in the previous master plan included both on-airport and off-airport (through-the-fence) aircraft. It should be noted that, since the completion of the previous master plan, a national recession caused a significant reduction in aviation activity not only at PAN but across the country. As a result, the projections from the previous master plan are no longer relevant.

The SASP projections were prepared most recently and account for the effects of the recession. The SASP forecasted operations to grow slightly from 33,770 in 2016 to 34,310 by 2036, and based aircraft to increase from 54 to 64 by 2036. In terms of based aircraft, the airport has exceeded these projections, when counting both on- and off-airport based aircraft, which totals 65. Operationally, the SASP base year estimate and long-term projection are roughly in line with what the FAA's TAF and Form 5010, *Airport Master Record*, reflect. Based on recent activity trends at PAN and the time that has passed since the preparation of these previous forecasts, it is necessary to develop new forecasts utilizing the most current information available.

Table 2D | Previous Forecasts – PAN

Year	Itinerant Operations	Local Operations	Total Operations	Based Aircraft*
2009 Airport Master Plan (2007 Base Year)				
2007	26,800	15,000	41,800	90
2013	30,300	18,800	49,100	105
2018	33,900	22,600	56,500	118
2028	40,000	29,700	69,700	140
2018 *Arizona State Aviation System Plan* Update (2016 Base Year)				
2016	22,630	11,140	33,770	54
2021	22,720	11,190	33,910	57
2026	22,810	11,230	34,040	59
2036	22,990	11,320	34,310	64

* Includes off-airport based aircraft
Note: Some totals are approximate and may not equal the total annual operations due to rounding

Sources: 2009 Master Plan; 2018 Arizona State Aviation System Plan Update

GENERAL AVIATION FORECASTS

General aviation 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 the airport, certain elements of this activity must be forecast. These indicators of general aviation demand include based aircraft, aircraft fleet mix, operations, 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. PAN is a unique facility in that it has based aircraft located both on- and off-airport in the Mazatzal Mountain Residential Airpark and the Sky Park Industrial Park. This is an important distinction to make when forecasting, as aircraft based off-airport will not factor significantly into landside facility needs on-airport. As such, forecasts will only be developed for on-airport based aircraft, and off-airport based aircraft will remain constant through the planning period.

From an operational standpoint, off-airport based aircraft are still an important segment to consider, as these aircraft will factor into annual operations occurring at the airport. Additionally, understanding the types of aircraft based both on- and off-airport, now and in the future, are instrumental in defining the airport's critical aircraft (to be discussed in a later section of this chapter) which will determine the FAA design standards that should be met on both the airside and the landside.

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 county-wide 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 the 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 of the forecasts is then examined for reasonableness, and any outliers are discarded or given less weight. The remaining forecasts collectively 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 several forecasts developed, or, based on the experience and judgement of the forecaster, it can be a blend of the forecasts.

Registered Aircraft Forecast

Historical registered aircraft in Gila County since 2003 are included in **Table 2E**. Aircraft registrations have grown from a low of 76 in 2018 to 93 registrations reported in 2022. The historic peak was reached in 2008, when there were 135 aircraft registered in the county. Aircraft registrations declined over the next 11 years, likely due in part to the FAA's requirement that aircraft owners re-register their aircraft to retain U.S. civil aircraft status. As a result, previously registered aircraft that may have been sold, scrapped/destroyed, or registered to multiple addresses were dropped from the database. Since 2018, registrations in the county have increased slightly.

Most registered aircraft in the county fall within the single engine piston category. In 2022, 84 of the 93 county-registered aircraft were single engine piston, accounting for 90 percent. Multi-engine pistons made up the next largest segment with five registrations, followed by three "other" aircraft, which includes gliders, balloons, and experimental aircraft. There is one helicopter registered in the county, and no turboprops or jets.

Table 2E | Gila County Registered Aircraft

Year	Single Engine Piston	Multi-Engine Piston	Turbo Prop	Jet	Helicopter	Other	Total
2003	98	8	6	0	2	3	117
2004	103	7	6	0	2	2	120
2005	104	5	6	0	2	2	119
2006	104	6	0	0	2	3	115
2007	109	8	0	0	2	6	125
2008	118	8	1	0	2	6	135
2009	110	7	1	1	2	5	126
2010	107	7	1	1	3	5	124
2011	105	7	1	0	3	5	121
2012	104	6	1	0	3	5	119
2013	86	5	0	0	2	4	97
2014	82	5	0	0	1	4	92
2015	86	3	0	1	1	3	94
2016	83	3	0	1	1	2	90
2017	70	3	0	0	1	3	77
2018	68	4	0	0	1	3	76
2019	76	6	0	0	1	2	85
2020	77	6	0	0	0	2	85
2021	79	5	0	0	0	2	86
2022	84	5	0	0	1	3	93

Source: FAA Registered Aircraft

Different forecasting strategies were used to determine registered aircraft projections, including market share analysis and ratio projection methods. Several regression forecasts were considered as well, including single- and multi-variable regressions examining registered aircraft's correlation with the service area population, employment, income, and gross regional product, and with U.S. active general aviation aircraft. None of the regressions produced a strong correlation (r^2 value over 0.9); therefore, the regression forecasts were not considered further.

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

Table 2F | Registered Aircraft Projections for Gila County

Year	Service Area Registrations[1]	U.S. Active Aircraft[2]	Market Share of U.S. Aircraft	Service Area Population[3]	Aircraft per 1,000 Residents
2003	117	209,606	0.0558%	51,337	2.28
2004	120	219,319	0.0547%	51,423	2.33
2005	119	224,257	0.0531%	51,655	2.30
2006	115	221,942	0.0518%	52,541	2.19
2007	125	231,606	0.0540%	53,252	2.35
2008	135	228,664	0.0590%	53,437	2.53
2009	126	223,876	0.0563%	53,561	2.35
2010	124	223,370	0.0555%	53,565	2.31
2011	121	220,453	0.0549%	53,345	2.27
2012	119	209,034	0.0569%	52,810	2.25
2013	97	199,927	0.0485%	52,727	1.84
2014	92	204,408	0.0450%	52,675	1.75
2015	94	210,031	0.0448%	52,522	1.79
2016	90	211,794	0.0425%	52,802	1.70
2017	77	211,757	0.0364%	52,921	1.45
2018	76	211,749	0.0359%	53,035	1.43
2019	85	210,981	0.0403%	53,180	1.60
2020	85	204,140	0.0416%	53,306	1.59
2021	86	204,405	0.0421%	53,589	1.60
2022	93	204,590	0.0455%	53,752	1.73
Constant Market Share of U.S. Active Aircraft - Low Range (CAGR 0.10%)					
2027	93	204,925	0.0455%	54,575	1.71
2032	93	205,195	0.0455%	55,410	1.68
2042	95	208,905	0.0455%	57,121	1.66
Increasing Market Share of U.S. Active Aircraft - High Range (CAGR 1.42%)					
2027	100	204,925	0.0489%	54,575	1.83
2032	107	205,195	0.0522%	55,410	1.93
2042	123	208,905	0.0590%	57,121	2.16
Increasing Market Share of U.S. Active Aircraft - Mid Range (CAGR 0.76%)					
2027	97	204,925	0.0471%	54,575	1.77
2032	100	205,195	0.0489%	55,410	1.81
2042	108	208,905	0.0518%	57,121	1.90
Constant Ratio Projection per 1,000 County Residents - Low Range (CAGR 0.30%)					
2027	94	204,925	0.0461%	54,575	1.73
2032	96	205,195	0.0467%	55,410	1.73
2042	99	208,905	0.0473%	57,121	1.73
Increasing Ratio Projection per 1,000 County Residents - High Range (CAGR 2.22%)					
2027	105	204,925	0.0514%	54,575	1.93
2032	118	205,195	0.0575%	55,410	2.13
2042	144	208,905	0.0691%	57,121	2.53
Increasing Ratio Projection per 1,000 County Residents - Mid Range (CAGR 0.99%) – Selected Forecast					
2027	98	204,925	0.0478%	54,575	1.79
2032	103	205,195	0.0501%	55,410	1.86
2042	113	208,905	0.0542%	57,121	1.98
10-Year Historic Registered Aircraft Growth Rate (CAGR -0.21%)					
2027	92	204,925	0.0449%	54,575	1.69
2032	91	205,195	0.0444%	55,410	1.64
2042	89	208,905	0.0427%	57,121	1.56

1 FAA Aircraft Registration Database
2 FAA Aerospace Forecast - Fiscal Years 2022-2042
3 Woods & Poole 2022

Market Share Projections

- ***Constant Market Share*** – The low-range market share forecast maintains the 2022 market share of county residents (0.0455 percent) at a constant throughout the planning period. The result is near stagnant growth in registrations over the 20-year planning period, with just two additional aircraft registrations in the county by 2042, reflective of a 0.10 percent compound annual growth rate (CAGR).
- ***Increasing Market Share*** – Two increasing market share forecasts were also considered. The first evaluated a high-range scenario based on the county's historic high market share, which was 0.0590 percent in 2008. A return to this produces stronger growth, with 123 aircraft projected by the end of the planning period (1.42 percent CAGR). The mid-range market share forecast considered a less aggressive growth rate of 0.76 percent, which produced a forecast of 108 registered aircraft in the county by 2042.

Population Ratio Projections

- ***Constant Ratio*** – In 2022, there were 1.73 registered aircraft per 1,000 county residents. Carrying this ratio forward through the plan years results in a relatively flat CAGR of 0.30 percent, or 99 aircraft by 2042, as the county's population is expected to grow slowly over the next 20 years.
- ***Increasing Ratio*** – Two increasing ratio scenarios were also considered. This first is based upon the historic high ratio of aircraft to county residents and results in the most significant growth, with 144 aircraft registered in Gila County by 2042. This equates to a CAGR of 2.22 percent and represents the high end of the planning envelope. A projection was also made based upon the 20-year average ratio, which was 1.98 aircraft per 1,000 residents. Applying this ratio to the out year of the planning period produced a CAGR of 0.99 percent, or 113 aircraft registered in the county by 2042.

Historic Registered Aircraft Growth Rate

- It was also deemed prudent to consider the growth rate that has occurred over the last 10 years. Since 2013, registered aircraft in Gila County have generally declined and reflect a CAGR of -0.21 percent. When this is applied to the forecast years, the number of aircraft registrations falls to 89 by the end of the planning period.

A comparison of each projection is shown in graph form on **Exhibit 2C**. The registered aircraft projections result in a range between 89 and 144 registered aircraft in Gila County by 2042, with the 10-year historic growth rate projection representing the low end and the high-range increasing ratio projection the high end of the forecasts. Each has been evaluated for reasonableness. Both the low and mid-range market share forecasts show very slow growth in county-registered aircraft, and both are deemed unlikely based on the county's historic levels of registered aircraft. The high-range market share projection produced a more significant growth rate, but likely overstates the growth potential for registered aircraft in the county. This is also true for the first increasing ratio projection, which resulted in the most significant growth scenario of all. The 10-year historic growth rate forecast was the only one that considered a decline in aircraft registrations. Based on the county's historic numbers, along with continued growth in county population and in the national aircraft fleet, a decrease in registrations over the next 20 years is not anticipated to occur. Therefore, each of the above forecasts has been determined to be improbable.

The remaining projection, which resulted in 113 registered aircraft (0.99 percent CAGR) is considered to be the most reasonable forecast for registered aircraft in Gila County over the next 20 years. This forecast represents a moderate level of growth, in line with national and regional trends. As such, the mid-range increasing ratio forecast is considered the most likely scenario and will be carried forward as the selected forecast for service area registered aircraft. This projection shows an increase from 93 registered aircraft in 2022 to 98 in 2027, 103 in 2032, and 113 in 2042.

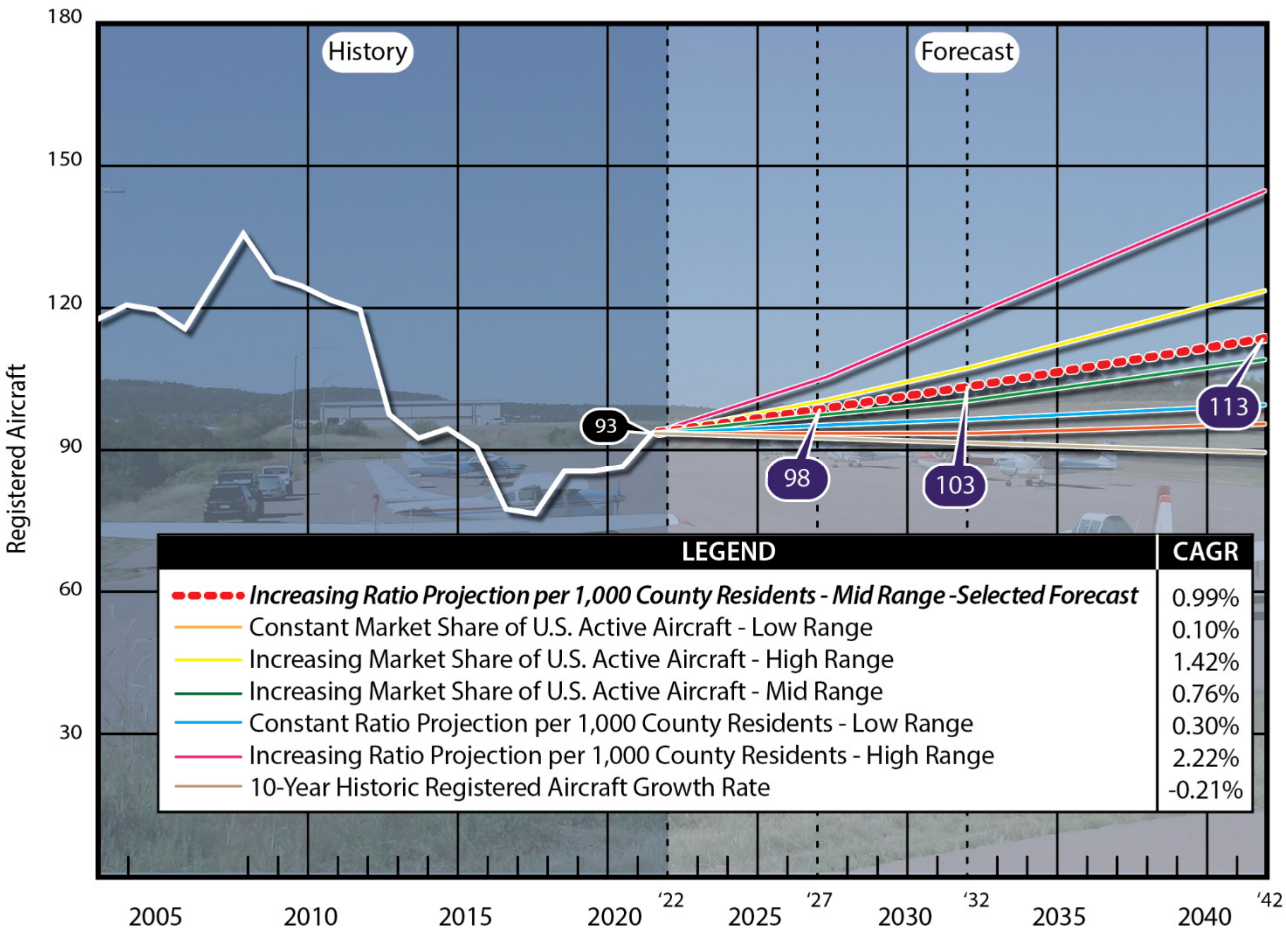


Exhibit 2C – Registered Aircraft Projections

Based Aircraft Forecast

Determining the number of based aircraft at an airport can be a challenging task. Aircraft storage can be somewhat transient in nature, meaning aircraft owners can and do move their aircraft. Some aircraft owners may store their aircraft at an airport for only part of the year. At PAN, determining an accurate based aircraft count is further complicated by the off-airport users, some of whom prefer not to disclose information about their aircraft (quantity and type).

For many years, the FAA did not require airports to report their based aircraft counts, nor did they validate based aircraft at airports; however, this has changed in recent years, and now the FAA mandates that airports report their based aircraft levels. These counts are recorded in the National Based Aircraft Inventory program and maintained and validated by the FAA to ensure accuracy.

According to the FAA's database, PAN has 55 based aircraft, a count which was last validated on December 14, 2021. However, records maintained and confirmed by airport staff show 66 based aircraft at the airport, 33 of which are based on-airport and 33 which are based off-airport in the adjacent residential/industrial airparks. For forecasting purposes, 33 based aircraft will serve as the base year count. Again, the based aircraft forecast is used primarily to determine landside facility needs over the next 20 years (i.e., hangar capacities, tiedowns, etc.) As aircraft based off-airport are not in need of these facilities, they are not factored into the forecast. Off-airport based aircraft will be considered, though, when the airport's critical aircraft is identified to determine ultimate airfield needs (i.e., planning standards based on aircraft type).

As detailed in **Table 2G**, historic records sourced from the previous master plan were available and included a count of 60 on-airport based aircraft in 2007. Like the registered aircraft forecasts, two types of projections have been made for based aircraft at Payson Municipal Airport – market share and ratio projections. The market share is based on the airport's percentage of based aircraft as compared to registered aircraft in the service area, while the ratio projection is based on the number of based aircraft per 1,000 county residents. The results of these analyses are detailed in **Table 2G** and depicted graphically in **Exhibit 2D**.

Market Share Projections

- ***Constant Market Share*** – In 2022, the airport had 33 on-airport based aircraft, which equates to 35.5 percent of the market share of registered aircraft in Gila County. Carrying this percentage throughout the plan years results in an increase in based aircraft, reflective of a 0.99 percent CAGR. This projection yielded 40 based aircraft by 2042, which serves as the low-range market share projection.
- ***Increasing Market Share*** – Two increasing market share forecasts were also evaluated. The mid-range scenario is based on the airport's previous market share, as evaluated in the last master plan. This forecast reflected with a return to 48.0 percent market share by 2042 and resulted in an increase in based aircraft to 54, or 2.53 percent CAGR, by the end of the planning period. The high-range market share forecast evaluated a stronger growth scenario that considered PAN holding 60.0 percent of the market share by the end of the planning period. This resulted in 68 on-airport based aircraft by 2042, for a CAGR of 3.68 percent.

Ratio Projections

- ***Constant Ratio*** – In 2022, the ratio of based aircraft per 1,000 county residents stood at 0.61. Maintaining this at a constant through 2042 resulted in a growth rate of 0.30 percent, or 35 based aircraft.

- ***Increasing Ratio*** – Mid- and high-range growth scenarios were also evaluated. The mid-range scenario is based on a median ratio of 0.87 based aircraft per 1,000 residents. Applying this figure to the end of the planning period results in 50 based aircraft at the airport by 2042, at a CAGR of 2.07 percent. The high-range scenario considers a return to the 2007 ratio of 1.13 that formed the baseline of the previous master plan. With some growth estimated to occur in the county over the next 20 years, applying this ratio produces the most significant growth scenario evaluated, resulting in 65 on-airport based aircraft forecast by 2042.

Table 2G | On-Airport Based Aircraft Forecasts for Payson Municipal Airport

Year	PAN Based Aircraft*	Service Area Registrations	Market Share	Service Area Population	Aircraft Per 1,000 Residents
2007	60	125	48.0%	53,252	1.13
2022	33	93	35.5%	53,752	0.61
Constant Market Share - Low Range (CAGR 0.99%)					
2027	34	98	34.4%	54,575	0.62
2032	35	103	34.4%	55,410	0.64
2042	39	113	34.4%	57,121	0.68
Increasing Market Share - Mid Range (CAGR 2.53%)					
2027	38	98	38.6%	54,575	0.69
2032	43	103	41.7%	55,410	0.78
2042	54	113	48.0%	57,121	0.95
Increasing Market Share - High Range (CAGR 3.68%)					
2027	41	98	41.6%	54,575	0.75
2032	49	103	47.7%	55,410	0.89
2042	68	113	60.0%	57,121	1.19
Constant Ratio per 1,000 Residents (CAGR 0.30%)					
2027	34	98	37.8%	54,575	0.61
2032	34	103	333.1%	55,410	0.61
2042	35	113	31.0%	57,121	0.61
Increasing Ratio per 1,000 Residents - Mid Range (CAGR 2.07%) – Selected Forecast					
2027	37	98	37.8%	54,575	0.68
2032	41	103	40.0%	55,410	0.74
2042	50	113	43.9%	57,121	0.87
Increasing Ratio per 1,000 Residents - High Range (CAGR 3.41%)					
2027	41	98	41.4%	54,575	0.74
2032	48	103	47.0%	55,410	0.87
2042	65	113	57.0%	57,121	1.13
FAA TAF (CAGR 0.97%)					
2027	40	98	40.9%	54,575	0.73
2032	40	103	38.9%	55,410	0.72
2042	40	113	35.3%	57,121	0.70
FAA TAF Statewide Growth Rate (CAGR 1.57%)					
2027	36	98	36.4%	54,575	0.65
2032	39	103	37.5%	55,410	0.70
2042	45	113	39.8%	57,121	0.79
*Excludes off-airport based aircraft					

Sources: Airport records; 2009 Master Plan; 2023 FAA TAF; Woods & Poole CEDDS 2022

As a point of comparison, the FAA TAF projections for based aircraft at PAN are also included. The TAF shows no growth in based aircraft, with the count flatlined at 40 throughout the planning period. The TAF for the State of Arizona was also examined, and the statewide growth rate for based aircraft of 1.57 percent was applied. This resulted in 45 on-airport based aircraft at PAN by the end of the planning period.

The forecasts produce a planning envelope ranging from 40 to 68 based aircraft on the airport by 2042. As of January 2023, there are no hangar vacancies, and 21 individuals are on a wait list for hangar space. This is indicative of strong demand for aircraft storage space at the airport. Combined with favorable trends in aircraft ownership both locally and nationally, along with the lack of competing facilities nearby, it is reasonable to assume a more robust growth rate for on-airport based aircraft. Therefore, the mid-range increasing ratio forecast has been selected as the preferred projection. With a CAGR of 2.07 percent, this forecast shows an increase of 17 on-airport based aircraft by the end of the planning period, for a total of 50 aircraft based on-airport by 2042.

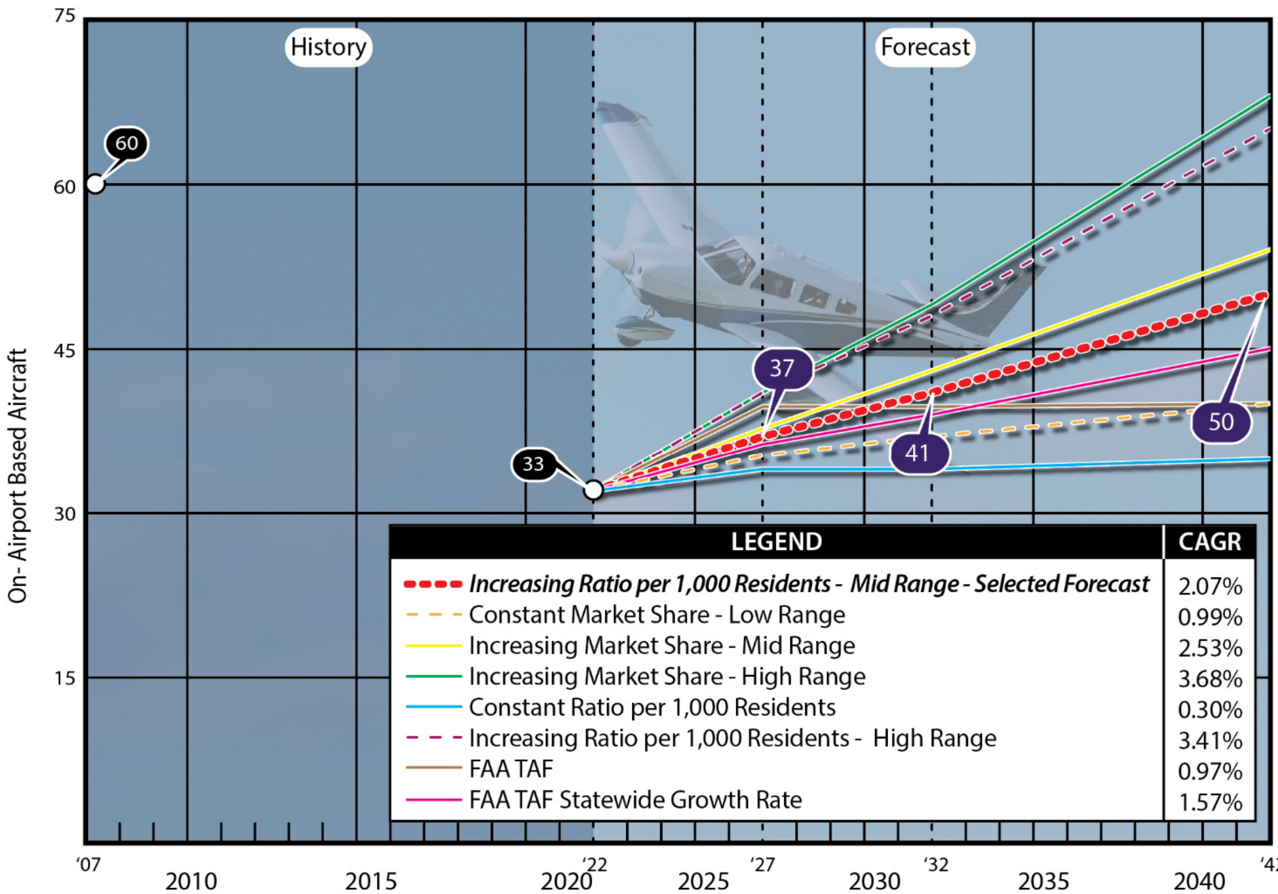


Exhibit 2D – On-Airport Based Aircraft Projections

Based Aircraft Fleet Mix Forecast

The fleet mix of based aircraft is often more important to airport planning and design than the total number of aircraft. For example, the presence of one or a few large business jets can have a greater impact on design standards for the runway and taxiway system compared to a greater number of smaller, single engine piston-powered aircraft. As such, aircraft based off-airport in the residential and industrial parks will be factored into the overall fleet mix forecast. Currently, these off-airport aircraft total 33, of which 32 are single engine piston aircraft and one is a multi-engine piston.

As seen in **Table 2H**, these totals by aircraft type are carried through the plan years and added into the aggregate count of on- and off-airport based aircraft to give a more accurate picture of the types of aircraft operating regularly at PAN. The selected on-airport based aircraft count is also included, with fleet mix projections developed based upon the FAA's estimates of how the national fleet mix will evolve over the same period. Local factors, such as the potential for increased turboprop and helicopter operations due to the presence of emergency and firefighting service providers, for example, are also considered.

In 2022, most based aircraft (89 percent) at PAN fell into the single engine piston category. This is projected to remain the majority category over the planning period, with slow and steady growth in the number of single engine piston aircraft based at the airport by 2022. The next largest aircraft type is "other", with five of these aircraft based at the airport in 2022. This segment, which comprised eight percent of the fleet mix in 2022, is expected to remain flat over the planning years. Nationally, multi-engines are expected to decline, while turboprops, jets, and helicopters are all anticipated to increase. At PAN, the long-range forecast for fleet mix of both on- and off-airport includes the addition of four turboprops, one jet, and two helicopters by 2042.

Table 2H | Total Based Aircraft Fleet Mix for Payson Municipal Airport

	EXISTING		FORECAST					
Aircraft Type	**2022**	**%**	**2027**	**%**	**2032**	**%**	**2042**	**%**
Single Engine Piston	59	89%	61	87%	64	86%	70	84%
Multi-Engine Piston	1	2%	1	1%	1	1%	0	0%
Turboprop	0	0%	1	1%	2	3%	4	5%
Jet	0	0%	0	0%	0	0%	1	1%
Helicopter	1	2%	2	3%	2	3%	3	4%
Other	5	8%	5	7%	5	7%	5	6%
Totals	**66**	**100%**	**70**	**100%**	**74**	**100%**	**83**	**100%**

Source: Airport records; Coffman Associates analysis

OPERATIONS FORECASTS

Operations at PAN 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 14 Code of Federal Regulations (CFR) Part 135, otherwise known as "for-hire" or "on-demand" activity. Military operations include those operations conducted by various branches of the U.S. military.

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

Because PAN is not equipped with an airport traffic control tower (ATCT), precise operational (takeoff and landing) counts are not available. Sources for estimated operational activity at the airport include the FAA Form 5010 Airport Master Record, the FAA TAF, and the 2018 SASP. The 2023 FAA TAF indicates a total of 34,250 operations in 2022, as does Form 5010 for the 12-month period ending May 10, 2022. In both estimates, the majority of operations (58.4 percent) are itinerant, with 35.0 percent recorded as local operations. Air taxi and military operations are estimated at 5.1 percent and 1.5 percent of the total, respectively. On a more local level, the SASP provides an estimate of total operations, reporting 34,310 operations (67 percent itinerant and 33 percent local); no air taxi or military operations are estimated in the SASP.

Additional calculations to estimate annual operations were also conducted for comparison purposes. The first, Equation 15 in FAA's "Model for Estimating General Aviation Operations at Non-towered Airports Using Towered and Non-towered Airport Data," factors in regional population and based aircraft data to develop a baseline operational count. When this data was input, the result was 21,802 annual operations.

The second calculation multiplies validated based aircraft by an estimated number of operations per based aircraft (OPBA), as outlined in Airport Cooperative Research Program (ACRP) Report 129, *Evaluating Methods for Counting Aircraft Operations at Non-Towered Airports*. In FAA Order 5090.5, the FAA recommends using a multiplier of 350 OPBA for local GA airports. This resulted in an estimated 22,750 total annual operations.

In summary, the following estimates of annual operations as derived from various sources are:

- FAA Form 5010 – 34,250 annual operations
- FAA TAF – 34,250 annual operations
- FAA Equation 15 – 21,802 annual operations
- OPBA with 350 multiplier – 22,750 annual operations

Based on activity levels in the region and at similar airports, the baseline figure that will be utilized for general aviation operations forecasts is the one included in the FAA TAF and Form 5010, which reflects the following and totals 34,250 operations:

- 20,000 annual itinerant GA operations
- 12,000 annual local GA operations
- 1,750 annual air taxi operations
- 500 annual military operations

Itinerant General Aviation Operations Forecast

Table 2J presents several forecasts for itinerant GA operations. Three forecasts are based on the airport's market share of total U.S. itinerant GA operations, and the FAA TAF for PAN and the SASP growth rate are also included for comparison purposes. Historic operational data is sourced from the 2009 Airport Master Plan, which had a base year of 2007, and the 2018 SASP, which had a base year of 2016.

Table 2J | Itinerant General Aviation Operations Forecasts for Payson Municipal Airport

Year	PAN Itinerant Operations	U.S. ATCT Itinerant GA Operations	PAN Share %
2007	25,000	18,577,200	0.1346%
2016	22,630	13,905,204	0.1627%
2022	20,000	14,569,014	0.1373%
Market Share - Maintain Constant (CAGR 0.55%)			
2027	21,500	15,636,300	0.1373%
2032	21,700	15,838,715	0.1373%
2042	22,300	16,259,605	0.1373%
Increasing Market Share - Mid-Range (CAGR 1.42%)			
2027	22,500	15,636,300	0.1436%
2032	23,800	15,838,715	0.1500%
2042	26,500	16,259,605	0.1627%
Increasing Market Share - High Range (CAGR 1.79%) – Selected Forecast			
2027	22,900	15,636,300	0.1467%
2032	24,700	15,838,715	0.1561%
2042	28,500	16,259,605	0.1750%
FAA TAF Statewide Growth Rate (CAGR 0.68%)			
2027	20,700	15,636,300	0.1324%
2032	21,400	15,838,715	0.1351%
2042	22,900	16,259,605	0.1408%
FAA TAF (CAGR 0.00%)			
2027	20,000	15,636,300	0.1279%
2032	20,000	15,838,715	0.1263%
2042	20,000	16,259,605	0.1230%
State System Plan Growth Rate (CAGR 0.07%)			
2027	20,100	15,636,300	0.1285%
2032	20,200	15,838,715	0.1275%
2042	20,300	16,259,605	0.1248%

Sources: FAA Aerospace Forecast 2022-2042; FAA Form 5010; State System Plan; 2009 Master Plan; 2023 FAA TAF

Market Share Projections

In 2022, the airport held 0.1373 percent of the market share of national itinerant operations. The first forecast carries this figure forward as a constant through the planning period, resulting in 22,300 itinerant operations by 2042 for a CAGR of 0.55 percent. Next, the historic high market share of 0.1627 percent was considered. A return to this level of market share by the end of the planning period resulted in 26,500 annual itinerant operations, reflective of a 1.42 percent CAGR and comprising the mid-range market share forecast. The last market share analysis considered a high-range scenario based upon the airport holding 0.1750 percent of the national market share for itinerant operations. This produced a CAGR of 1.79 percent, or 28,500 total annual itinerant operations by 2042.

Other Projections

Lastly, projections presented in the FAA TAF and the SASP growth rate were considered, with the TAF projections included primarily for comparison purposes. The TAF estimates itinerant operations at PAN to remain flatlined at 20,000 over the course of the planning period, which is reflective of a 0.00 percent CAGR. The statewide TAF growth rate for itinerant operations is estimated at 0.68 percent, which, when applied to the base year count, results in 22,900 itinerant operations at PAN by 2042. The state system plan projected an overall growth rate of 0.07 percent for operations at PAN. When this percentage is applied to the forecast years, there is no notable growth in itinerant operations projected to occur, with just 20,300 operations forecast for 2042.

Exhibit 2E presents a graph of the itinerant GA operation projections. Combined, the forecasts present a planning envelope ranging from 20,000 (TAF forecast) to 28,500 itinerant operations (high-range increasing market share). With growth in itinerant operations anticipated both nationally and regionally, it is reasonable to assume a moderate increase in this type of traffic over the next 20 years. As such, the high-range increasing market share forecast is the selected projection. While this is representative of the top end of the forecast envelope, the growth remains moderate, with a gradual increase of roughly 2,000 additional itinerant operations for each five-year forecast horizon.

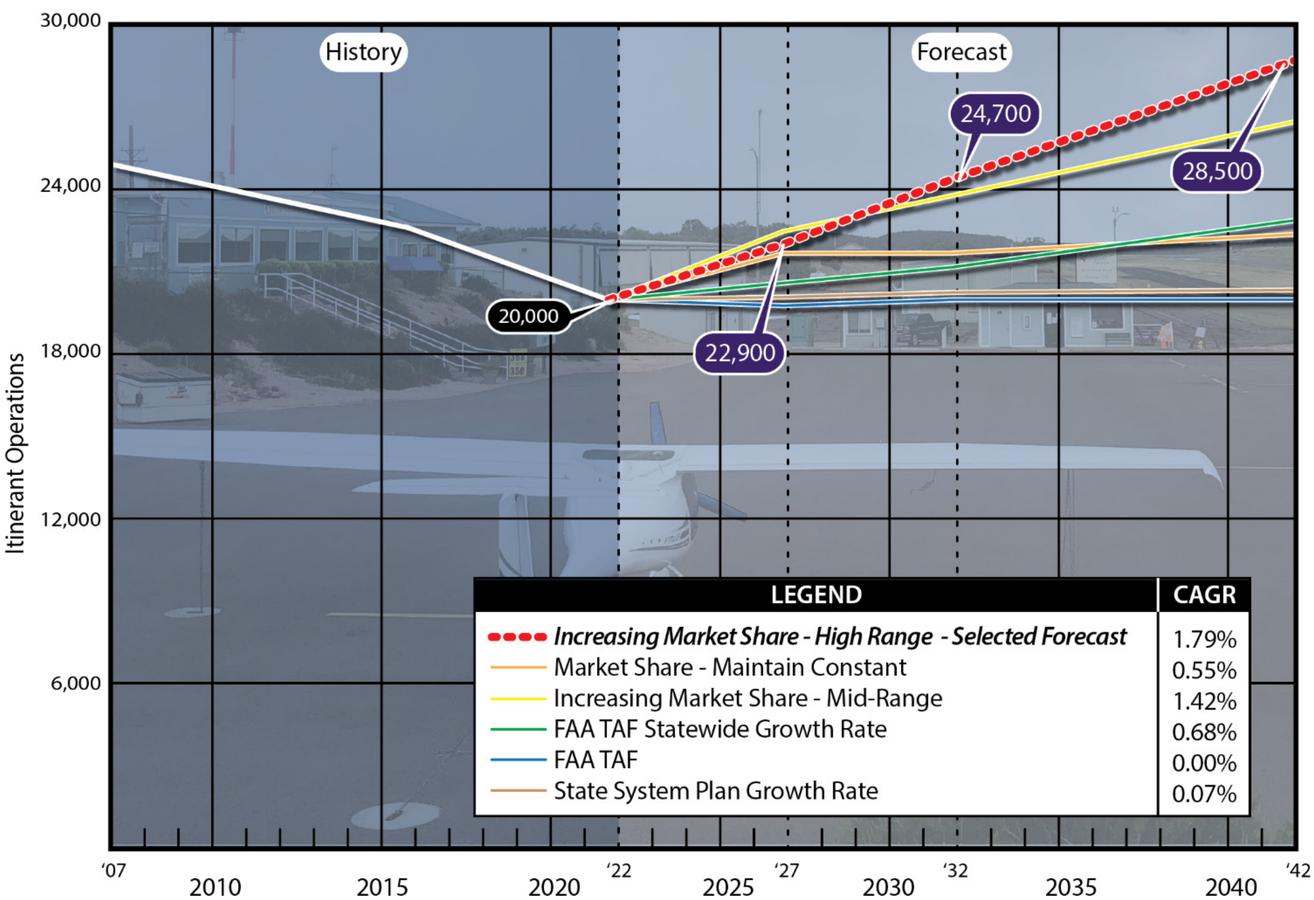


Exhibit 2E – Itinerant GA Operations Projections

Local General Aviation Operations Forecast

Local operations, or those that stay within the traffic pattern or are executing touch-and-go operations, have also been forecast. This type of operation comprises a smaller share of the total operations occurring at PAN, with 12,000 local operations estimated in 2022. **Table 2K** details historic local operations at the airport utilizing the figures from the previous master plan and SASP. The base year of 2022 represents a market share of 0.0874 percent when compared to total U.S. local operations. Like the itinerant forecasts, several market share projections were made, as well as a forecast based on the SASP growth rate for the airport. The TAF projections for PAN have also been included.

Table 2K | Local General Aviation Operations Forecasts for Payson Municipal Airport

Year	PAN Local Operations	U.S. ATCT Local GA Operations	PAN Share %
2007	15,000	14,557,300	0.1030%
2016	11,140	11,632,612	0.0958%
2022	12,000	13,731,399	0.0874%
Market Share - Maintain Constant (CAGR 0.70%)			
2027	13,100	14,950,786	0.0874%
2032	13,300	15,214,104	0.0874%
2042	13,800	15,767,539	0.0874%
Increasing Market Share - Mid-Range (CAGR 1.51%)			
2027	13,700	14,950,786	0.0913%
2032	14,500	15,214,104	0.0952%
2042	16,200	15,767,539	0.1030%
Increasing Market Share - High Range (CAGR 2.08%) – Selected Forecast			
2027	14,100	14,950,786	0.0943%
2032	15,400	15,214,104	0.1012%
2042	18,100	15,767,539	0.1150%
FAA TAF Statewide Growth Rate (CAGR 0.92%)			
2027	12,600	14,950,786	0.0843%
2032	13,100	15,214,104	0.0861%
2042	14,400	15,767,539	0.0913%
FAA TAF (CAGR 0.00%)			
2027	12,000	14,950,786	0.0803%
2032	12,000	15,214,104	0.0789%
2042	12,000	15,767,539	0.0761%
State System Plan Growth Rate (CAGR 0.08%)			
2027	12,000	14,950,786	0.0803%
2032	12,100	15,214,104	0.0795%
2042	12,200	15,767,539	0.0774%

Sources: FAA Aerospace Forecast 2022-2042; FAA Form 5010; State System Plan; 2009 Master Plan; 2023 FAA TAF

Market Share Projections

In the first forecast, the constant market share of 0.0874 percent was carried through the plan years. This resulted in 13,800 operations by 2042, for a CAGR of 0.70 percent.

The next two forecasts evaluated increasing market share scenarios, with the mid-range projection considering an increase to 0.1030 percent of the market share. This is based upon the airport's historic high market share of national local operations, and resulted in a 1.51 percent CAGR, or 16,200 local operations by 2042. A second increasing market share forecast considered a more aggressive growth scenario, in which PAN held 0.1150 percent of the market share. In this scenario, growth in local operations is projected to reach 18,100 operations by 2042, which is reflective of a 2.08 percent CAGR.

Other Projections

As mentioned, the TAF forecasts have also been included for comparison. The TAF estimates local operations to remain at 12,000 throughout the planning period, which equates to a 0.00 percent CAGR. However, when forecasting local operations across the state, the TAF reflects a 0.92 percent growth rate. When this is applied to the base year local operational count at PAN, the result is 14,400 annual local operations by 2042. Similar to the itinerant operations forecast, the state system plan projects very slow growth in local operations, at a CAGR of just 0.08 percent. Applying this growth rate to the plan years results in virtually no increase in local operations, with only 200 more anticipated over the next 20 years for a total of 12,200 local operations.

Exhibit 2F presents a graph of the local GA operation projections that have been developed. The planning envelope that results from these forecasts ranges from 12,000 to 18,100 local operations. Like the itinerant forecasts, the most reasonable forecast is reflected at the top end of the forecast envelope. While the selected forecast predicts a stronger growth rate for PAN than what the TAF projects for the airport, the projection is considered reasonable due to local and regional trends in this type of operation, particularly for airports that support flight training, such as PAN.

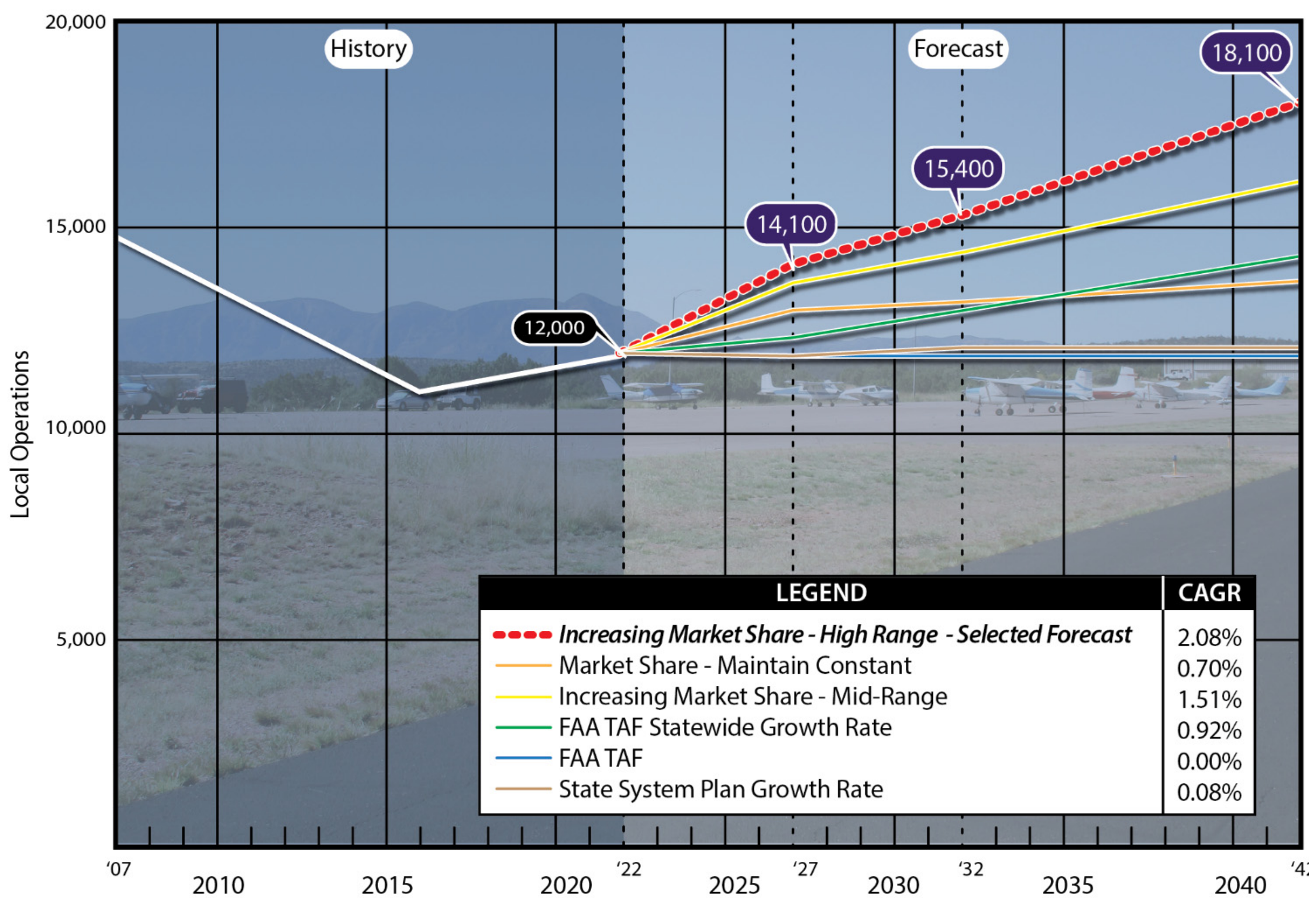


Exhibit 2F – Local GA Operations Projections

Air Taxi Operations Forecast

The air taxi category, which is a subset of the itinerant operations category, is comprised of operations that are conducted by aircraft operating under 14 CFR Part 135. Part 135 operations are "for-hire" or "on-demand" and include charter and commuter flights, air ambulance, or fractional ownership aircraft operations. The FAA projects a 0.5 percent CAGR increase in air taxi operations between 2022 and 2042. The primary reasons for this increase are the technological advancements of the electric vertical takeoff and landing aircraft (eVTOL) and the continued national growth in the business jet segment of the air taxi category.

Historic air taxi records at PAN were not available. The base year count of 1,750 is derived from the FAA TAF and Form 5010 and accounts for 5.1 percent of total operations. Nationally, PAN holds 0.0278 percent of the market share of air taxi operations. Market share and growth rate projections based on the state TAF have been prepared, with the FAA TAF estimate included for comparison.

Market Share Projections

As presented in **Table 2L**, three market share projections were developed for air taxi operations at PAN. Carrying 2022's market share of 0.0278 percent results in slow growth throughout the planning period. At a CAGR of 0.41 percent, the constant market share projection produces 1,900 air taxi operations by 2042.

Stronger growth scenarios based on market share were also evaluated. The mid-range scenario considered PAN holding 0.0400 percent of the national market share by 2042, which translated to 2,800 air taxi operations by the end of the planning period. This is reflective of a 2.38 percent CAGR. A high-range projection was also prepared which assessed a 0.0550 percent market share by 2042. This produced a CAGR of 3.95 percent, or 3,800 air taxi operations.

Other Projections

Growth trend and TAF projections are also included within the forecast envelope. The growth trend forecast considers the projected growth rate of air taxi operations in the state between 2022 and 2042, as reported in the Arizona TAF. The state TAF anticipates a 1.38 percent growth in air taxi operations over the next 20 years. Applying this growth rate to the plan years yields 2,300 air taxi operations at PAN by 2042.

Like the previous forecasts, the TAF projections were used as additional comparison points. The TAF projects air taxi operations at PAN to remain at 1,750 annually throughout the plan years, which equates to a 0.00 percent CAGR.

TABLE 2L | Air Taxi Operations Forecasts for Payson Municipal Airport

Year	PAN Air Taxi Operations	U.S. ATCT Air Taxi Operations	PAN Share %
2022	1,750	6,284,713	0.0278%
Constant Market Share (CAGR 0.41%)			
2027	1,700	5,962,583	0.0278%
2032	1,700	6,221,965	0.0278%
2042	1,900	6,966,613	0.0278%
Increasing Market Share - High Range (CAGR 2.08%) – Selected Forecast			
2027	1,800	5,962,583	0.0309%
2032	2,100	6,221,965	0.0339%
2042	2,800	6,966,613	0.0400%
Increasing Market Share - High Range (CAGR 3.95%)			
2027	2,100	5,962,583	0.0346%
2032	2,600	6,221,965	0.0414%
2042	3,800	6,966,613	0.0550%
State TAF 20-Year Forecast Growth Rate (CAGR 1.38%)			
2027	1,900	5,962,583	0.0319%
2032	2,000	6,221,965	0.0321%
2042	2,300	6,966,613	0.0330%
FAA TAF (CAGR 0.00%)			
2027	1,750	5,962,583	0.0293%
2032	1,750	6,221,965	0.0281%
2042	1,750	6,966,613	0.0251%

Sources: FAA Aerospace Forecast 2022-2042; FAA Form 5010; 2023 FAA TAF

Exhibit 2G presents a graph of the new air taxi operation projections. The air taxi forecasts range between a low of 1,750 operations, based on the TAF, and a peak of 3,800 operations based on a high-range increasing market share. As mentioned previously, Payson Municipal Airport serves as a base for an air ambulance operator, which conducts air taxi operations. Payson and the surrounding Rim Country are also popular destinations, so it is not unreasonable to assume some share of air taxi operations as a result of tourism. Therefore, moderate growth is anticipated for this operational segment, and the mid-range increasing market share will be carried forward as the selected forecast, with 2,800 air taxi operations projected by 2042.

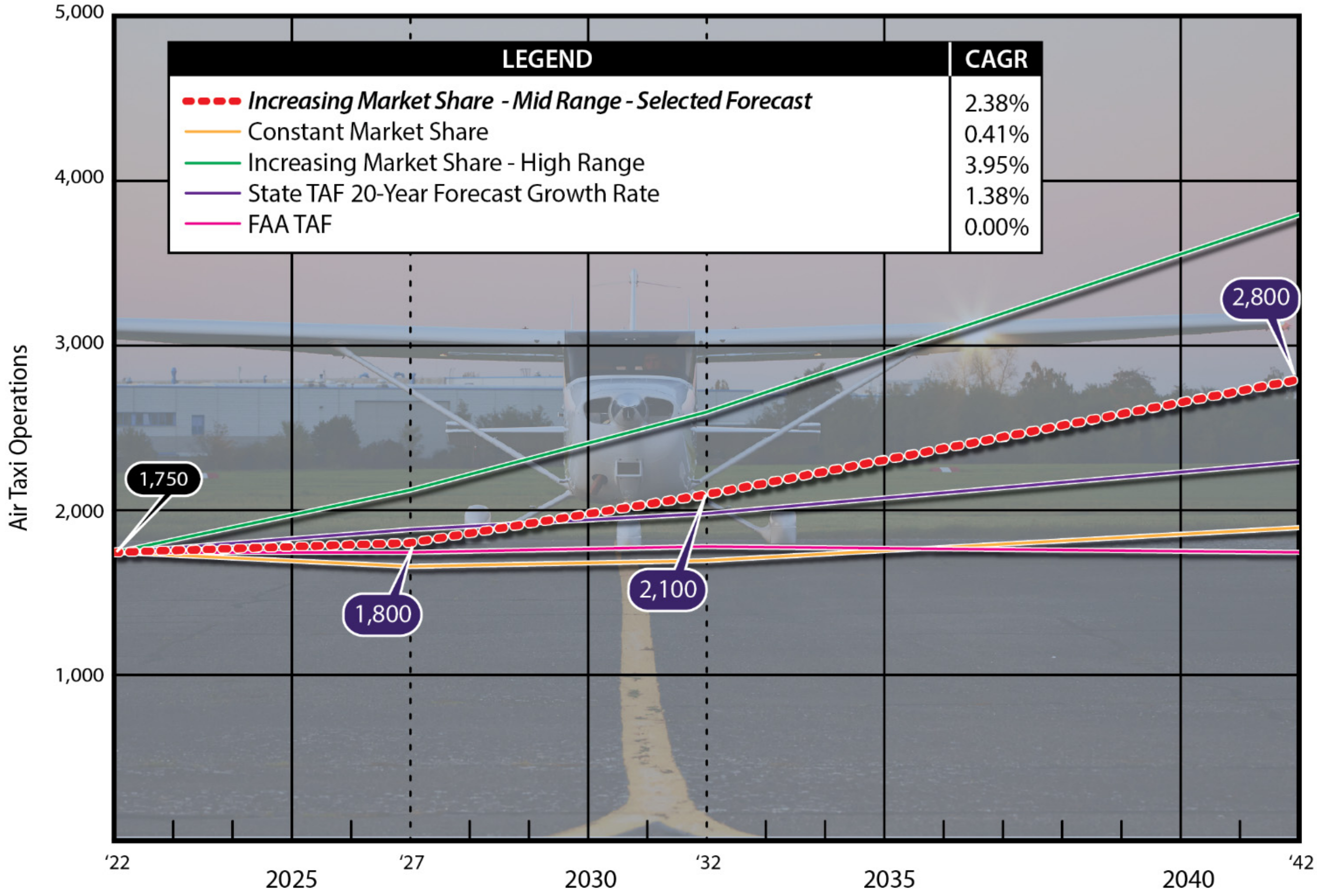


Exhibit 2G – Air Taxi Operations Projections

Military Operations Forecast

Military aircraft can and do utilize civilian airports across the country, including PAN. However, it is inherently difficult to project future military operations due to their national security nature and the fact that missions can change without notice. Thus, it is typical for the FAA to use a flat-line number for military operations. For this planning study, military operations at PAN are projected to stay constant through the plan years at 500 itinerant operations and will likely constitute helicopter activity.

Annual Instrument Approaches

An instrument approach, as defined by the FAA, is "an approach to an airport with the intent to land by an aircraft in accordance with an Instrument Flight Rule (IFR) flight plan, when visibility is less than three miles and/or when the ceiling is at or below the minimum initial approach altitude." To qualify as an instrument approach, aircraft must land at the airport after following one of the published instrument approach procedures in less than visual conditions. Forecasts of annual instrument approaches (AIAs) provide guidance in determining an airport's requirements for navigational aid facilities, such as an instrument landing system. It should be noted that practice or training approaches do not count as annual AIAs, nor do instrument approaches conducted in visual conditions.

During poor weather conditions, pilots are less likely to fly and rarely would perform training operations. As a result, an estimate of the total number of AIAs can be made based on a percentage of itinerant operations regardless of the frequency of poor weather conditions. An estimate of 3.47 percent of total itinerant (general aviation and air taxi) operations is utilized to forecast AIAs at PAN, as presented in **Table 2M**. This percentage is derived from the amount of time that IFR conditions or poor visibility conditions (PVC) are present at the airport, based upon 10 years of data as collected from the airport's automated weather observing system (AWOS).

Table 2M | Annual Instrument Approaches – PAN

Year	Annual Instrument Approaches	Itinerant Operations	Ratio
2022	694	20,000	3.47%
2027	795	22,900	3.47%
2032	857	24,700	3.47%
2042	989	28,500	3.47%

Source: FAA Form 5010; Coffman Associates analysis

PEAK PERIOD FORECASTS

Peaking characteristics play an important role in determining airport capacity and facility requirements. Because PAN does not have a control tower, the generalized peaking characteristics of other non-towered general aviation airports have been used for the purposes of this study. The peaking periods used to develop the capacity analysis and facility requirements are described below.

- Peak month – the calendar month in which traffic activity is the highest
- Design day – the average day in the peak month, derived by dividing the peak month by the number of days in the month
- Design hour – the average hour within the design day
- Busy day – the busiest day of a typical week in the peak month

For the purposes of this study, the peak month for total operations was estimated at 10 percent of the annual operations. By 2042, the estimated peak month is projected to reach 4,990 operations. The design day is estimated by dividing the peak month by the number of days in month (31), and the busy day is calculated at 1.25 times the design day. The design hour is then calculated at 15 percent of the design day. These projections are included in **Table 2N**.

Table 2N | Peak Period Forecasts – PAN

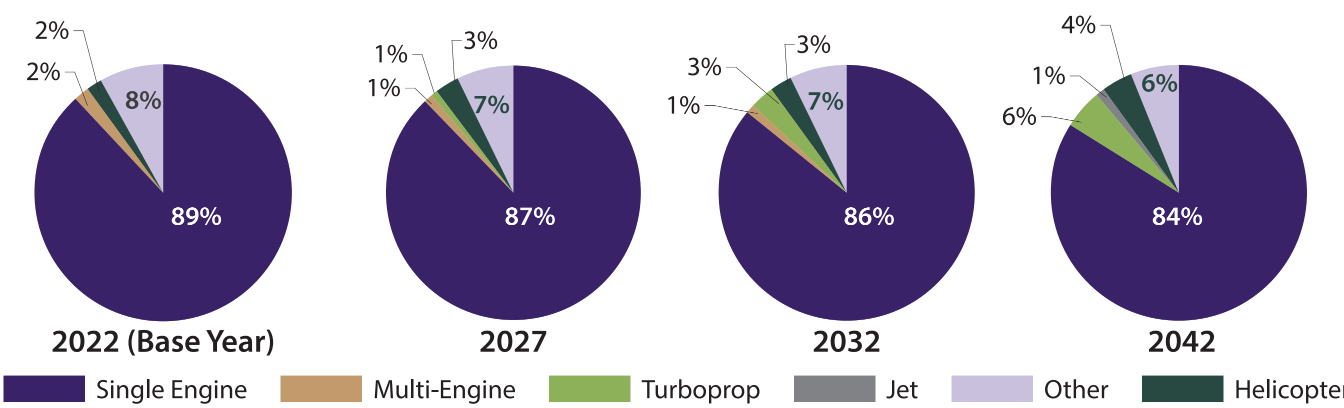
	2022	2027	2032	2042
Annual	34,250	39,300	42,700	49,900
Peak Month	3,425	3,930	4,270	4,990
Design Day	110	127	138	161
Design Hour	17	19	21	24
Busy Day	138	157	169	195

Forecast Summary and Comparison to the FAA TAF

Demand-based forecasts of aviation activity at Payson Municipal Airport over the next 20 years have been developed. An attempt has been made to define the projections in terms of short (1-5 years), intermediate (6-10 years), and long (11-20 years) term planning horizons. **Exhibit 2H** presents a 20-year forecast summary. Elements such as local socioeconomic indicators, anticipated regional development, historical aviation data, and national aviation trends were all considered when determining future conditions.

	BASE YEAR	2027	2032	2042
ANNUAL OPERATIONS				
Itinerant				
Air Carrier	0	0	0	0
Other Air Taxi	1,750	1,800	2,100	2,800
General Aviation	20,000	22,900	24,700	28,500
Military	500	500	500	500
Total Itinerant Operations	***22,250***	***25,200***	***27,300***	***31,800***
Local				
General Aviation	12,000	14,100	15,400	18,100
Military	0	0	0	0
Total Local Operations	***12,000***	***14,100***	***15,400***	***18,100***
Total Annual Operations	***34,250***	***39,300***	***42,700***	***49,900***
AIAs	**694**	**795**	**857**	**989**
PEAKING				
Total Annual Operations	34,250	39,300	42,700	49,900
Peak Month	3,425	3,930	4,270	4,990
Design Day	110	127	138	161
Design Hour	17	19	21	24
Busy Day	138	157	169	195
BASED AIRCRAFT				
Single Engine Piston	59	61	64	70
Multi-Engine Piston	1	1	1	0
Turboprop	0	1	2	4
Jet	0	0	0	1
Helicopter	1	2	2	3
Other	5	5	5	5
On-Airport Based Aircraft	**33**	**37**	**41**	**50**
Off-Airport Based Aircraft	**33**	**33**	**33**	**33**
TOTAL PAN BASED AIRCRAFT	***66***	***70***	***74***	***83***

Total Based Aircraft Fleet Mix



Historically, forecasts have been submitted to the FAA for evaluation and to be compared to the TAF. The FAA preferred that forecasts differ by less than 10 percent in the 5-year period and 15 percent in the 10-year period. Where the forecasts do differ, supporting documentation was necessary to justify the difference.

Table 2P presents a summary of the selected forecasts and a comparison to the FAA TAF. The direct comparison between the master plan forecasts and the TAF is presented at the bottom of the table. The operations forecast is slightly outside the TAF tolerance for both the 5-year and 10-year periods, at 13.73 percent for the 5-year period and 21.96 percent for the 10-year period. This is due to operations being flatlined over the planning period, whereas the master plan predicts some level of growth in operations.

Table 2P | Comparison of Master Plan Forecasts to FAA TAF

	2022	2027	2032	2042	CAGR
Total Operations					
Master Plan Forecast	34,250	39,300	42,700	49,900	1.9%
TAF	34,250	34,250	34,250	34,250	0.0%
% Difference	0.00%	13.73%	21.96%	37.20%	
Based Aircraft					
Master Plan Forecast	66	70	74	83	1.1%
TAF	40	40	40	40	0.0%
% Difference	49.06%	54.55%	59.80%	69.62%	

In terms of based aircraft, the master plan forecast is well outside the TAF tolerance for both the 5- and 10-year periods. Again, this is due in part to the TAF projecting no growth in based aircraft at PAN over the next 20 years, but also due to the discrepancy in the 2022 count of based aircraft (on- and off-airport) between the master plan and the TAF. While airport records maintained by staff show 66 based aircraft, the TAF only reports 40, further contributing to the larger percentage outside tolerance.

AIRCRAFT/AIRPORT/RUNWAY CLASSIFICATION

The FAA has established several aircraft classification systems that group aircraft types based on their performance (approach speed in landing configuration) 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 upon the characteristics of the aircraft which are currently using, or are expected to use, an airport. The critical aircraft is used to define the design parameters for an airport. The critical aircraft may be a single aircraft type or a composite aircraft representing a collection of aircraft with similar characteristics. The critical 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 2J**.

AIRCRAFT APPROACH CATEGORY (AAC)

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

AIRPLANE DESIGN GROUP (ADG)

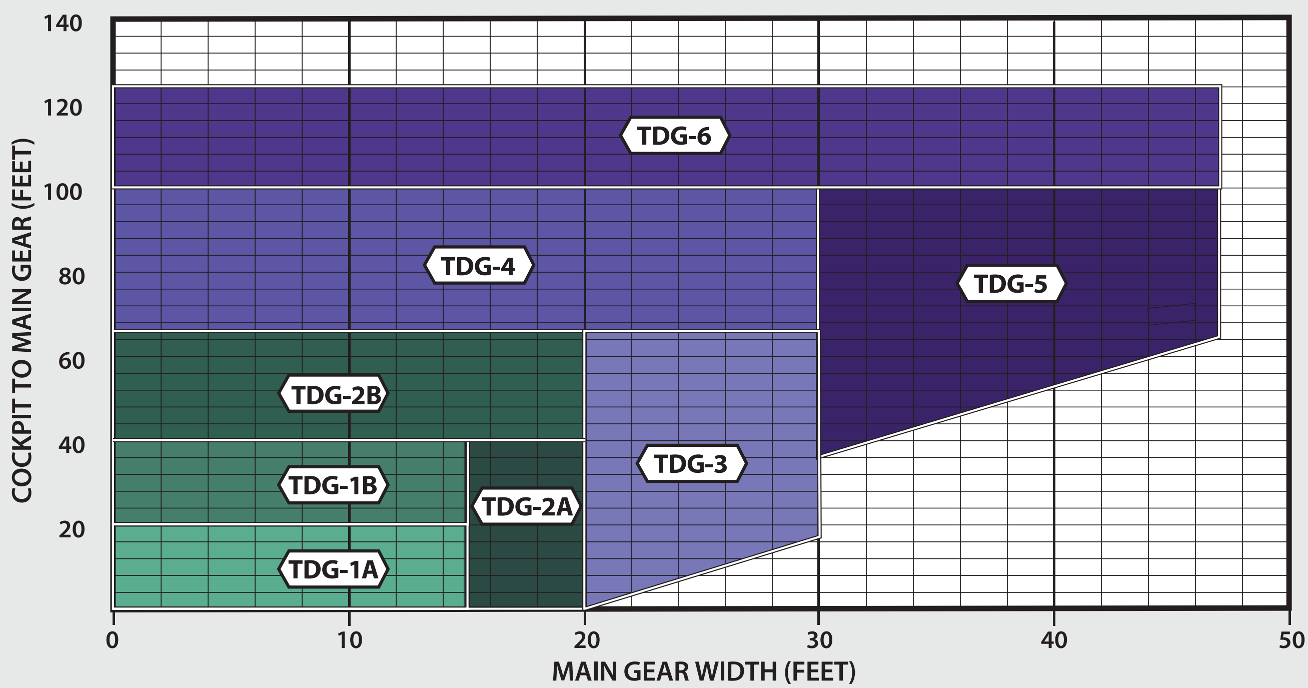
Group #	Tail Height (ft)	Wingspan (ft)
I	<20	<49
II	20-<30	49-<79
III	30-<45	79-<118
IV	45-<60	118-<171
V	60-<66	171-<214
VI	66-<80	214-<262

VISIBILITY MINIMUMS

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

***RVR**: Runway Visual Range

TAXIWAY DESIGN GROUP (TDG)



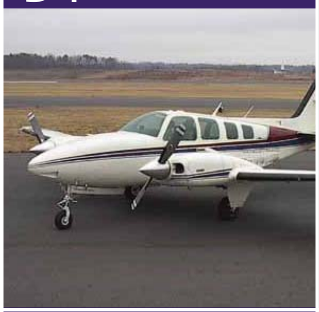
Source: FAA AC 150/5300-13B, Airport Design

Exhibit 2J
AIRCRAFT CLASSIFICATION PARAMETERS

A-I

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

B-I



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

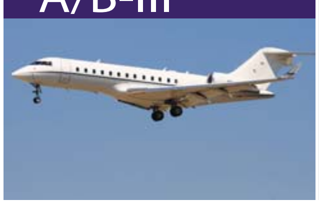
A/B-II *12,500 lbs. or less*

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

B-II *over 12,500 lbs.*

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

A/B-III



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

C/D-I

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

C/D-II

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

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

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

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

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

C/D-IV

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

D-V

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

TDG - Taxiway Design Group

Note: Aircraft pictured is identified in bold type.

Exhibit 2J (continued)
AIRCRAFT REFERENCE CODES

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 stall speed (V_{SO}) at the maximum certificated landing weight. V_{REF}, V_{SO}, and the maximum certificated landing weight are those values as established for the aircraft by the certification authority of the country of registry.

The AAC generally refers to the approach speed of an aircraft in landing configuration. The higher the approach speed, the more restrictive the applicable design standards. The AAC, depicted by a letter A through E, is the aircraft approach category and relates to aircraft approach speed (operational characteristics). 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 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): A classification of airplanes based on outer-to-outer Main Gear Width (MGW) and Cockpit to Main Gear (CMG) distance. The TDG relates to the undercarriage dimensions of the critical aircraft. The TDG is classified by an alphanumeric system: 1A, 1B, 2A, 2B, 3, 4, 5, 6, and 7. The taxiway design elements determined by the application of the TDG include the taxiway width, taxiway edge safety margin, taxiway shoulder width, taxiway fillet dimensions, and, in some cases, the separation distance between parallel taxiways/taxilanes. Other taxiway elements, such as the taxiway safety area (TSA), taxiway/taxilane 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 critical aircraft utilizing those surfaces. It is appropriate for taxiways to be planned and built to different TDG standards based on expected use.

The back side of **Exhibit 2J** summarizes the classification 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 the larger commercial aircraft will fall in AAC C and D.

AIRPORT AND RUNWAY CLASSIFICATIONS

Airport and runway classifications, along with the aircraft classifications defined previously, 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 upon 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 design standards that apply. The first component, depicted by a letter, is the AAC and relates to aircraft approach speed (operational characteristics). The second component, depicted by a Roman numeral, is the ADG and relates to either the aircraft wingspan or tail height (physical characteristics), whichever is most restrictive. The third component relates to the available instrument approach visibility minimums expressed by RVR values in feet of 1,200 (⅛-mile), 1,600 (¼-mile), 2,400 (½-mile), 4,000 (¾-mile), and 5,000 (1-mile). The RVR values approximate standard visibility minimums for instrument approaches to the runways. The third component reads "VIS" for runways designed for visual approach use only.

Approach Reference Code (APRC): A code signifying the current operational capabilities of a runway and associated parallel taxiway with regard to 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 particular meteorological conditions where no special operating procedures are necessary, as opposed to the RDC, which is based upon planned development with no operational component. The APRC for a runway is established based upon 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 with regard to takeoff operations. The DPRC represents those aircraft that can take off from a runway while any aircraft are present on adjacent taxiways, under particular meteorological conditions with no special operating conditions. The DPRC is similar to the APRC but is composed of two components: 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 (visibility) component 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 PAN identifies the existing ARC as B-I.

CRITICAL AIRCRAFT

The selection of appropriate FAA design standards for the development and location of airport facilities is based primarily upon the characteristics of the aircraft which are currently using, or are expected to use, an airport. The critical aircraft is used to define the design parameters for an airport. The critical aircraft may be a single aircraft or a composite aircraft representing a collection of aircraft classified 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 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 critical aircraft is defined as the most demanding aircraft type, or grouping of aircraft with similar characteristics, that make regular use of the airport. Regular use is 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 aircraft currently using the airport can severely limit the airport's ability to accommodate future operations of more demanding aircraft. Conversely, it is not practical or economical to base airport design on aircraft that will not realistically use the airport." Selection of the current and future critical aircraft must be realistic in nature and supported by current data and realistic projections.

AIRPORT CRITICAL AIRCRAFT

There are three elements for classifying the airport critical aircraft. The three elements are the AAC, ADG, and the 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 traffic (air carrier and air taxi), general aviation, and military aircraft. Due to certain 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 2K** presents the TFMSC operational mix at the airport for turbine aircraft operations for the last 10 years. As can be seen, the airport experiences activity by a wide range of business jets; however, no single aircraft or family of aircraft has conducted 500 or more operations at the airport in recent years. In 2022, the greatest number of operations in any single design family was 72 in B-I, which accounted for approximately 41 percent of logged turbine aircraft activity. Over the 10-year period, the B-I design category has averaged approximately 52.6 annual operations, as reported by the TFMSC. Representative aircraft in this category include the Citation M2 (Model C525) and the Beechcraft King Air 90/100. The next largest number of operations was conducted by the B-II family of aircraft, which includes aircraft such as the King Air 200/300/350. These and other B-II aircraft conducted an average of 56.8 operations annually over the last 10 years and comprised approximately 24 percent of logged turbine operations.

When planning for future facilities at PAN, it is necessary to consider the types of aircraft operating most frequently at the airport, in order to identify the existing and ultimate critical aircraft. With no one family of aircraft operating more than 500 times per year, it is reasonable to identify B-I as the existing critical aircraft given the reported data as well as itinerant operations conducted by piston-powered aircraft. When comparing annual B-I and B-II operations, B-I operations have generally exceeded B-II operations over the last 10 years, with the exception of four years (2016, 2017, 2020, and 2021). Single engine pistons will likely continue to dominate in terms of operations at the airport over the planning period, with some turboprop and jet operations. Turboprop and jet numbers, however, are not expected to exceed 500 annual operations, especially by some of the larger B and C turbine aircraft. Therefore, the existing and ultimate critical aircraft for PAN has been determined to fall within ARC B-I(Small), with the Citation M2 serving as the representative aircraft. The "Small" portion of the ARC refers to an aircraft with a maximum certificated takeoff weight of 12,500 pounds or less.

Airport Critical Aircraft Summary

Previous planning determined the ultimate critical aircraft to be B-II, which was considered reasonable and prudent based on projected activity at the time. Since then, more specific information has become available regarding the types of aircraft most frequently operating at PAN (i.e., the TFMSC). Based on this recent data, the current aircraft approach category is "B," and the current airplane design group is "I(Small)." Over the last 10 years, the most active B-I airplane at PAN has been the Cessna Citation M2, which is TDG 1A aircraft. The airport is also used regularly by aircraft that fall within TDG 2A, such as the King Air 90/100. For planning purposes, this more demanding TDG will be carried forward as part of the overall critical aircraft; therefore, the current and ultimate critical aircraft for PAN is classified as B-I(Small)-2A, represented by small business jet aircraft such as the Cessna Citation M2 and the King Air 90/100.

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 aircraft will also be the RDC for the primary runway.

Runway 6-24, which is 5,504 feet long and 75 feet wide, should be designed to accommodate the overall airport critical aircraft. The critical aircraft has been identified as B-I(Small). Runway 6-24 has a circling GPS-A instrument approach with visibility minimums as low as 1-mile. Based on the current activity and instrument approach capability, the existing and ultimate RDC is B-I(Small)-5000. It should be noted that a straight-in instrument approach is currently being pursued by the airport sponsor. For planning purposes, the ultimate RVR will remain at 5000 (i.e., 1-mile visibility minimums).

APPROACH AND DEPARTURE REFERENCE CODES

The approach and departure reference codes (APRC and DPRC) describe the current operational capabilities of each runway and the adjacent parallel taxiways, where no special operating procedures are necessary. Essentially, the APRC and DPRC describe the current conditions at an airport in runway classification terms when considering the parallel taxiway.

The parallel taxiway for Runway 6-24 is located 150 feet from the runway (centerline to centerline). Based on this separation distance and the lowest visibility minimums associated with the runway, the APRC for Runway 6-24 is B/I(S)/4000 and its DPRC is B/I(S).

AIRPORT AND RUNWAY CLASSIFICATION SUMMARY

Table 2Q summarizes the airport and runway classification currently and in the future. The critical aircraft is now defined by those aircraft in ARC B-I(Small) and is expected to remain at this classification throughout the planning period.

ARC	Aircraft	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
A-I	A36 Bonanza	0	0	0	0	2	0	0	0	0	0
	Cirrus Vision Jet	0	0	0	0	0	0	0	0	2	4
	Eclipse 400/500	2	2	2	0	0	0	2	2	2	0
	Epic Dynasty	0	0	0	0	2	0	4	0	0	0
	Lancair Evolution/Legacy	0	0	0	2	0	0	0	0	0	0
	Piper Malibu/Meridian	28	22	16	14	16	8	4	8	6	6
	Socata TBM 7/850/900	0	0	2	4	6	4	6	2	4	8
	Total	30	24	20	20	26	12	16	12	14	18
A-II	Cessna Caravan	4	8	0	0	0	0	2	0	0	2
	Pilatus PC-12	30	38	46	4	28	18	22	22	12	22
	Total	34	46	46	4	28	18	24	22	12	24
A-III	De Havilland Dash 7	0	0	0	0	0	2	2	0	0	0
	Total	0	0	0	0	0	2	2	0	0	0
B-I	Beechjet 400	0	2	2	4	0	0	0	2	14	0
	Cessna 425 Corsair	0	0	0	0	0	0	2	0	0	0
	Citation CJ1	8	4	0	2	8	72	34	4	10	2
	Citation I/SP	2	0	0	0	4	0	0	0	8	6
	Citation M2	0	0	0	0	0	0	0	0	10	38
	Citation Mustang	0	2	0	0	2	0	0	0	2	0
	Honda Jet	0	0	0	0	0	0	0	0	2	0
	King Air 90/100	42	34	44	12	16	14	10	12	10	8
	L-39 Albatross	0	0	2	0	0	0	0	0	0	0
	Mitsubishi MU-2	0	4	0	0	0	0	0	0	10	4
	Phenom 100	4	2	0	4	2	4	4	0	2	0
	Piper Cheyenne	0	2	0	0	0	0	0	0	4	4
	Premier 1	2	0	0	0	0	0	2	2	8	10
	T-6 Texan	0	0	0	0	0	0	0	0	2	0
	Total	58	50	48	22	32	90	52	20	82	72
B-II	Aero Commander 690	0	0	4	2	0	0	0	0	0	0
	Beech 1900	2	0	0	0	0	0	0	0	0	0
	Cessna Conquest	2	0	0	2	0	10	0	6	2	0
	Citation CJ2/CJ3/CJ4	0	0	6	38	28	6	2	36	4	4
	Citation II/SP/Latitude	2	0	6	8	2	2	4	4	6	2
	Citation V/Sovereign	2	2	6	8	12	6	4	12	8	2
	Citation X	2	0	0	0	0	0	2	0	6	0
	Citation XLS	0	6	10	10	6	2	2	2	6	0
	Dornier 328	0	0	0	4	0	0	0	0	0	0
	Falcon 20/50	0	0	0	0	2	0	0	0	0	2
	King Air 200/300/350	24	14	0	24	18	12	8	34	54	24
	King Air F90	0	0	0	0	0	0	0	0	2	0
	Phenom 300	2	2	4	0	6	0	8	0	4	8
	Swearingen Merlin	0	0	0	0	0	2	2	0	2	0
	Total	36	24	36	96	74	40	32	94	94	42
B-III	Falcon 7X/8X	0	0	0	0	4	0	0	0	0	0
	Total	0	0	0	0	4	0	0	0	0	0
C-I	Learjet 31	0	2	2	0	0	0	0	0	0	0
	Learjet 40 Series	0	0	0	0	0	22	8	8	14	14
	Learjet 50 Series	0	0	0	2	0	0	0	2	0	0
	Learjet 60 Series	0	0	0	2	2	0	2	2	4	2
	Total	0	2	2	4	2	22	10	12	18	16
C-II	Challenger 600/604	0	0	0	0	0	2	0	0	0	0
	Citation III/VI	0	2	0	0	0	0	2	0	0	2
C-II cont.	Gulfstream 100/150	0	0	0	0	0	0	0	0	2	0
	Gulfstream 280	0	0	0	0	0	0	0	0	0	2
	Hawker 800 (Formerly Bae-125-800)	6	0	0	2	0	0	0	0	0	0
	Total	0	2	2	4	2	22	10	12	18	16
C-III	Boeing 737 (200 thru 700 series)	0	0	0	0	0	0	2	0	0	0
	Total	0	0	0	0	0	0	2	0	0	0
C-IV	Boeing 707	0	0	2	0	0	0	0	0	0	0
	C-130 Hercules	0	0	0	2	0	2	0	0	0	0
	Total	0	0	2	2	0	2	0	0	0	0
D-I	Learjet 35/36	2	2	4	2	0	2	0	0	2	0
	Total	2	2	4	2	0	2	0	0	2	0
D-II	Gulfstream 200	0	0	0	0	2	2	0	0	2	0
	Total	0	0	0	0	2	2	0	0	2	0
D-III	Gulfstream 500/600	0	2	0	0	0	0	0	0	0	0
	Total	0	2	0	0	0	0	0	0	0	0

Source: PAN TFMSC 2013-2022

AIRPORT REFERENCE CODE (ARC) SUMMARY

ARC CODE	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
A-I	30	24	20	20	26	12	16	12	14	18
A-II	34	46	46	4	28	18	24	22	12	24
A-III	0	0	0	0	0	2	2	0	0	0
B-I	58	50	48	22	32	90	52	20	82	72
B-II	36	24	36	96	74	40	32	94	94	42
B-III	0	0	0	0	4	0	0	0	0	0
C-I	0	2	2	4	2	22	10	12	18	16
C-II	6	2	0	2	0	2	2	0	2	4
C-III	0	0	0	0	0	0	2	0	0	0
C-IV	0	0	2	2	0	2	0	0	0	0
D-I	2	2	4	2	0	2	0	0	2	0
D-II	0	0	0	0	2	2	0	0	2	0
D-III	0	2	0	0	0	0	0	0	0	0
Total	166	152	158	152	168	192	140	160	226	176

AIRCRAFT APPROACH CATEGORY (AAC)

AC	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
A	64	70	66	24	54	32	42	34	26	42
B	94	74	84	118	110	130	84	114	176	114
C	6	4	4	8	2	26	14	12	20	20
D	2	4	4	2	2	4	0	0	4	0
Total	166	152	158	152	168	192	140	160	226	176

AIRCRAFT DESIGN GROUP (ADG)

DG	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
I	90	78	74	48	60	126	78	44	116	106
II	76	72	82	102	104	62	58	116	110	70
III	0	2	0	0	4	0	2	0	0	0
IV	0	0	2	2	0	2	0	0	0	0
Total	166	152	158	152	168	192	140	160	226	176

Exhibit 2K
HISTORICAL TURBOPROP AND JET OPERATIONS

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Table 2Q | Airport and Runway Classifications for Payson Municipal Airport

	Runway 6-24 Existing / Ultimate
Airport Reference Code (ARC)	B-I(Small)
Airport Critical Aircraft	B-I(S)-2A
Critical Aircraft (Typ.)	Citation M2
Runway Design Code (RDC)	B-I(S)-5000
Approach Reference Code (APRC)	B/I(S)/4000
Departure Reference Code (DPRC)	B/I(S)
Taxiway Design Group (TDG)	2A*
*Based on the King Air 90/100	

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 aircraft for the airport. Total based aircraft (on- and off-airport) are forecast to grow from 66 currently to 83 by 2042. Operations are forecast to grow from an estimated 34,250 in 2022 to 49,900 by 2042. The projected growth is driven by FAA's positive outlook for general activity nationwide, as well as positive outlooks for socioeconomic growth (population, employment, and income/GRP) in Payson and the region.

The critical aircraft for the airport was determined by examining the FAA TFMSC database of flight plans. The current and ultimate critical aircraft is described as B-I(S)-2A and is best represented by a Citation M2, a small business jet typically utilized for business operations or air charters.

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 activity levels that will serve as milestones or activity benchmarks in evaluating facility requirements.