Chapter 2
Forecasts of Aviation Demand

Chapter 2
Forecasts of Aviation Demand

Facility planning requires a definition of demand that may be expected to occur during the useful life of the facility's crucial components. For LBX, this involves projecting aviation demand for a 20-year timeframe. In this report, forecasts of county registered aircraft, based aircraft, based aircraft fleet mix, annual airport operations, and forecasts of airport peaking characteristics are projected.

The forecasts generated may be used for a multitude of purposes, including facility needs assessments and environmental evaluations. The forecasts will be submitted to TxDOT for review and approval to ensure accuracy and reasonable projection of aviation activity. The intent of the projections is to enable the airport to make facility improvements to meet demand in the most efficient and cost-effective manner possible.

It should be noted that aviation activity can be affected by numerous outside influences on a local, regional, and national level. As a result, forecasts of aviation demand should be used only for advisory purposes. It is recommended that planning strategies remain flexible enough to accommodate any unforeseen facility needs.

FORECASTING APPROACH

Typically, the most accurate and reliable forecasting approach is derived from multiple analytical forecasting techniques. Analytical forecasting methodologies typically consist of regression analysis, trend analysis and extrapolation, market share or ratio analysis, and smoothing. Through the use of multiple forecasting techniques based upon each aviation demand indicator, an envelope of aviation demand projections can be generated.

Regression analysis can be described as a forecasting technique that correlates certain aviation demand variables (such as passenger enplanements or operations) with economic measures. When using regression analysis, the technique should be limited to relatively simple models containing independent variables for which reliable forecasts are available (such as population or income forecasts).

Trend analysis and extrapolation is a forecasting technique that records historical activity (such as airport operations) and projects this pattern into the future. Oftentimes, this technique can be beneficial when local conditions of the study area are differentiated from the region or other airports.

Market share or ratio analysis can be described as a forecasting technique that assumes the existence of a top-down relationship between national, regional, and local forecasts. The local forecasts are presented as a market share of regional forecasts, and regional forecasts are presented as a market share of national forecasts. Typically, historical market shares are calculated and used as a base to project future market shares.

Smoothing is a statistical forecasting technique that can be applied to historical data, giving greater weight to the most recent trends and conditions. Generally, this technique is most effective when generating short-term forecasts.

NATIONAL GENERAL AVIATION TRENDS

The long-term outlook for general aviation is stable, as growth at the high-end offsets continuing retirements at the traditional low end of the segment. The active[1] general aviation fleet is forecast to decrease in number between 2019 and 2040, declining from 212,335 to 210,380. 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. Drivers of the decline in fixed-wing piston aircraft are unfavorable pilot demographics, overall increasing cost of aircraft ownership, availability of lower cost alternatives for recreational usage, coupled with new aircraft deliveries not keeping pace with aircraft retirements.

Despite a decrease in total active aircraft, the number of flight hours is projected to increase from 25.5 million hours in 2018 to 30.2 million by 2040. This growth in flight hours is a result of newer more sophisticated turbine fixed wing and rotorcraft aircraft flying more hours.

[1] An active aircraft is one that flies at least one hour during the year.

Exhibit 2A shows the primary general aviation demand indicators as forecast by the FAA.

GENERAL AVIATION AIRCRAFT FLEET MIX

For 2019, the FAA estimated there were 142,335 piston-powered aircraft in the national fleet. The total number of piston-powered aircraft in the fleet is forecast to decline by 1.0 percent annually from 2020-2040, resulting in 115,970 by 2040. This includes a decline of 1.0 percent annually for single engine pistons and 0.5 percent for multi-engine pistons.

Total turbine aircraft are forecast to grow at an annual growth rate of 1.8 percent through 2040. The FAA estimates there were 25,000 fixed-wing turbine-powered aircraft in the national fleet in 2019, and there will be 36,595 by 2040. This includes annual growth rates of 1.2 percent for turboprops and 2.2 percent for business jets.

Total helicopters are forecast to grow at an annual growth rate of 1.6 percent annually through 2040. The FAA estimates there were 10,165 helicopters in 2019, which are forecast to grow to 14,295 by 2040. This includes annual growth rates of 1.4 percent for piston helicopters and 1.7 percent for turbine helicopters.

The FAA also forecasts growth for experimental aircraft, light sport aircraft, and other types such as gliders and ultralight aircraft. Combining each of these aircraft types, there were 34,835 “other” aircraft in 2019 that are forecast to grow to 43,520 by 2040, for an annual growth rate of 1.1 percent.

GENERAL AVIATION OPERATIONS

The FAA also forecasts total operations based upon activity at control towers across the U.S. Operations are categorized as air carrier, air taxi/commuter, general aviation, and military.

General aviation operations, both local and itinerant, declined significantly as a result of the 2008-2009 recession and subsequent slow recovery. Through 2040, total general aviation operations are forecast to grow 0.29 percent annually. This includes annual growth rates of 0.33 percent for local general aviation operations and 0.26 percent for itinerant general aviation operations. Itinerant general aviation operations are expected to increase from 14.2 million in 2019 to 15.2 million in 2040. Local general aviation operations are expected to grow from 13.1 million in 2019 to 14.5 million in 2040.

Exhibit 2A presents the historical and forecast U.S. active general aviation operations at towered airports.

GENERAL AVIATION AIRCRAFT SHIPMENTS AND REVENUE

The 2008-2009 economic recession had a negative impact on general aviation aircraft production, and the industry has been slow to recover. Aircraft manufacturing declined for three straight years from 2008 through 2010. According to the General Aviation Manufacturers Association (GAMA), there is optimism

that aircraft manufacturing will stabilize and return to growth, which has been shown since 2011. **Table 2A** presents historical data related to general aviation aircraft shipments.

Worldwide shipments of general aviation airplanes have increased each of the last three years, with a total of 2,658 units delivered around the globe, compared to 2,268 units in 2016. Worldwide general aviation billings were also highest since 2014. In 2019, $23.515 billion in new general aviation aircraft were shipped as compared to $20.564 billion in 2018. 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 Asian-Pacific region is the second largest market for piston-powered and turboprop aircraft.

TABLE 2A
Annual General Aviation Airplane Shipments
Manufactured Worldwide and Factory Net Billings

YEAR	TOTAL	SEP	MEP	TP	J	NET BILLINGS ($MILLIONS)
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	2,267	890	129	582	666	20,432
2017	2,325	936	149	563	677	20,201
2018	2,443	954	185	601	703	20,564
2019	2,658	1,111	213	525	809	23,515

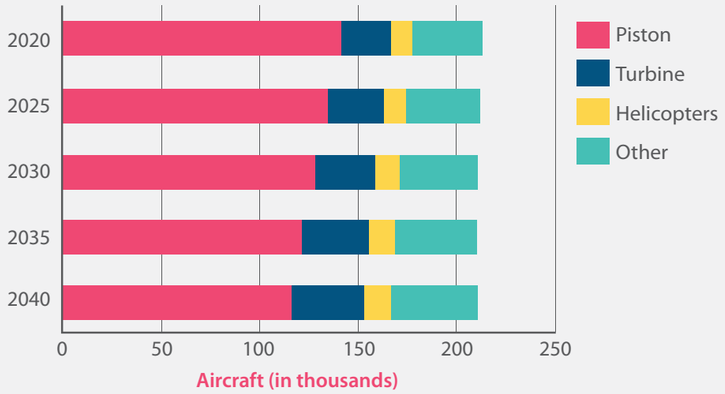
SEP - Single Engine Piston; MEP - Multi-Engine Piston; TP - Turboprop; J - Turbofan/Turbojet
Source: General Aviation Manufacturers Association, 2019 Databook

Business Jets: Business jet deliveries grew from 703 units in 2018 to 809 units in 2019, the most since 2009. The North American market accounted for 67.1 percent of business jet deliveries, which is a 2.0 percent increase in market share compared to 2018.

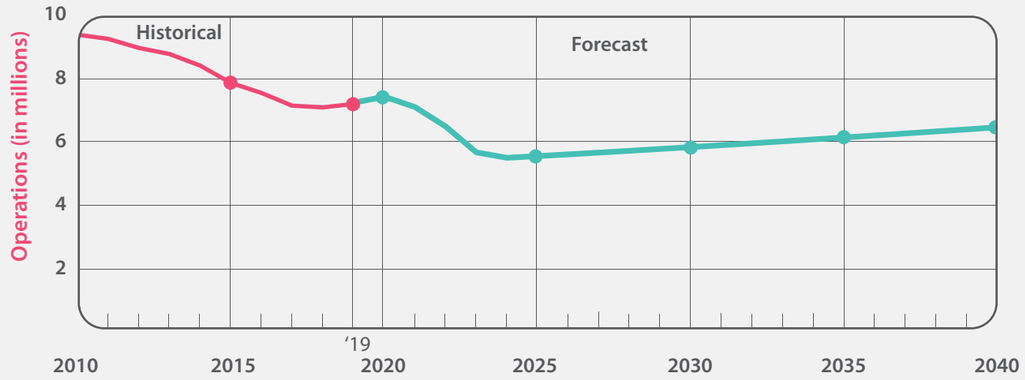
Turboprops: Turboprop shipments were down from 601 in 2018 to 525 in 2019. North America's market share of turboprop aircraft, however, increased by 0.5 percent in the last year. The Latin American and Middle East African markets also increased, while the European and Asian-Pacific markets decreased their market share.

Pistons: In 2019, piston airplane shipments grew to 1,111 units over 2018's shipment of 954 units. North America's market share of piston aircraft deliveries recovered from a 4.1 percent decline in 2018 with a 4.9 percent increase in 2019. The Asian-Pacific and Latin American markets experienced declines in market share during the past year.

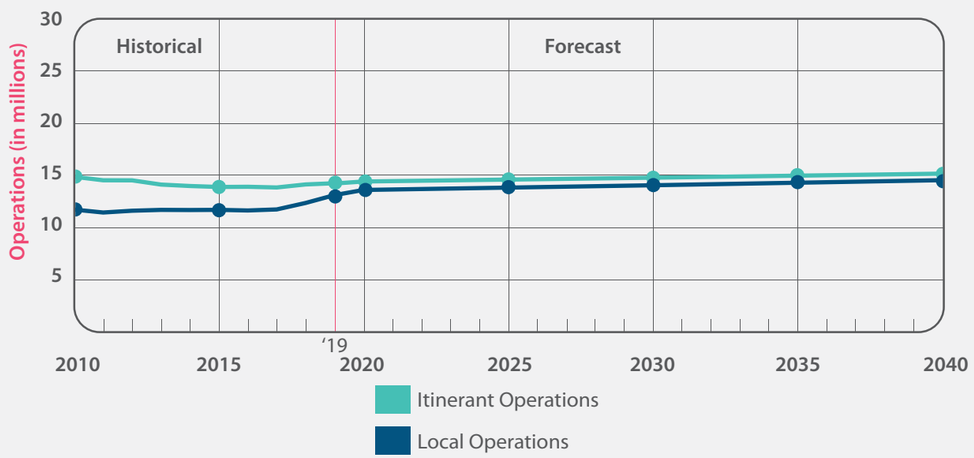
U.S. Active General Aviation Aircraft



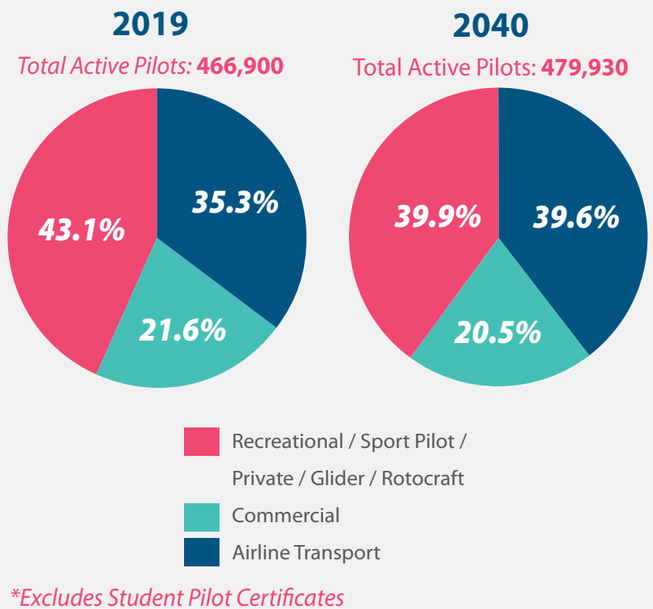
U.S. Air Taxi Operations



U.S. General Aviation Operations



Active Pilots By Certificate



*Excludes Student Pilot Certificates

Source: FAA Aerospace Forecasts FY2020-2040

This page intentionally left blank

U.S. PILOT POPULATION

There were 664,565 active pilots certificated by the FAA at the end of 2019, including student pilot certificates. All pilot categories, except for private, rotorcraft only, and recreational only certificates, continued to increase. Except for student pilots and airline transport pilots (ATP), the number of active general aviation pilots is projected to decrease about 12,120 (down 0.2 percent annually) between 2019 and 2040. The ATP category is forecast to increase by 25,150 (up 0.7 percent annually). The FAA has suspended the student pilot forecast due to insufficient data.

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. Oil prices moved lower in 2019 to about $60 per barrel and lower still in early 2020 but are projected to gradually increase to $100 per barrel by 2040.

The rapid spread of the novel coronavirus (COVID-19) that began in early 2020 now presents a new risk without clear historical precedent. It is not clear at this point how the virus will affect aviation in the long-term; however, impacts have already been felt in 2020 and could carry over into 2021. The long-term impact of COVID-19 on the aviation industry will not be understood until the full spread or intensity of the human consequences, as well as the breadth and depth of possible economic fallout, is known.

AIRPORT SERVICE AREA FORECASTS

In determining aviation demand for an airport, it is necessary to identify the role of that airport. LBX is classified as a general aviation (GA) reliever airport in the NPIAS. As such, the primary role of the airport is to relieve GA traffic from the Houston area commercial service airports and to support GA activities of the local area. GA is a term used to describe a diverse range of aviation activities, which includes all segments of the aviation industry, except commercial air carriers and the military. GA is the largest component of the national aviation system and includes activities, such as pilot training, recreational flying, and the use of sophisticated turboprop and jet aircraft for business and corporate use.

The initial step in determining the GA demand for an airport is to define its service area. The airport service area is a generalized geographical area where there is a potential market for airport services, particularly based aircraft. Access to GA airports and transportation networks enter the equation to determine the size of a service area, as well as the quality of aviation facilities, distance, and other subjective criteria.

Typically, the service area for a Local GA airport can extend up to and even beyond 30 miles. The proximity and level of GA services are largely the defining factors when describing the GA service area. As shown in **Table 2B**, there are 10 public-use airports located within 30 nautical miles of LBX. Of the 10 airports, only three of them are within the *National Plan of Integrated Airports System* (NPIAS). Those that are not in the NPIAS have very limited facilities and generally serve only a few based aircraft. Bay City Regional Airport, the closest NPIAS airport to LBX, is in Matagorda County, west of Brazoria County. The other NPIAS airports in the region, Houston-Southwest and Pearland Regional, are both GA relievers within the City of Houston; however, Pearland Regional is located within the jurisdictional boundary of Brazoria County.

TABLE 2B
Airports Within 30 NM from LBX

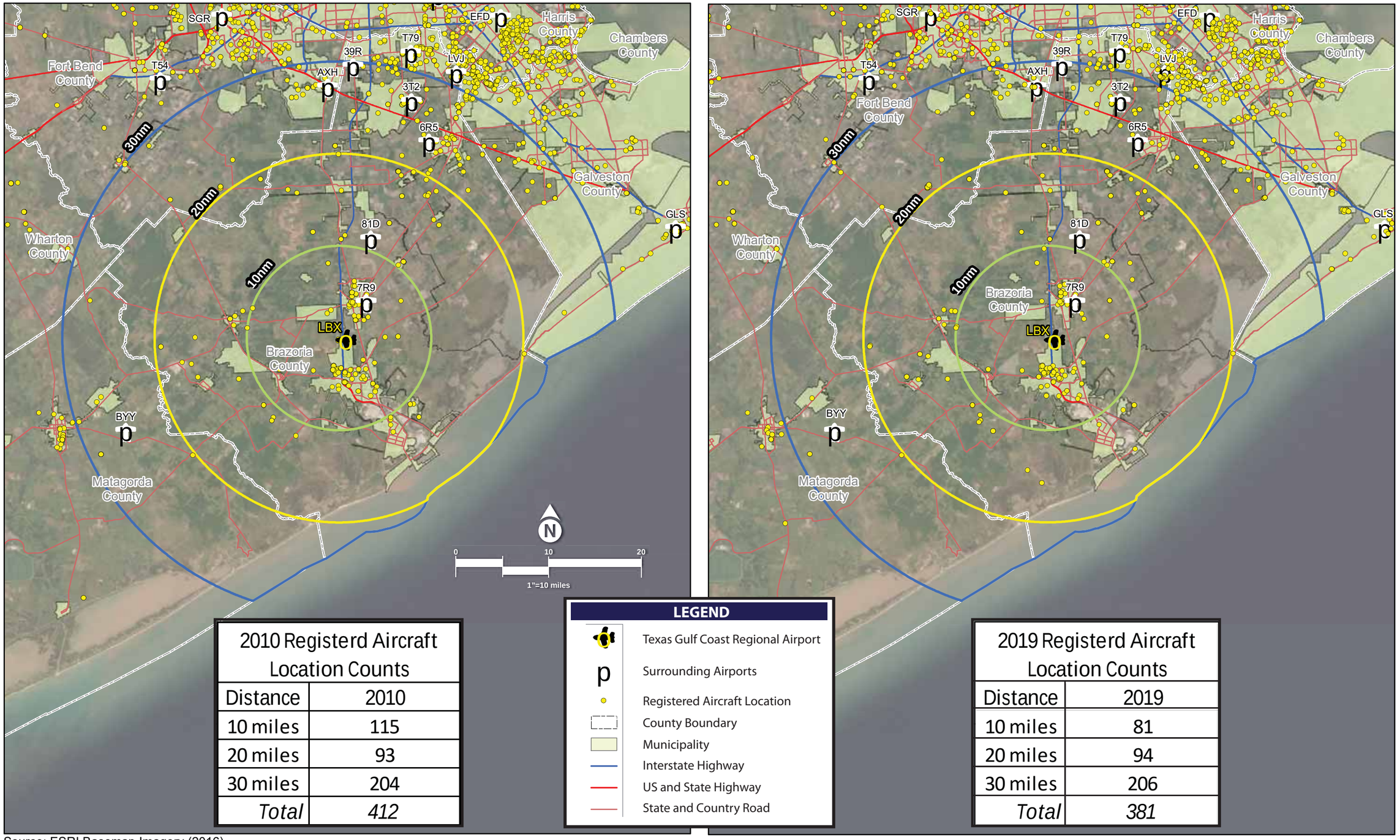
Airport	Nautical Miles/ Direction from LBX[1]	FAA Service Level[2]	Based Aircraft[1]	Annual Operations[1]	Longest Runway (ft.)[1]	Lowest Visibility Minimum[1]
Texas Gulf Coast Regional (LBX)	--	**Reliever**	**104**	**79,915**	**7,000**	**½-mile**
Bailes Airport (7R9)	4.7 nm NE	N/A	9	1,092	2,060	None
Flyin'Tiger Airport (81D)	9.7 nm NNE	N/A	6	1,768	2,261	None
Alvin Airpark Airport (6R5)	20.5 nm NNE	N/A	16	N/A	1,500	None
Bay City Regional Airport (BYY)	22.6 nm WSW	GA - Local	31	14,235	5,107	1-mile
Wolfe Air Park Airport (3T2)	23.3 nm NNE	N/A	75	16,060	2,910	None
Houston-Southwest Airport (AXH)	23.9 nm N	Reliever	25	42,705	5,002	1-mile
Flyin' B Airport (39R)	25.8 nm N	N/A	N/A	N/A	2,100	None
Pearland Regional Airport (LVJ)	27.3 nm NNE	Reliever	183	59,860	4,313	⅞-mile
Skyway Manor Airport (T79)	27.7 nm NNE	N/A	5	504	2,550	None
Lane Airpark Airport (T54)	29.8 nm NNW	N/A	7	1,976	3,200	None

Sources: [1]FAA Form 5010 Airport Master Record / basedaircraft.com; [2]NPIAS.

When discussing the GA service area, two primary demand segments need to be addressed. The first component is the airport's ability to attract based aircraft. Almost universally, aircraft owners choose to base at an airport nearer their home or business. Convenience is the most common reason for basing. **Exhibit 2B** depicts a 10-, 20-, and 30-nautical mile (nm) radius from LBX, which extends through the majority of Brazoria County, missing only the very northern portion. The exhibit also depicts registered aircraft within the region both in 2010 and in 2019. Most registered aircraft in both years are within the 20-30 nm ring, which includes the southern portion of the City of Houston. The number of registered aircraft in the 10 nm ring has dropped since 2010 from 115 to 81 in 2019.

The second demand segment to consider is itinerant aircraft operations. In most cases, itinerant aircraft operators will also elect to utilize airports nearer their intended destination. This, however, is highly dependent on the airport's capabilities to accommodate the aircraft operator. As a result, airports with better services and facilities are more likely to attract a larger portion of the region's itinerant aircraft operations.

LBX has better available services and facilities compared to the other public-use airports in the region. It is centrally located within Brazoria County so it is the most convenient airport to most county-registered



2010 Registerd Aircraft Location Counts	
Distance	2010
10 miles	115
20 miles	93
30 miles	204
Total	*412*

LEGEND

- Texas Gulf Coast Regional Airport
- p — Surrounding Airports
- Registered Aircraft Location
- County Boundary
- Municipality
- Interstate Highway
- US and State Highway
- State and Country Road

2019 Registerd Aircraft Location Counts	
Distance	2019
10 miles	81
20 miles	94
30 miles	206
Total	*381*

Source: ESRI Basemap Imagery (2016),
FAA Registered Aircraft Database

This page intentionally left blank

aircraft owners, except for the south Houston area, where Pearland Regional and Houston-Southwest would be more convenient. Since LBX has a longer runway, better instrument approach capabilities, and ample developable property for new hangars and amenities, it has the capability to compete with Pearland Regional and Houston-Southwest for based aircraft. For this reason, the entirety of Brazoria County is considered the core service area for the purposes of this study.

REGISTERED AIRCRAFT FORECAST

Figure 2A presents historical registered aircraft counts for Brazoria County from 1993 to 2019. Aircraft registrations have grown from a low of 287 in 1993 to reach their peak count of 448 in 2011. Since 2011, registrations have dropped to 334 in 2018 and then increased in 2019 to 342. The declining trend since 2011 is likely a result of the FAA's changed aircraft registration requirements that were issued in 2010. The FAA terminated the registration of all aircraft registered before October 1, 2010 over a three-year period and required re-registration 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.

In 2019, the single-engine piston category represents by far the most registered aircraft in the service area with 274. However, there are now more jets and turboprops registered in the county than at any time in recent history. Helicopter registrations have fallen dramatically since the early 2000s when more than 60 were in the county. In 2019, there were 12 registered helicopters. Since 2000, registered aircraft in Brazoria County has grown at a -0.6 percent compound annual growth rate (CAGR). Applying this historic growth rate to the forecast period results in 305 registered aircraft by 2040.

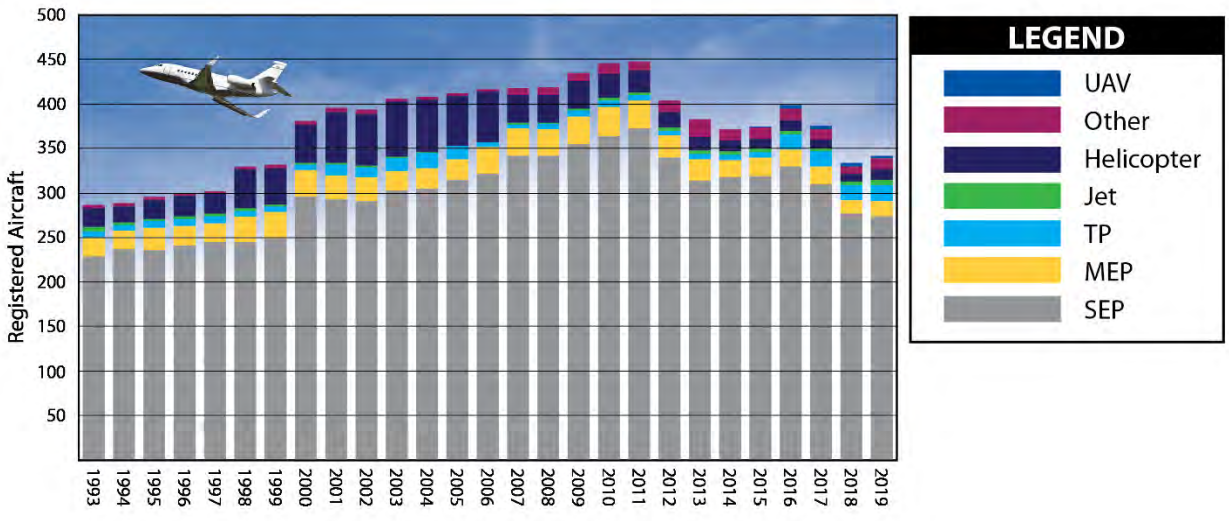


***FIGURE 2A** – Brazoria County Registered Aircraft History*

When projecting registered aircraft, it is helpful to calculate the service area's market share of the total active GA aircraft in the U.S. In conducting this market share analysis, comparison of the service area aircraft ownership trends against the nation's ownership trends can be carried out. The county's market share of U.S. active GA aircraft has fluctuated since 2000, increasing to a high of 0.203 percent in 2011, and then dropping down to 0.160 percent in 2019. Holding the 2019 market share constant through the forecast period results in a decreasing number of county registered aircraft by 2040. It was explained previously that the drop in registered aircraft in recent years is largely due to new FAA registration requirements. Furthermore, registrations grew from 2018 to 2019, so there is reason to believe that registrations have stabilized and could continue to grow again into the future. A return to average market share projection was prepared, which returns the county's market share to 0.183 percent, which is the average share since 2000. This projection results in 385 registered aircraft by 2040.

Population trends have also been used to analyze and project aircraft registrations within the service area. This projection method analyzes the service area population as a ratio of the historical registered aircraft per 1,000 residents. In 2019, there were 0.91 registered aircraft per 1,000 service area residents. The historic ratio has not fluctuated significantly as the average aircraft per 1,000 residents over the period was 1.3. Service area population is projected to continue a growth trend over the next 20 years, reaching 604,816 residents by 2040. A constant ratio projection maintaining the current ratio of 0.91 yields 552 registered aircraft in the service area by 2040. An increasing ratio projection was also prepared with the ratio returning to the historic average of 1.3. This projection results in 790 registered aircraft by 2040.

Several regression forecasts were also prepared, including single- and multi-variable regressions examining correlations between registered aircraft and the LBX service area population, employment, income, and gross regional product, and with U.S. active GA aircraft. None of the regressions produced a strong correlation (r^2 value over 0.9); therefore, they were not considered further. For comparison purposes, a time series growth trend projection was prepared, which results in 482 registered aircraft by 2040. Like the other regressions prepared, the correlation for the time series was well below 0.9.

The new registered aircraft projections result in a registered aircraft range of 305 to 790 by 2040. The constant and increasing ratio per capita projections likely overstate the growth potential since aircraft registrations typically do not keep pace with population growth. More likely is that registrations will return to the average market share, which reflects modest growth, especially compared to what is anticipated at a national level. For this reason, the return to average market share projection will be carried forward as the selected forecast. **Figure 2B** depicts each registered aircraft projection for comparison, along with the selected forecast.

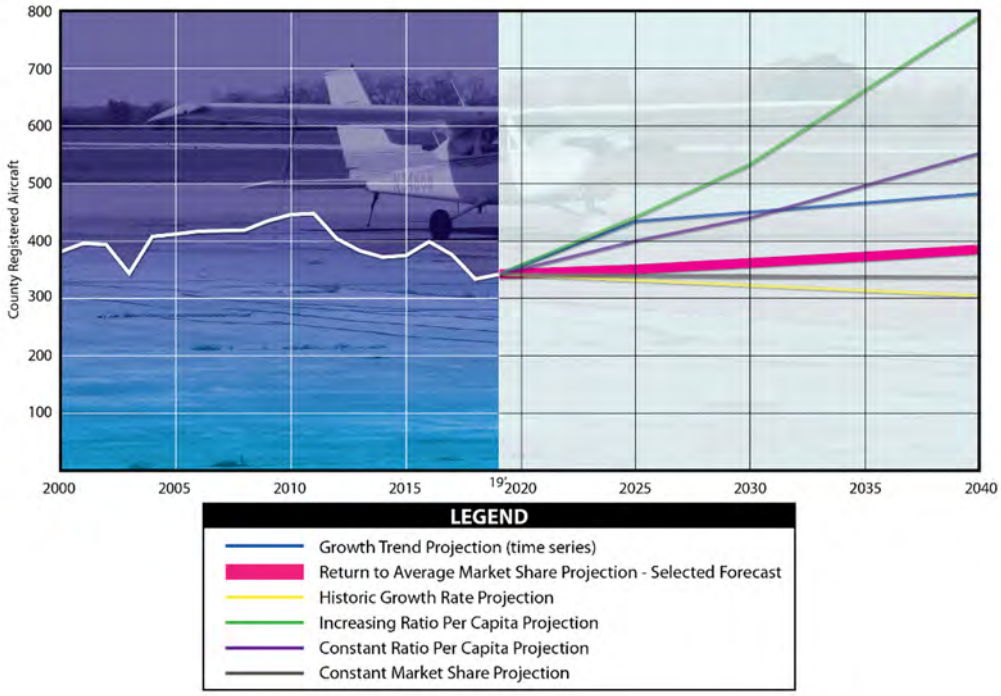


***FIGURE 2B** – Brazoria County Registered Aircraft Forecasts*

BASED AIRCRAFT FORECAST

The FAA, up until recently, did not require airports to report their based aircraft counts, nor did the FAA validate based aircraft levels at airports. However, in recent years, the FAA has established a based aircraft registry[2] so that more accurate based aircraft counts can be established and validated. On August 8, 2019, the FAA validated 23 based aircraft at LBX, based on 66 aircraft reported in its inventory. However, other records maintained by the airport reflect a 2019 based aircraft count of 104. With an aircraft storage capacity on the airport for well over 66 based airplanes and near 100 percent occupancy, it is more likely that 104 is reflective of the current count. Some based aircraft at LBX may also be based at other airports, which is not uncommon; however, for the purposes of facility planning, it is important to include all aircraft that regularly use and hangar at the airport, whether they are validated by the FAA or not. For this reason, this study will utilize 104 as the current based aircraft count.

Since historic based aircraft records have not been kept consistently, it is more difficult to piece together a historic trend. However, using data presented in previous planning studies, we can determine that based aircraft levels at LBX have ranged from a high of around 116 to a low of around 93. Since 2000, it is estimated that based aircraft have grown at a CAGR of 0.1 percent. Applying this historic trend to the forecast period results in near zero growth with 106 based airplanes in 2040.

Building upon the registered aircraft projections previously developed, market share analysis and trend line projection forecasting approaches were used to generate forecasts for the future LBX based aircraft.

[2] National Based Aircraft Inventory Program, accessed at: https://www.basedaircraft.com/Default.aspx?ReturnUrl=%2f

The airport's market share of county-registered aircraft in 2019 was 30.4 percent, which is above the historic average of 26.2 percent. Holding the current market share constant results in a total based aircraft count of 117 by 2040. To account for continued market share growth, an increasing market share projection was prepared, which results in 152 based aircraft by 2040.

Additional projections were prepared by examining the ratio of based aircraft to county population. In 2019, the ratio of based aircraft to 1,000 county residents was 0.28. This ratio has been declining over the years as population growth has outpaced based aircraft growth. Maintaining the current ratio constant through 2040 results in 168 based aircraft. An increasing ratio projection, which grows the ratio to the historic average of 0.34, results in 205 based aircraft by 2040.

The FAA's TAF for LBX reflects based aircraft growth to 130 by 2040; however, the base year count in the TAF is 71, which is 33 less than the current airport count. The TAF's projected CAGR of 3.1 percent, when applied to the current count, results in a projection of 190 based aircraft by 2040.

Similar to the registered aircraft, the constant and increasing ratio projections likely overstate the growth potential since population growth typically outpaces aircraft growth. Also, knowing that LBX currently maintains a hangar waiting list with 45 individuals listed, we can estimate that the historic growth trend, constant market share, and FAA TAF underestimate growth potential. For this reason, the increasing market share of county registrations, which anticipates an increase of 48 based aircraft by 2040, has been chosen as the selected forecast. This forecast accounts for the potential reflected in the hangar waiting list, as well as additional growth not accounted for in the waiting list. **Figure 2C** depicts the based aircraft forecasts for comparison, along with the selected forecast.

It should be noted that the selected planning forecast is based upon an unconstrained growth model. The ability for the airport to generate funding for aircraft hangars and capital improvement projects may be a limiting factor to based aircraft growth.

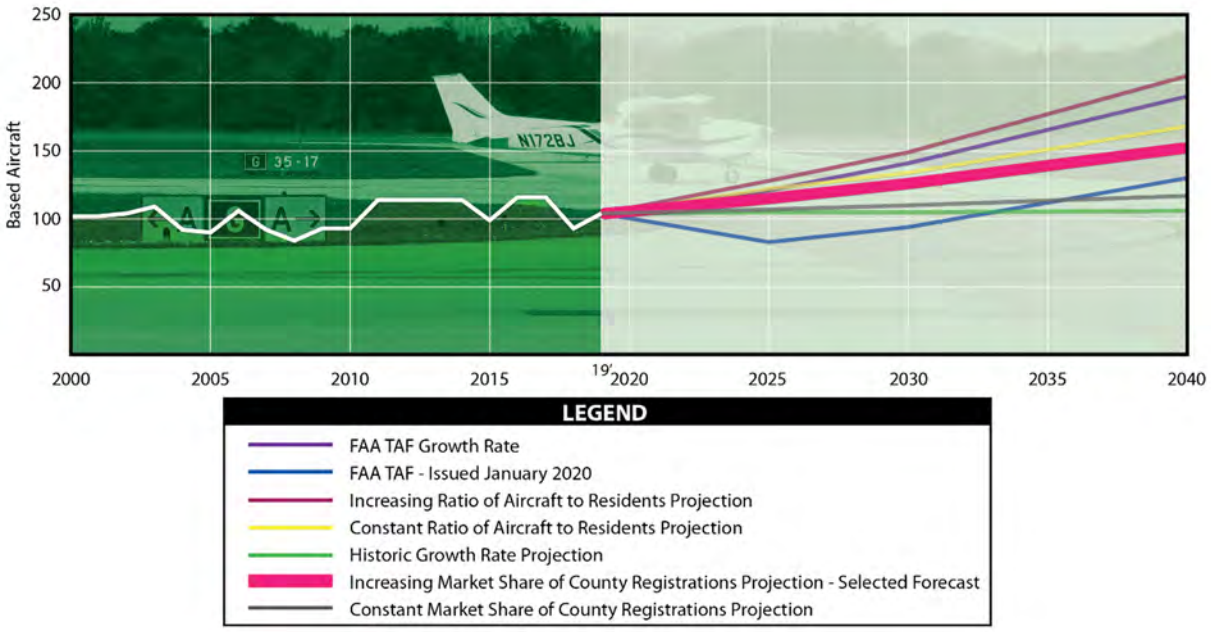


***FIGURE 2C** – Based Aircraft Forecasts*

BASED AIRCRAFT FLEET MIX

Given that the total number of aircraft based at the airport is projected to increase, it is important to have an idea of the type of aircraft expected to utilize the airfield. A forecast of the fleet mix will ensure that adequate facilities are planned to accommodate these aircraft in the future. The projection for the fleet mix of based aircraft was generated by comparing the existing fleet mix of based aircraft at LBX with the U.S. GA fleet trends.

The current fleet mix based at LBX consists of 86 single-engine piston aircraft, five multi-engine pistons, two jets, five helicopters, and six aircraft within the "other" category, which includes ultralights and gliders. The forecast for the active U.S. GA fleet shows increasing trends in larger, more sophisticated aircraft, including jets, turboprops, and helicopters. Piston aircraft are projected to decrease nationally over the next 20 years. Accounting for these national trends, a projected based aircraft fleet mix has been prepared and is detailed in **Figure 2D**. Growth is anticipated to include primarily new single-engine piston aircraft; however, there is potential for new based jets, turboprops, and helicopters.

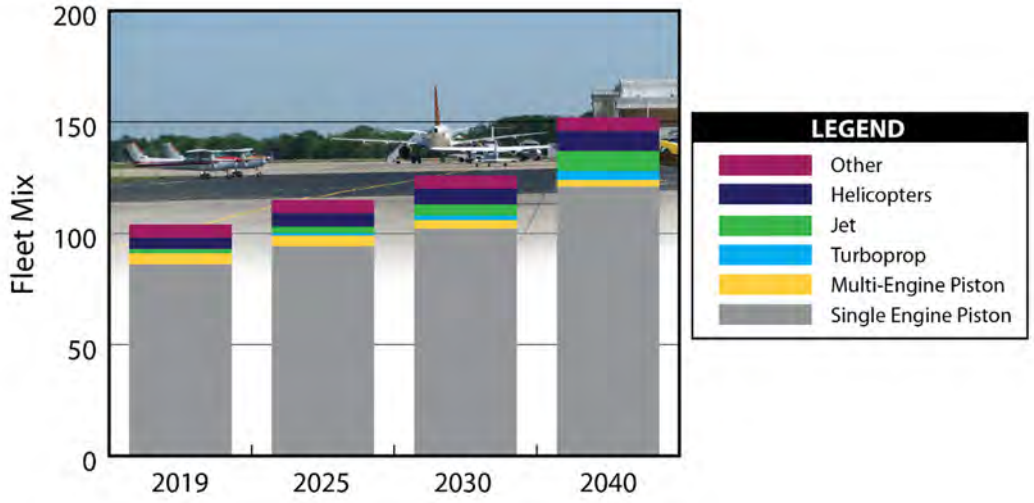


***FIGURE 2D** – Based Aircraft Fleet Mix Forecast*

GENERAL AVIATION OPERATIONS

General aviation operations are classified as either local or itinerant. A local operation is a take-off or landing performed by an aircraft that operates within sight of the airport, or which executes simulated approaches or touch-and-go operations at the airport. Generally, local operations are characterized by training operations. Itinerant operations are those performed by aircraft with a specific origin or destination away from the airport. Typically, itinerant operations increase with business and commercial use since business aircraft are not typically used for large-scale training activities.

As a non-towered airport, the airport and FAA rely on operational estimates as reported by the airport. According to the FAA TAF, there were 46,899 GA itinerant operations and 28,387 GA local operations in 2019 for a combined 75,286 GA operations. Both figures are up from older estimates dating back to 2008, which reflected 45,831 GA itinerant operations and 27,740 GA local operations.

Itinerant General Aviation Operations Forecast

Utilizing the operations counts provided in the FAA TAF, four forecasts of itinerant GA operations have been developed. The forecasts presented examine and/or manipulate variables, such as LBX's market share of national GA itinerant operations, forecast growth rates in the FAA's *Aerospace Forecast 2020-2040*, and operations per based aircraft (OPBA).

The first projection considers LBX maintaining its market share of total U.S. itinerant GA operations at a constant level. In 2019, LBX accounted for 0.3292 percent of U.S. itinerant operations. Maintaining this market share results in a projection of 49,930 itinerant GA operations by 2040. An increasing market share scenario, which increases market share slightly to 0.3501 percent by 2040, results in 53,100 annual GA itinerant operations.

Examining the ratio of itinerant GA OPBA shows that in 2019, LBX experienced 451 itinerant GA OPBA. If LBX should maintain this ratio as its based aircraft count grows over the forecast period, this would result in 68,500 annual GA itinerant operations by 2040. A second projection increases the OPBA to 475, resulting in 72,200 annual GA itinerant operations by 2040.

For comparison purposes, the FAA's TAF projection is also included. The FAA projects itinerant GA operations to reach 5,636 by 2038. The FAA TAF reflects a strong growth rate (2.3 percent CAGR) resulting in approximately 76,100 annual GA itinerant operations by 2040. The TAF reflects a growing market share and an increase in OPBA, both trends that seem likely considering the potential for new based aircraft, particularly more sophisticated turbine aircraft. For this reason, the TAF, which rounded to the nearest hundred, will be carried forward as the selected forecast.

Figure 2E depicts the GA itinerant operations projection for comparison, along with the selected forecast.

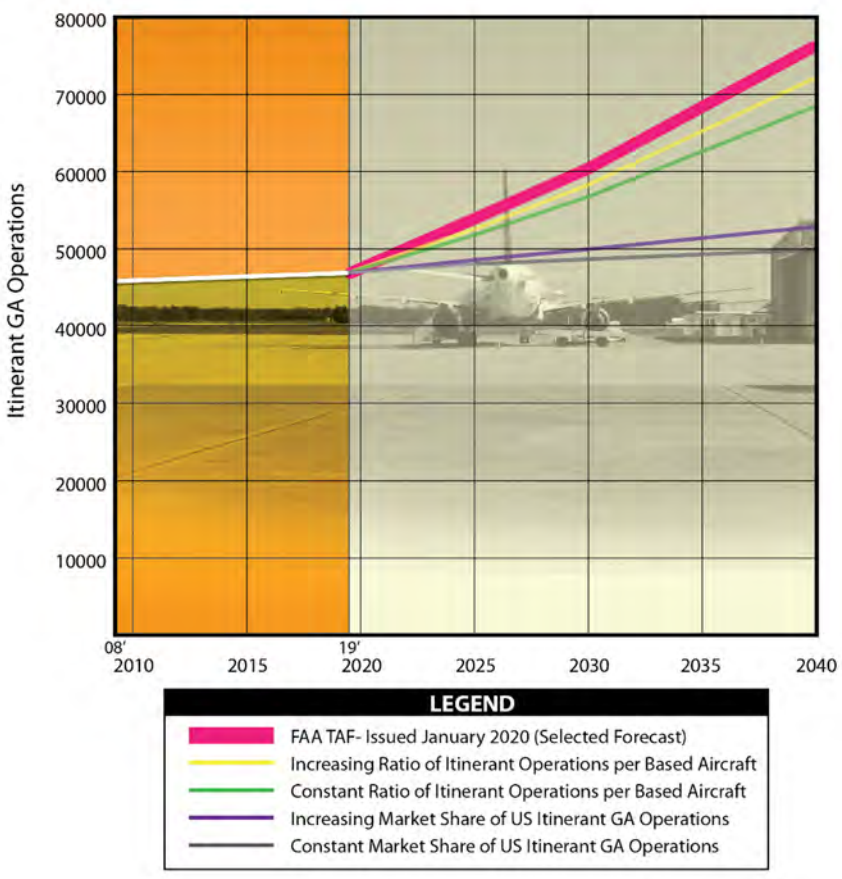


***FIGURE 2E** – Itinerant General Aviation Operations Forecasts*

Local General Aviation Operations Forecast

A similar methodology was utilized to generate a planning forecast for local GA operations. The first projection considers maintaining LBX's current market share of U.S. local GA operations constant at 0.2165 percent through the planning period, resulting in 31,500 operations by 2040. The second projection considers the potential to increase LBX's market share to 0.2815 percent by 2040, resulting in 40,900 annual operations.

LBX currently experiences 273 local GA OPBA. Maintaining this ratio constant through the planning period results in 41,500 annual operations by 2040. Increasing this ratio to 300 results in 45,600 annual local GA operations by 2040.

The FAA's TAF reflects growth up to 46,091 total annual local GA operations by 2040. The TAF figure appears to be overly aggressive considering that the future based aircraft fleet mix will include more turbine aircraft, which would not be conducting local operations to a significant degree. It is, therefore, more likely that the OPBA ratio will gradually decline. However, local GA operations should still experience some growth should their based aircraft levels rise. For this reason, the increasing market share of U.S. local GA operations projection will be carried forward as the selected forecast.

Figure 2F depicts the GA local operations projections for comparison, along with the selected forecast.

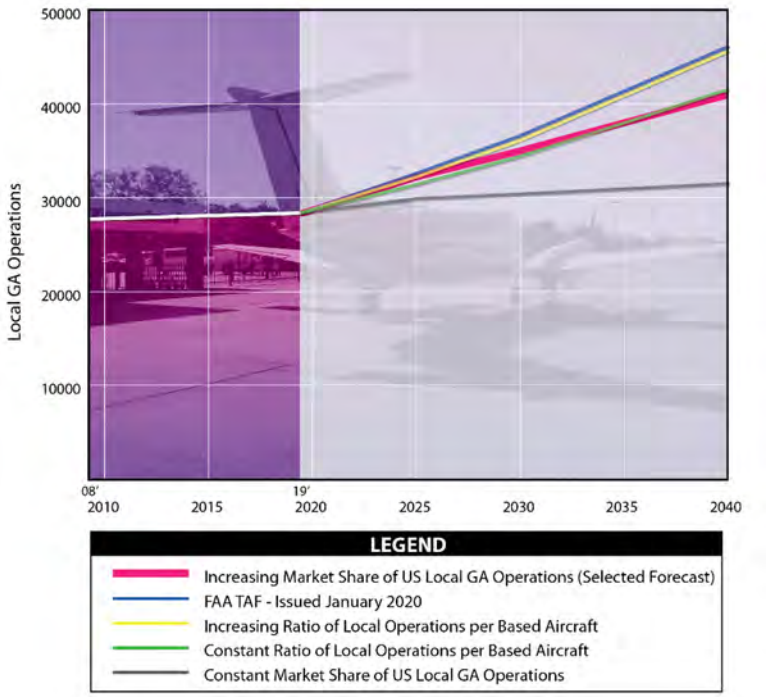


FIGURE 2F – Local General Aviation Operations Forecast

AIR TAXI OPERATIONS

Air taxi operations are those conducted by aircraft operating under FAR Part 135, otherwise known as "for-hire" or "on-demand" activity. Air taxi operations typically include commuter, air cargo, air ambulance, and many fractional ownership operations. Dow is the main contributor to air taxi operations at LBX transporting its employees to facilities in Saginaw, Michigan and Baton Rouge, Louisiana utilizing Bombardier CRJ700 aircraft with plans to transition to the CRJ900 in December 2020. Aside from Dow, LBX accommodates a variety of other air taxi operators, including small aircraft and helicopter charters.

Since ATCT counts are not available, flight plan records and the FAA TAF were utilized to establish a baseline count of air taxi operations at LBX. In 2019, there were an estimated 2,106 air taxi operations based on flight plans. This is lower than the estimated count utilized by the TAF, which reflects 2,890 annual air taxi operations and 520 annual air carrier operations. Air carrier operations are commercial flights conducted using aircraft with 60 or more passenger seats. However, based on the FAA's Traffic Flow Management System Counts (TFMSC), there have not been consistent air carrier operations at LBX since 2010 when Dow transitioned out of its Airbus aircraft to the CRJ700. For this reason, the TAF's air carrier operations estimate is not considered accurate and will not be counted among the air taxi operations baseline. Since flight plan records do not capture all air taxi operations, the TAF estimate of 2,890 is more likely to be closer to actual. Therefore, the TAF estimate of 2,890 air taxi operations will be utilized as the baseline.

Flight plan records for LBX show that between 2014 and 2019, air taxi operations held consistent year-to-year, varying only by about 370 operations from the maximum to minimum levels. An estimate of historic air taxi operations can be made by adjusting the baseline count per filed flight plan record. For example, in 2018, air taxi flight plans were 11 percent greater than in 2019, so the baseline of 2,890 is increased by 11 percent to arrive at an estimate of 3,210 air taxi operations.

The FAA TAF holds the current count of 2,890 air taxi operations flatlined over the forecast period. However, should economic conditions improve as projected in the local area, there is potential for air taxi operations growth. A forecast was prepared that reflects very modest growth at about a 1.3 percent CAGR, which results in 3,800 annual air taxi operations by 2040. **Figure 2G** depicts the selected air taxi forecast for LBX.

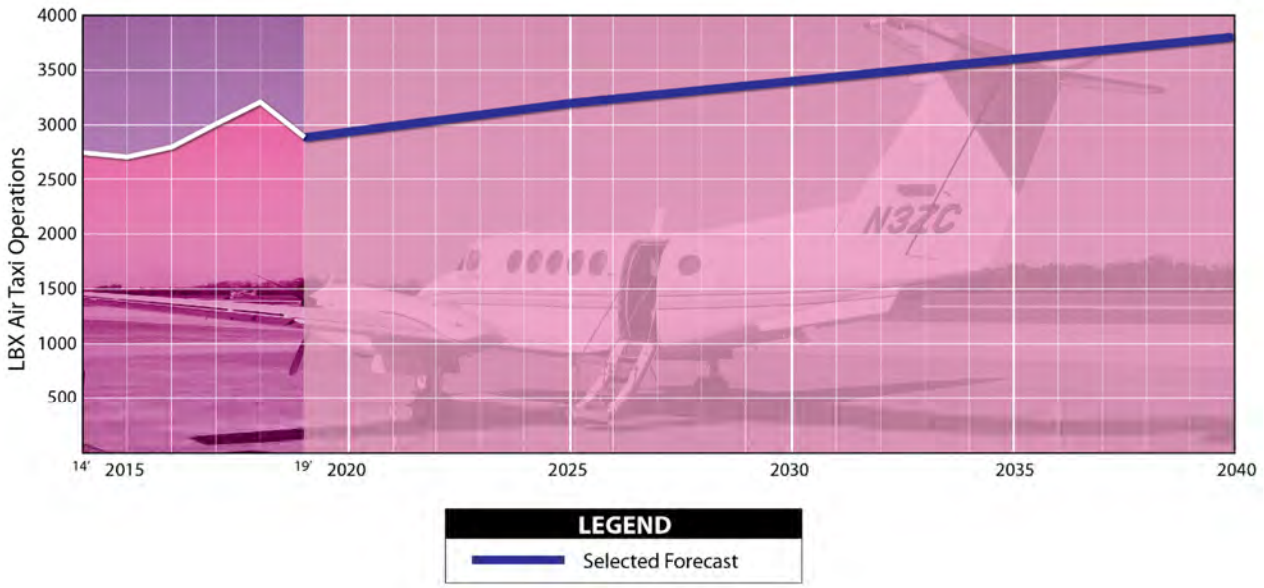


***FIGURE 2G** – Air Taxi Operations Forecast*

MILITARY OPERATIONS FORECAST

Military aircraft can and do utilize civilian airports across the country. The FAA TAF currently reflects 1,000 annual itinerant military operations at LBX. Forecasting of military activity is inherently difficult because of the national security nature of their operations and the fact that missions can change daily. Thus, it is typical for the FAA to utilize a flat-line number for military operations. For this planning study, military operations at LBX are forecasted to stay constant at 1,000 annual itinerant operations through 2040.

PEAK PERIOD FORECASTS

Peaking characteristics are an important aspect in generating airport capacity and facility requirements. It should be noted that because LBX does not have a control tower, the generalized peaking characteristics of other non-towered general aviation airports have been used for 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 highest.
- Busy Day – The busy day of a typical week in the peak month.
- Design Day – The average day in the peak month. This indicator is easily derived by dividing the peak month by the number of days in the month.
- Design Hour – The peak hour within the design day.

Based on filed flight plan data at LBX, the peak month is estimated at 10.1 percent of the annual operations. By 2040, the estimated peak month is projected to reach 12,270 operations. The design day is estimated by dividing the peak month by the average number of days in a month, and the busy day is calculated at 1.25 times the design day. The design hour is calculated at 15 percent of the design day. Peaking characteristics are summarized in **Table 2C**.

TABLE 2C
Peak Period Forecasts
Texas Gulf Coast Regional Airport

YEAR	2019	2025	2030	2040
Annual	**79,176**	**90,300**	**99,800**	**121,800**
Peak Month	7,970	9,090	10,050	12,270
Busy Day	328	374	413	504
Design Day	262	299	330	403
Design Hour	49	56	62	76

Source: Coffman Associates' analysis.

FORECAST SUMMARY

A summary of the selected forecasts is presented in **Figure 2H**. The FAA reviews the forecasts presented in this aviation planning studies for comparison to the *Terminal Area Forecast*. The forecasts are considered consistent with the TAF if they meet the following criteria:

- Forecasts differ by less than 10 percent in the 5-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 5090.3, *Field Formulation of the National Plan of Integrated Airport Systems*.

	Forecast Summary			
	2019	2025	2030	2040
AIRCRAFT OPERATIONS				
Itinerant				
Air Carrier	0	0	0	0
Air Taxi	2,890	3,200	3,400	3,800
General Aviation	46,899	53,900	60,400	76,100
Military	1,000	1,000	1,000	1,000
Local				
General Aviation	28,387	32,200	35,000	40,900
Military	0	0	0	0
TOTAL OPERATIONS	79,176	90,300	99,800	121,800
PEAKING				
Peak Month	7,970	9,090	10,050	12,270
Busy Day	328	374	413	504
Design Day	262	299	330	403
Design Hour	49	56	62	76
BASED AIRCRAFT				
Single-Engine Piston	86	94	102	121
Multi-Engine Piston	5	5	4	3
Turboprop	0	1	2	4
Jet	2	3	5	9
Helicopter	5	6	7	9
Other	6	6	6	6
TOTAL BASED AIRCRAFT	*104*	*115*	*126*	*152*

***FIGURE 2H** – Forecast Summary*

If the forecasts exceed these parameters, they may be sent to FAA headquarters in Washington, D.C. for further review. **Table 2D** presents the direct comparison of the master planning forecasts with the TAF published in January 2020. The operations forecast is within FAA TAF tolerances; however, the based aircraft are outside the tolerance. The baseline count in the TAF is only 71, which is not consistent with the airport's current count of 104. It is recommended that the airport update its inventory count in the FAA's based aircraft registry, which should then ultimately be reflected in the TAF.

TABLE 2D
Forecast Comparison to the Terminal Area Forecast
Texas Gulf Coast Regional Airport

	BASE YEAR	FORECAST		
	2019	2025	2030	2040
Operations				
Master Plan Forecast	79,176	90,300	99,800	121,800
2020 FAA TAF	79,696	90,868	101,438	126,602
% Difference	0.7%	0.6%	1.6%	3.9%
Based Aircraft				
Master Plan Forecast	104	115	126	152
2020 FAA TAF	71	83	94	130
% Difference	37.7%	32.3%	29.1%	15.6%

CAGR: Average annual growth rate
TAF: Terminal Area Forecast (published January 2020)

CRITICAL DESIGN AIRCRAFT

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

AIRCRAFT CLASSIFICATION

The use of appropriate FAA design standards is generally based upon the characteristics of aircraft commonly using or expected to use the airport facilities. The design criteria used in the aircraft classification process are presented in **Exhibit 2C**. An airport's critical aircraft can be a single aircraft or a collection of multiple aircraft commonly using the airport that fit into a single aircraft category. The design aircraft or collection of aircraft is classified by three different categories: Aircraft Approach Category (AAC), Airplane Design Group (ADG), and Taxiway Design Group (TDG). The FAA Advisory Circular (AC) 150/5300-13A, *Airport Design,* describes the following classification systems and parameters.

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 is, the design standards become more restrictive. The AAC, depicted by letters A-E, represents the approach category and relates to the approach speed of the aircraft (operational characteristics). The AAC typically 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 the aircraft wingspan or tail height (physical characteristics). If the aircraft wingspan or tail height fall under two different classifications, the higher category is used. The ADG is used to establish design standards for taxiway safety area, taxiway obstacle free area (TOFA), taxilane object free area, apron wingtip clearance, and various other separation standards.

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 dimensions of the under-carriage of the design aircraft. 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 taxiway/taxilanes. Other

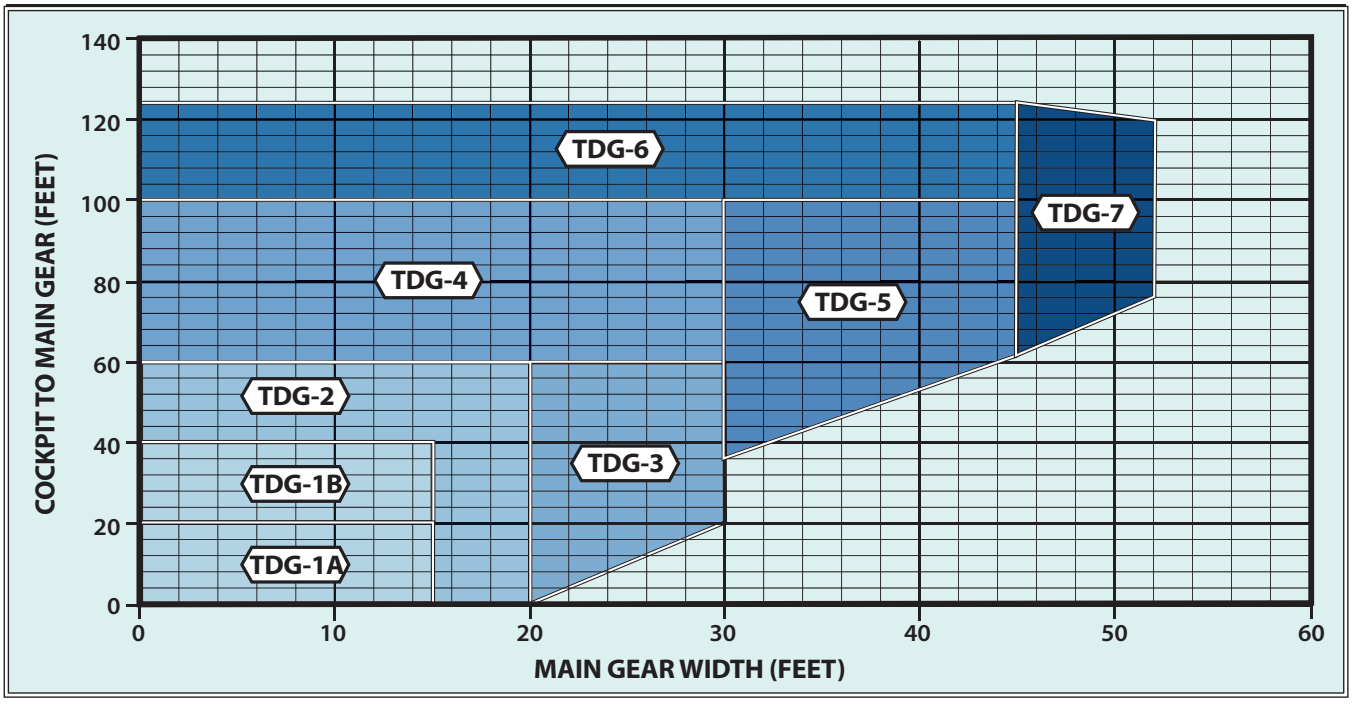
AIRCRAFT APPROACH CATEGORY (AAC)	
Category	**Approach Speed**
A	less than 91 knots
B	91 knots or more but less than 121 knots
C	121 knots or more but less than 141 knots
D	141 knots or more but less than 166 knots
E	166 knots or more

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 150/5300-13A, Airport Design

A-I

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

B-I

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

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

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

B-II *over 12,500 lbs.*

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

A/B-III

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

C/D-I

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

C/D-II

• Challenger 600/604/ 800/850	1B
• Cessna Citation VII, X+	1B
• CRJ-700	2
• Embraer Legacy 450/500	1B
• ERJ-135, 140, 145	2
• **Gulfstream IV,** 350, 450 (D-II)	2
• Gulfstream G200/G280	1B
• Lear 70, 75	1B

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

• Boeing 737-700, BBJ	3
• CRJ-900, 1000	2
• ERJ-170, 175, 190, 195	3
• Gulfstream V	2
• **Gulfstream** G500, 550, 600, **650 (D-III)**	**2**

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

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

C/D-IV

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

D-V

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

Note: Aircraft pictured is identified in bold type.

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 design aircraft utilizing those surfaces. It is appropriate for a taxiway to be planned and built to different taxiway design standards based on expected use.

Exhibit 2C presents the aircraft classification of common aircraft in operation today.

AIRPORT DESIGN AIRCRAFT

It is imperative to have an accurate understanding of what type of aircraft operate at the airport both now and in the future. The type of aircraft utilizing airport facilities can have a significant impact on numerous design criteria. Thus, an aircraft activity study by type and aircraft category can be beneficial in determining future airport standards that must be met to accommodate certain aircraft.

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 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 2D** presents the TFMSC operational mix at the airport for turboprops and jets since 2009. According to this data, operations at LBX within AAC C and ADG II have exceeded the 500 operations threshold each year since 2011, driven by Dow operations of the CRJ700. Annual operations within AAC D at LBX have never exceeded 74 operations over this period.

Dow has indicated that it intends to transition its LBX fleet to include two CRJ900s beginning in December 2020, which are C-III aircraft. Dow routinely conducts six daily operations at LBX so it is reasonable to assume the CRJ900 aircraft will conduct over 500 annual operations at LBX in the future.

AIRPORT DESIGN AIRCRAFT SUMMARY

The current aircraft approach category is "C." The current airplane design group is "II." The most active C-II airplane at LBX is the CRJ700, which is a TDG 2 aircraft. **Therefore, the current airport design aircraft is classified as C-II-2. Based on Dow's planned transition to the CRJ900 at LBX, the future airport design aircraft is identified as the CRJ900, which is C-III-2.** As a general aviation reliever, LBX's operations portfolio is anticipated to remain within the AAC A/B/C and ADG I/II/III categories. Operations for AAC D and ADG IV are not anticipated to exceed 500 annual operations in the future.

ARC	Aircraft Name	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
A-I	Cirrus Vision Jet	0	0	0	0	0	0	0	0	0	2	0
	Eclipse 400/500	0	3	3	16	4	27	14	1	4	6	11
	Epic Dynasty	0	2	0	0	0	0	0	2	0	0	0
	Kodiak Quest	0	0	1	0	0	0	0	0	0	0	0
	Lancair 4	3	0	0	0	0	0	0	0	0	0	0
	Lancair Evolution/Legacy	0	0	0	0	0	0	0	1	2	1	0
	Piper Malibu/Meridian	2	3	2	0	6	11	7	8	15	13	9
	Socata TBM 7/850/900	7	5	0	3	2	4	14	17	12	2	13
	TOTAL	12	13	6	19	12	42	35	29	33	24	33
A-II	Cessna Caravan	25	8	9	6	9	9	5	1	2	4	1
	De Havilland Twin Otter	7	3	4	4	2	2	0	1	0	0	0
	Pilatus PC-12	18	9	19	11	20	19	50	10	30	32	23
	TOTAL	50	20	32	21	31	30	55	12	32	36	24
B-I	Beechjet 400	0	0	33	10	21	10	13	7	8	4	2
	Cessna 425 Corsair	1	2	3	0	0	6	0	3	7	4	4
	Citation CJ1	4	51	31	34	28	27	7	6	22	19	12
	Citation I/SP	4	4	7	0	4	15	27	15	12	8	4
	Citation M2	0	0	0	0	0	0	0	0	10	40	24
	Citation Mustang	1	0	7	8	4	8	9	0	10	3	2
	Falcon 10	4	0	0	0	0	2	2	0	0	0	0
	King Air 90/100	123	32	47	50	49	79	44	17	39	34	23
	L-39 Albatross	0	0	0	0	1	1	0	0	1	0	0
	Mitsubishi MU-2	3	0	0	2	1	2	4	2	4	2	2
	Phenom 100	0	2	0	1	17	6	2	4	4	4	10
	Piaggio Avanti	2	1	2	4	0	0	0	2	3	1	0
	Piper Cheyenne	13	4	6	9	13	12	0	2	3	1	2
	Premier 1	0	1	0	0	4	0	5	0	8	3	6
	Rockwell Sabre 40/60	0	0	0	0	0	0	0	6	0	0	0
	Swearingen SJ-30	0	0	0	0	0	0	0	0	0	4	0
	T-6 Texan	0	0	2	0	1	1	0	0	0	0	0
	TOTAL	155	97	138	118	143	169	113	64	131	127	91
B-II	Aero Commander 1000 Series	0	4	0	0	0	0	0	0	0	0	0
	Aero Commander 690	0	1	3	3	3	3	2	0	2	1	2
	BAe Jetstream	0	0	0	0	0	0	0	0	0	1	0
	Beech 1900	735	381	296	0	0	0	0	0	2	0	0
	Cessna Conquest	1	1	1	2	6	8	2	4	4	11	10
	Challenger 300	0	0	2	4	4	8	4	14	12	4	13
	Citation CJ2/CJ3/CJ4	21	92	61	74	72	72	102	141	116	159	199
	Citation II/SP/Latitude	28	15	9	12	18	22	35	7	8	3	14
B-II	Citation V/Sovereign	13	5	27	14	12	37	80	91	47	57	50
	Citation X	2	0	6	6	6	24	4	8	4	2	0
	Citation XLS	12	8	15	16	12	34	46	53	38	38	9
	Dornier 328	0	0	0	0	0	1	0	4	0	0	0
	Falcon 20/50	57	44	51	46	75	41	35	37	37	12	8
	Falcon 2000	35	26	25	45	47	62	40	39	52	37	26
	Falcon 900	2	0	0	1	0	0	0	4	0	7	2
	King Air 200/300/350	168	67	67	82	51	71	80	113	92	58	64
	King Air F90	10	7	2	1	6	0	0	2	0	0	2
	Phenom 300	0	0	0	0	0	6	4	6	2	10	4
	Shorts Skyvan	0	0	1	0	1	1	0	0	0	0	0
	Swearingen merlin	1	7	4	1	11	17	18	14	1	9	9
	TOTAL	1,085	658	570	307	324	407	452	537	417	409	412
B-III	Bombardier Global Express	0	0	0	0	0	0	0	0	0	2	0
	CASA 235	0	0	0	0	0	0	11	12	6	15	13
	De Havilland Dash 8 Series	0	0	0	0	0	0	0	0	0	1	0
	TOTAL	0	0	0	0	0	0	11	12	6	18	13
C-I	BAe HS 125 Series	0	1	0	1	0	0	2	0	0	0	0
	Learjet 20 Series	5	4	0	0	0	0	0	0	0	0	0
	Learjet 31	2	4	0	2	6	4	4	0	2	3	2
	Learjet 40 Series	12	3	13	8	27	27	29	30	27	38	23
	Learjet 50 Series	4	0	3	0	0	0	0	0	0	0	0
	Learjet 60 Series	2	7	40	21	6	13	20	17	16	3	9
	Westwind II	2	1	83	35	13	12	17	0	4	2	11
	TOTAL	27	20	139	67	52	56	72	47	49	46	45
C-II	Beech Starship	0	0	0	0	0	0	0	0	2	0	0
	Bombardier CRJ 100/200/700	0	29	1,091	1,315	1,339	1,341	1,279	1,257	1,311	1,419	1,451
	Challenger 600/604	9	4	4	5	4	12	9	2	3	50	71
	Citation III/VI	0	2	42	52	12	8	3	4	7	4	3
	Embraer ERJ-135/140/145	4	6	0	2	2	2	0	20	0	0	1
	Gulfstream 100/150	11	1	7	5	4	2	4	29	10	4	0
	Gulfstream 280	0	0	0	0	4	4	4	5	1	6	8
	Gulfstream G-III	2	2	1	0	0	2	0	1	0	1	0
	Hawker 800 (Formerly Bae-125-800)	4	3	29	55	43	49	51	23	8	24	4
	Learjet 70 Series	0	0	0	0	0	0	4	2	6	12	10
	TOTAL	30	47	1,174	1,434	1,408	1,420	1,354	1,343	1,348	1,520	1,548
C-III	Airbus A319/320/321	345	156	0	0	0	0	0	0	0	0	0
	Boeing 737 (200 thru 700 series)	6	0	24	0	0	0	0	0	0	0	0
	Embraer EMB 170/175/190	0	0	0	0	0	0	0	0	6	0	0
	Mcdonnell Douglas DC-9	0	2	0	0	0	0	0	0	0	0	0

Source: FAA database **ARC** - Airport Reference Code

ARC	Aircraft Name	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
C-III	TOTAL	351	158	24	0	0	0	0	0	6	0	0
C-IV	Boeing C-17	2	0	0	0	0	0	0	0	0	0	0
	C-130 Hercules	0	0	0	0	0	0	3	0	1	0	3
	TOTAL	2	0	0	0	0	0	3	0	1	0	3
C-V	Airbus A350/360	0	1	0	0	0	1	1	0	0	0	0
	TOTAL	0	1	0	0	0	1	1	0	0	0	0
D-I	Learjet 35/36	2	0	6	8	1	4	4	4	6	2	0
	TOTAL	2	0	6	8	1	4	4	4	6	2	0
D-II	Gulfstream 200	2	5	8	0	0	0	4	1	4	5	4
	Gulfstream 450	2	0	16	6	20	14	16	25	11	2	5
	TOTAL	4	5	24	6	20	14	20	26	15	7	9
D-III	Boeing 737 800/900	0	1	0	0	0	0	0	0	0	0	0
	Gulfstream 500/600	3	2	4	16	2	13	6	44	51	57	38
	TOTAL	3	3	4	16	2	13	6	44	51	57	38

AIRPORT REFERENCE CODE (ARC) SUMMARY

ARC	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
A-I	12	13	6	19	12	42	35	29	33	24	33
A-II	50	20	32	21	31	30	55	12	32	36	24
B-I	155	97	138	118	143	169	113	64	131	127	91
B-II	1,085	658	570	307	324	407	452	537	417	409	412
B-III	0	0	0	0	0	0	11	12	6	18	13
C-I	27	20	139	67	52	56	72	47	49	46	45
C-II	30	47	1,174	1,434	1,408	1,420	1,354	1,343	1,348	1,520	1,548
C-III	351	158	24	0	0	0	0	0	6	0	0
C-IV	2	0	0	0	0	0	3	0	1	0	3
C-V	0	1	0	0	0	1	1	0	0	0	0
D-I	2	0	6	8	1	4	4	4	6	2	0
D-II	4	5	24	6	20	14	20	26	15	7	9
D-III	3	3	4	16	2	13	6	44	51	57	38
TOTAL	1,721	1,022	2,117	1,996	1,993	2,156	2,126	2,118	2,095	2,246	2,216

APPROACH CATEGORY (AC)

AC	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
A	62	33	38	40	43	72	90	41	65	60	57
B	1,240	755	708	425	467	576	576	613	554	554	516
C	410	226	1,337	1,501	1,460	1,477	1,430	1,390	1,404	1,566	1,596
D	9	8	34	30	23	31	30	74	72	66	47
TOTAL	1,721	1,022	2,117	1,996	1,993	2,156	2,126	2,118	2,095	2,246	2,216

DESIGN GROUP (DG)

DG	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
I	196	130	289	212	208	271	224	144	219	199	169
II	1,169	730	1,800	1,768	1,783	1,871	1,881	1,918	1,812	1,972	1,993
III	354	161	28	16	2	13	17	56	63	75	51
IV	2	0	0	0	0	0	3	0	1	0	3
V	0	1	0	0	0	1	1	0	0	0	0
TOTAL	1,721	1,022	2,117	1,996	1,993	2,156	2,126	2,118	2,095	2,246	2,216

RUNWAY DESIGN CODE

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

Runway 17-35 should be designed to accommodate the overall airport design aircraft, which has been identified as C-II-2 in the current condition and C-III-2 in the ultimate condition. The primary runway is 7,000 feet long, 100 feet wide, and has a Category I precision instrument approach with visibility minimums as low as ½-mile on 17 end. Based on the current activity, the applicable existing RDC is **C-II-2400**.

The future critical design aircraft for LBX is within the C-III category; therefore, the future RDC for Runway 17-35 is **C-III-2400**.

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 17-35 is located 400 feet from the runway (centerline to centerline). Runway 17 has a CAT I precision instrument approach with ½-mile visibility minimums. **The APRC for Runway 17-35 is D/IV/2400 and D/V/2400 and its DPRC is D/IV and D/V.**

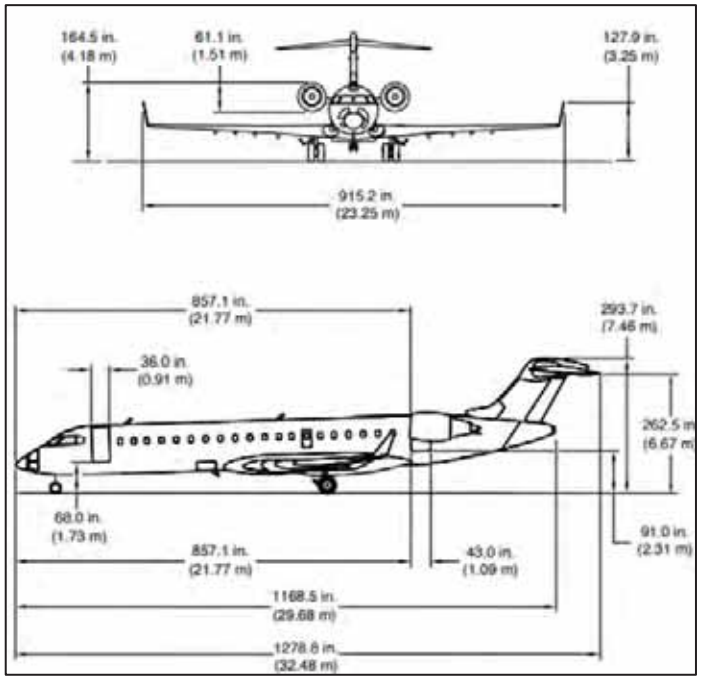
CRITICAL AIRCRAFT SUMMARY

Table 2E summarizes the airport and runway classification currently and in the future. The critical aircraft is now defined by those aircraft in ARC C-II and is expected to change to C-III in the future.

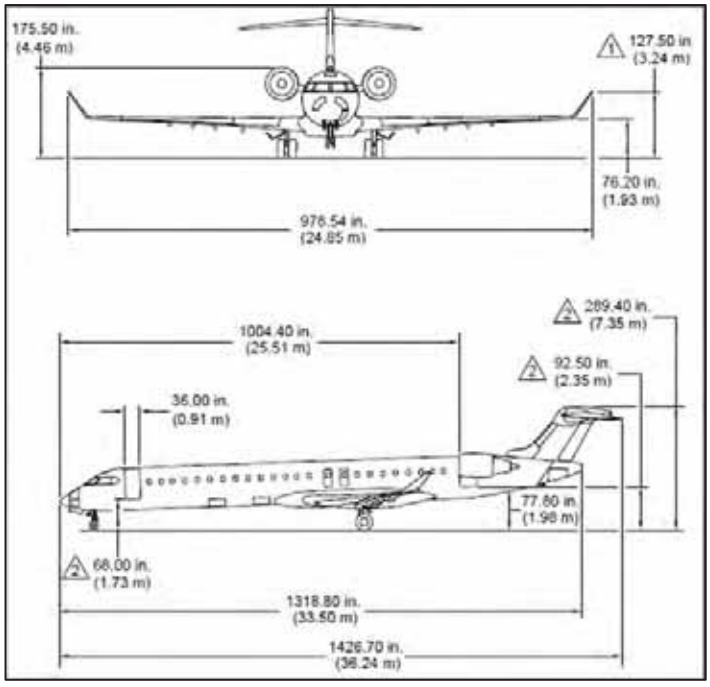
TABLE 2E
Airport and Runway Classifications
Texas Gulf Coast Regional Airport

	RUNWAY 17-35	
	Existing	Ultimate
Airport Reference Code (ARC)	C-II	C-III
Airport Design Aircraft	Bombardier CRJ700	Bombardier CRJ900
Runway Design Code (RDC)	C-II-2400	C-III-2400
Approach Reference Code (APRC)	D/IV/2400 & D/V/2400	D/IV/2400 & D/V/2400
Departure Reference Code (DPRC)	D/IV & D/V	D/IV & D/V
Taxiway Design Group (TDG)	2	2

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



Existing Critical Design Aircraft – Bombardier CRJ700



Ultimate Critical Design Aircraft – Bombardier CRJ900