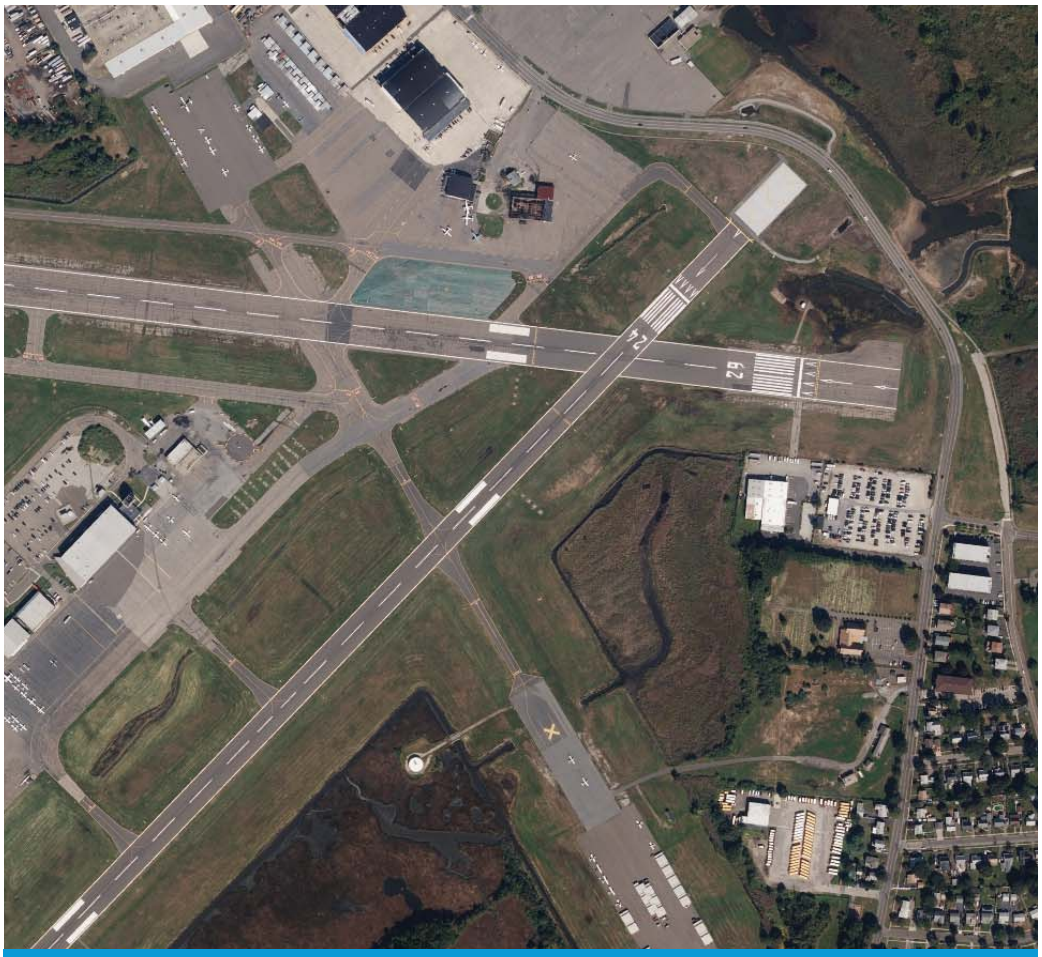


Airport Master Plan

Igor I Sikorsky Memorial Airport

DRAFT WORKING PAPER 1

AIRPORT INVENTORY & FORECAST OF AVIATION DEMAND

May 2019

Prepared by:

CHA
design/construction solutions

Prepared for:

Contents

Tables

Figures

1 Introduction

The City of Bridgeport has retained CHA Consulting, Inc. ('CHA') to prepare a Master Plan Update (Study) for the Igor I Sikorsky Memorial Airport ('BDR' or 'the Airport'). The purpose of the study is to evaluate the current utilization and operational characteristics of the airfield, general aviation and support facilities, ground access, and land development considerations. It is the intent to consider all alternatives that can be developed for the best use of space and logical guidance provided for the continued improvements necessary to accommodate projected aviation activity in a logical and financially-feasible manner throughout the 20-year planning period.

This introductory chapter provides a description of the project and a background overview of the Airport and its facilities. Additional information about the Airport and the Study can be found on its website at www.planbdrairport.com. The Airport's website has airport information and maps, driving directions, ground transportation, and parking information.

1.1 Project Description

The airport master planning process assesses how well an airport services existing users, is equipped to meet future demands, and fulfills Federal Aviation Administration (FAA) safety and design standards. The process includes the development of activity forecasts, the identification and evaluation of financial, physical, and environmental issues, and the recommendation of feasible improvements.

An airport master plan is a comprehensive study of an airport that is conducted via a systematic process that evaluates existing facility and market conditions, identifies anticipated facility needs, and formulates short-, medium-, and long-term development plans to meet future aviation demand. The process, methods and ultimate products are guided by Federal Aviation Administration (FAA) Advisory Circular (AC) 150/5070-6B, *Airport Master Plans*. Consistent with this guidance, this Master Plan Update provides recommendations for the improvement and development of the Airport. The recommendations are intended to satisfy aviation demand, minimize environmental impacts, and address community concerns. The study follows the format and design criteria outlined in the following federal guidance materials and regulations:

- FAA Advisory Circular 150/5070-6B, "*Airport Master Plans*"
- FAA Advisory Circular 150/5300-13A "*Airport Design*"
- Federal Aviation Regulation (FAR) Part 77, "*Safe, Efficient Use, and Preservation of the Navigable Airspace*"

The products of the study include this narrative report and an Airport Layout Plan (ALP). The ALP illustrates the existing and proposed airport facilities and will be formally approved by the City of

Bridgeport and FAA. Several additional drawings that illustrate the surrounding airspace, adjacent land use, and airport property support the ALP. The combined set of drawings is called the ALP Drawing Set.

Note that approval of the ALP does not represent a commitment by the City of Bridgeport or the FAA to undertake or financially support the proposed projects, nor does it constitute any environmental approval. However, the FAA's approval of the Forecast and ALP, and acceptance of the Master Plan Update is necessary for specific projects to become eligible for federal and state funding.

1.2 Regional and Airport Overview

BDR is a public-use airport owned and operated by the City of Bridgeport. According to the FAA's National Plan of Integrated Airport Systems (NPIAS) Report, BDR is designated with a service level of "General Aviation" (GA), which is defined as:

> *General Aviation – "A public airport that does not have scheduled service or has scheduled service with less than 2,500 passenger boardings each year."*

In FAA's 2012 Report: General Aviation: A National Asset, Sikorski Memorial Airport is categorized as the highest level of GA airport – National importance. An airport in this classification:

> *"Supports the national airport system by providing communities access to national and international markets in multiple states and throughout the U.S. National airports have very high levels of aviation activity with many jets and multiengine propeller aircraft".*

The other FAA airport categories, include "Regional, Local, Basic, and Unclassified." Of the nearly 3,000 public airports in the study, only 84 airports were considered to be of National Importance.

1.3 Airport History

Igor I Sikorsky Memorial Airport, originally known as Avon Field, was the site of the country's first airshow in 1911 before it was purchased by the City of Bridgeport in 1937. Prior to being rededicated in namesake to Igor I Sikorsky (i.e., Sikorsky Memorial), the Airport was widely known as Bridgeport Municipal Airport from 1937 through 1972.

Throughout the decades, the Airport has received numerous grants and completed

various development improvements on the airfield and the landside including perimeter fencing, runway and taxiway extensions, safety area improvements, development of GA and hangar facilities, and environmental improvements. The airport was originally constructed with three runways, however as part of an effort to provide more aircraft storage and operations area, the third runway was closed.

2 Inventory of Existing Conditions

Understanding the background of an airport and the region it serves is essential to making informed decisions pertaining to airport-related improvements. Therefore, to develop a well-rounded understanding of BDR, an inventory of key airport elements was conducted and discussed in the subsequent sections.

2.1 Airport Location

BDR is in the Town of Stratford, Connecticut and is approximately three miles southeast of the City of Bridgeport. Bridgeport and Stratford are in Fairfield County, approximately 15 miles from New Haven and 60 miles from New York City (Midtown Manhattan). **Figure 2-1** depicts the location of BDR relative to both the State of Connecticut and the New York, New England region.

Figure 2-1 – Igor I Sikorsky Memorial Airport (BDR) Location

2.2 Airport Service Area and Surrounding Airports

Airport service areas are generally described as the location from which people are expected to use the airport as a first choice, as compared to other neighboring facilities. The airport service area encompasses most businesses, passengers, and based aircraft owners utilizing an airport, as well as the tourist destinations of visitors. In general, a service area boundary for a GA airport is defined within a 20-mile radius, or a 30-minute drive time to the airport. Tweed New Haven Airport is within a 20-mile radius of BDR, however it is on the outer cusp of the drive time at 28 minutes without traffic. Other nearby airports include Waterbury-Oxford to the north, Danbury Municipal Airport to the northeast, and Westchester County Airport to the west. These other airports are beyond the service area.

As depicted in **Figure 2-2**, three airports (one NPIAS), and the counties of Fairfield and New Haven are located with 20 miles of BDR and have been identified as the BDR service area. Although portions of these counties are not within the specific 20-miles service radius, due to relatively

high saturation of airports within the area, the entirety of the county will be included in subsequent socioeconomic evaluations.

Table 2-1 – Airports Surrounding BDR (20 miles)

Airport Name	ID	No. of Runways	Longest Runway	Runway Surface	Instrument Approach	Distance/Dir. from BDR	NPIAS
Igor I Sikorsky	BDR	2	4,761’	Asphalt	ILS/DME	-	Yes
Danbury Municipal	DXR	2	4,422’	Asphalt	LOC/DME, GPS	20.2 / NW	Yes
Waterbury-Oxford	OXC	1	5,801’	Asphalt	ILS/DME	18.9 / N	Yes
Tweed-New Haven	HVN	2	5,600’	Asphalt	ILS/DME	12.2 / E	Yes

Source: CHA, 5010-1 Form, FAA NPIAS, 2019

Figure 2-2 – Igor I Sikorsky Memorial Airport (BDR) Service Area

Source: CHA

2.3 Airport Facilities

A primary role of master planning is developing a detailed listing of recommended facilities and improvements for implementation over the planning period. As such, the first step in this process is to inventory existing facilities and review their current condition.

Airport facilities are often described as either airside or landside, depending upon the type of operation they support. Airside facilities are those related to the landing, takeoff, and taxiing of aircraft in the airfield environment. Examples of airside facilities include: the runway and taxiway system; airfield lighting, marking and visual aids. Landside facilities are those related to the transition from air to ground movement or vice versa. Examples of landside facilities include: the airport terminal building, aircraft refueling area, aircraft storage, and vehicle parking. At Sikorsky, a former passenger terminal building was demolished; however, several airport tenants provide passenger and pilot facilities including Atlantic Aviation, Three Wing Aviation, and Volo Aviation.

2.3.1 Inventory of Airfield Facilities

Airside facilities refer to all areas accessible to aircraft. This includes runways, taxiways, and any additional airfield infrastructure such as navigational aids, lighting, and marking.

2.3.1.1 Runways

BDR operates under a two intersecting runway system consisting of a main runway and a crosswind runway. Runway 11-29 is 4,761’ long and 150’ wide. It is constructed of asphalt and in fair to poor condition. According to the FAA Facility Directory, the runway’s load-bearing capacity is estimated at 30,000 pounds for single wheel aircraft and 108,000 pounds for double wheel aircraft. Runway 11 end maintains basic markings while Runway 29 maintains non-precision markings, both are in fair condition.

Crosswind Runway 6-24 was reconstructed in 2016 and measures 4,677’ in length and 100’ in width. It is constructed of asphalt and is in excellent condition. As per the FAA Facility Directory, the runway’s load-bearing capacity is estimated at 57,000 pounds for single wheel aircraft and 80,000 pounds for double wheel aircraft. The Runway 6 end maintains precision markings in good condition while the Runway 24 end maintains non-precision markings, also in good condition.

Per FAA AC 150-5320-6e, *Airport Pavement Design and Evaluations*, stabilized base and subbase courses are necessary for new pavements designed to accommodate jet airplanes weighing 100,000 pounds or more. The Runway 6-24 reconstruction record drawings do not include a stabilized base in the design, meaning that aircraft operating at over 100,000 lbs would result in additional wear on pavement and could reduce its functional service life. In addition to the lack

of stabilized base on Runway 6-24, the FAA published weight bearing capacities on Runway 6-24 are 57,000 lbs. for single wheel aircraft, and 80,000lbs for double wheel aircraft.

Table 2-2 – Runway Data

	Runway 11/29		Runway 6/24	
Runway Length (feet)	4,761’		4,677’	
Displaced Threshold (feet)	0	364’	0	320’
Width (feet)	150’		100’	
Runway End Elevation (feet above MSL)	8.5’	6.5’	6.9’	6.8’
Pavement Type	Asphalt		Asphalt/Grooved	
Pavement Load Bearing	108,000 lbs. (Double Wheel)		80,000 lbs. (Double Wheel)	
Effective Runway Gradient	0.04%		0.01%	
Aircraft Approach Category	C		C	
Airplane Design Group	III		II	
Runway Markings	Basic		Precision	
Runway and Approach Lighting	HIRL, REIL, PAPI-4		HIRL, REIL, PAPI-4	
Navigational Aids	n/a	RNAV	ILS/DME, RNAV	RNAV, VOR
Runway Design Code	C-III-5000		C-II-4000	C-II-5000

Source: FAA 5010-1 Form, CHA, 2019.

2.3.1.2 Taxiways

BDR contains 9 taxiways in its system, however, none are full length parallel taxiways. Runway 24 is the only runway end accessible by taxiway for takeoff while all others require back-taxiing.

Table 2-3 – Taxiway Data

Taxiway	Description	Width (feet)	Taxiway Design Group (ADG)
A	Parallel to Runway 6-24. Adjacent to the Main General Aviation Apron (Three-Wings and Volo FBO facilities). Provides access to RWY 24 and RWY 6 (back taxi).	varies	4
B	Connects RWY 6-24 to TWY ‘A’	35	2
C	Connects RWY 6-24 to TWY ‘A’	35	2
D	Parallel to Runway 11-29. Adjacent to the North General Aviation Apron (Atlantic FBO facilities). Provides access to RWY 11 via backtaxiing. Connects to TXY ‘A’	35	2
E	Connects RWY 11-29 to TWY ‘D’.	50	3
G	Partial parallel taxiway south of RWY 11-29.	60	3
H	Connects the South Ramp and North General Aviation Apron	varies	
J	Connects RWY 11-29 to TWY ‘G’	60	3
K	Connects RWY 11-29 to TWY ‘G’	60	3

Source: FAA 5010-1 Form, CHA, 2019.

Figure 2-3 – Existing Airport Facilities

(To Be Completed)

2.3.1.3 Lighting

An airport rotating beacon light universally indicates the location and presence of an airport. The Airport's beacon is equipped with an optical system that projects two beams of light (one green and one white), 180 degrees apart. BDR's rotating beacon is located on the Air Traffic Control Tower. All runway ends are equipped with Runway End Identifier Lights (REILs) that provide identification of the runway approach end at night and during Instrument Meteorological Conditions (IMC). The REIL system consists of a pair of synchronized white flashing lights located on both sides of the runway threshold. All runways maintain High Intensity Runway Lights (HIRLs). However, only Runways 6, 24, 29 are equipped for Instrument Approach Procedures.

2.3.1.4 Marking and Signage

Runway markings denote the type of approach (e.g., visual, non-precision, precision) associated with the runway. Runway 6 approach end has precision markings in good condition. Runway 24 and Runway 29 approach ends both have non-precision markings with good and fair conditions, respectively. Runway 11 approach end has basic visual markings in fair condition. BDR has standard, lighted airfield signage.

2.3.1.5 Landing Aids

BDR maintains 4-light Precision Approach Path Indicators (PAPI-4) on all runway ends. This system provides pilots with visual descent guidance information during an approach to the runway. PAPIs typically have a visual range of approximately four miles, weather permitting, and inform pilots if they are high, low, or on the correct descent path to the threshold. REILs are equipped at all runway ends as mentioned in the previous section. Additionally, a Wind Sock and Segmented Circle is located northeast of the Main General Aviation Parking Apron adjacent to Taxiway "A" approximately 400' northwest of the ATCT.

2.3.1.6 Navigational Aids

BDR is equipped with a full Instrument Landing System on the Runway 6 approach end. All runways, except for Runway 11 approach end, have a GPS RNAV instrument procedure, with Runway 24 approach end having an additional VHF Omnidirectional Range (VOR) procedure using the Bridgeport VOR.

Table 2-4 – Navigational Aids

Runway	Runway Markings	Navigational Aids	Lighting	Instrument Approach Types
6	Precision	ILS/DME	HIRL, PAPI-4, REIL	ILS or LOC, RNAV (GPS)
24	Non-precision	VOR	HIRL, PAPI-4, REIL	RNAV (GPS), VOR
11	Basic/Visual	n/a	HIRL, PAPI-4, REIL	n/a
29	Non-Precision	GPS	HIRL, PAPI-4, REIL	RNAV (GPS)

Source: FAA Form 5010-1, CHA, 2019.

2.3.1.7 Aprons

There are three main apron areas at BDR: The Main Apron to the south and adjacent to Taxiway "A"; the North Apron and Ramp adjacent to Taxiway "D"; and the South Apron accessible via Taxiway "H". All aprons are primarily asphalt and contain tie-downs. A list of approximate apron area and aircraft tie-down spaces are listed in **Table 2-5.**

Table 2-5 – Existing Apron Areas

Apron Area		Approximate No. of Tie-Downs	Approximate Size (SF)
Main Apron	Stratford School for Aviation Technicians	14	42,000
	Three Wing Aviation	17	70,000
	Gama	n/a	40,000
	Volo	15	130,000
North Apron	Atlantic Aviation	15	350,000
	CT Air & Space Museum	10	35,000
	North Ramp (T-Hangar)	28	140,000
South Ramp	N.E. Hangar Development	15	300,000

Source: BDR Airport Management, CHA, 2019.

Table 2-6 – Existing Hangar Space

Tenant	# of Hangars	Approx. Area*
Stratford School for Aviation Technicians	1	38,000
Volo	2	43,000
Gama	1	12,000
Three Wing Aviation	2	43,000
Atlantic	4	112,000
Connecticut Air & Space Center	1	15,000
North Apron T-Hangars (Individually Leased)	~25 T-Hangars	~28,000
N.E Hangar Development	20 T-Hangars	30,000

Source: BDR Airport Management, CHA, 2019.

* - May include office space

2.3.2 Terminal Area Facilities

Landside facilities include all areas at an airport that are not accessible to aircraft. This includes terminal facilities and support buildings, passenger amenities, vehicle parking and access.

2.3.2.1 Airport Buildings (ATCT, Hangars, ARFF, maintenance and snow equipment storage)

BDR currently has 17 buildings and facilities leased out to private tenants in addition to an Air Traffic Control Tower (ATCT), and an Air Rescue and Fire Fighting facility (ARFF). Of the buildings, 10 are for aircraft storage totaling approximately 225,000 square feet. Locations of existing airport buildings is shown in **Figure 2-4**.

Sikorsky Memorial Airport

MASTER PLAN UPDATE

GRAPHIC SCALE (FEET)

0 200 400

EXISTING FACILITIES	
ID No	DESCRIPTION
1	ATLANTIC AVIATION HANGAR
2	ATLANTIC AVIATION HANGAR
3	T-HANGARS
4	FUEL FARM
5	HANGAR
6	CT AIR & SPACE MUSEUM HANGAR
7	CIVIL AIR PATROL
8	T-HANGARS
9	FUEL FARM
10	AIR RESCUE & FIRE FIGHTING
11	AIR TRAFFIC CONTROL TOWER
12	VOLO AVIATION HANGAR
13	GAMA HANGAR
14	THREE WING AVIATION HANGAR
15	THREE WING AVIATION HANGAR
16	STRATFORD SCHOOL FOR AVIATION MAINTENANCE TECHNICIANS
17	FLIGHT SERVICE STATION (VACANT)

Figure 2-4
Building Diagram

2.3.2.2 Security Facilities

Overall the security posture at the airport is good with most areas being secure. As compared to other GA facilities, BDR is adequate with security measures including security fencing (in most areas), security gates, and cameras. Other than the growth of shrubs and trees next to hangar number two (between GAMA and Three Wing Aviation) and the gate code on the personnel gate next to the fuel farm, there were no obvious deficiencies that could be identified for immediate repair. The Facility Requirements portion of this Study will further discuss general recommendations regarding existing security practices and procedures in accordance with the Transportation Security Administrations (TSA) *Airport Characteristics Measurement Tool*.

2.3.2.3 Parking, access, and circulation

The Airport is served by Interstate 95 with its main entrance accessible via Connecticut State Route 113 (Lordship Boulevard). BDR offers four connected surface parking lots adjacent to the Main General Aviation area along Great Meadow Road. Additionally, Atlantic Aviation and the City of Bridgeport (former Blue Sky) Hangar have parking adjacent to their respective hangars in the North General Aviation Apron.

Table 2-7 – Existing Parking Spaces (Approximate)

Location	# of Spaces
Main General Aviation Area	600
North General Aviation Area	60

Source: BDR Airport Management, CHA, 2019.

2.4 Inventory of Operations, Airspace, and ATCT Procedures

In addition to facilities, the Master Plan accounts for how the airport is operated and used in order to better understand and address any areas of concern that will ultimately guide the design and development of the future alternatives.

2.4.1 Airport Activity and Based Aircraft

Although BDR currently does not have scheduled airline service, the Airport is active with both public and private users. The majority of operations are General Aviation with some air taxi and charters.

The number of based aircraft at an airport is used to determine the need for aircraft hangar space, apron area, and other related facilities. Based aircraft include those owned by individuals, businesses, or organizations that are stored at the Airport on a regular basis. According to the FAA 5010 Records, BDR has a total of 149 based aircraft. Of that total, there are 109 single engine aircraft, 10 multi-engine aircraft, 28 jets, and 2 helicopters. **Table 2-8** illustrates examples of the fleet mix of aircraft types currently based and used at BDR. The smallest aircraft are single-engine

pistons which are typically used as for recreationally flying. The largest aircraft used at BDR are corporate jets used for chartered flights.

Table 2-8 – Aircraft Types at BDR

Piston	Turbo-Prop	Other
Single-Engine Piston	*Single-Engine Turbo-Prop*	*Corporate Jet*
 *Cessna 150*	 *Pilatus PC-12*	 *Bombardier Global Express*
Multi-Engine Piston	*Multi-Engine Turbo-Prop*	*Helicopter*
 *Piper Aztec*	 *King Air*	 *Bell 407*

Source: CHA, 2019.

2.4.1.1 Operations

An aircraft operation is defined as either a landing or a takeoff. Thus, each flight includes at least two operations; one takeoff and one landing. According to data provided by the Air Traffic Control Tower, there were approximately 55,000 annual operations at BDR in 2018, which amounts to an average of 75 landings per day. Of that total, itinerant and local operations were approximately split evenly. Local flights are conducted mostly by based aircraft, and primarily include single- and multi-engine piston aircraft conducting training and recreational flights. Itinerant operations (i.e., those arriving from outside of the local area) are conducted by a mix of based and transient or visiting aircraft.

2.4.1.2 Wind data

A factor influencing the infrastructure requirements on airfield are the local weather conditions and their effect on both airport operations and capacity. For GA airports, one of the main influencing variables in wind conditions at the airport. Wind conditions affect all airplanes in varying degrees, generally the smaller the airplane, the more affected its operations are by wind, particularly crosswind components. As such, crosswind components of airfields are evaluated

based on FAA guidelines of 10.5, 13, 16, and 20 knots, considering the aircraft types and each individual runway.

Based on the aircraft types operating at BDR (see Table 2-8), the following crosswind components are applicable (per FAA Advisory Circular 150/5300-13A):

- Light single and twin-engine= 10.5 knots
- Turboprop aircraft and light jets = 13 knots
- Corporate & Regional Jets = 16 knots

Furthermore, wind data is evaluated under All Weather (AW), Visual Flight Rules (VFR), and Instrument Flight Rules (IFR) conditions. Per FAA, for a runway to have adequate wind coverage, it must have a 95% wind coverage for the aircraft accommodated. Should a runway fall below 95%, a crosswind runway may be necessary for safety of operations at the airport.

This study utilizes weather observations for the period of 2009 to 2018 recorded by the Automated Surface Observation Station (ASOS) and are the basis of the wind rose analysis. **Table 2-9** lists the wind coverage for the runways at BDR. Both runways provide similar coverage, providing the desired wind coverage of 16 knots for the large corporate jet aircraft operating at BDR. As shown in the table, both runways provide 98% all-weather wind coverage for a 16-knot crosswind component.

Runway 11-29 provides slightly better wind coverage during fair weather or VFR conditions, and during inclement or poor weather conditions Runway 6-24 is the preferred runway from a wind standpoint. However, neither runway alone provides 95% all-weather wind coverage for the 10.5 or 13 knots crosswind component for the light aircraft and turboprops operating at the Airport.

Table 2-9 - Wind Data

	Runway	10.5 Knots	13 Knots	16 Knots	20 Knots
AW	6-24	90.40%	94.49%	98.07%	99.48%
	11-29	88.78%	93.98%	98.16%	99.51%
	All Combined	96.7%	98.76%	99.64%	99.93%
VFR	6-24	90.24%	94.34%	98.09%	99.54%
	11-29	89.15%	94.40%	98.57%	99.68%
	VFR Combined	96.76%	98.87%	99.72%	99.96%
IFR	6-24	91.17%	95.22%	98.05%	99.25%
	11-29	87.36%	92.21%	96.35%	98.84%
	IFR Combined	96.56%	98.36%	99.29%	99.80%

Source: NOAA National Climatic Data Center (Igor I Sikorsky Memorial Airport 2009-2018), CHA, 219.

2.4.1.3 Runway Designations

The FAA classifies each airport runway as either primary, crosswind, secondary, or additional as per the ***Airport Improvement Program (AIP) Handbook***, FAA Order 5100.38D. All but 'additional' runways are eligible for FAA funding. For BDR, the designation of the primary runway is not obvious, as the runways are similar in length and both have relevant factors in the determination, as summarized in the table below.

Table 2-10 – Primary Runway Determination Factors

Potential Primary Runway Criteria	Runway 6/24	Runway 11/29
Runway Length	4,677'	**4,761'**
Runway Width	100'	**150'**
Preferred Runway (noise)	No	**Yes**
Runway Utilization*	**60% estimated**	40% estimated
Approach Capabilities	**ILS (3/4 mile – 250' DH)**	RNAV LPV (1-mile, 400' MDA)
Hourly Capacity	**82 ops/hour**	71 ops/hour
Proximity to Facilities	Good	Good

*Based on wind data.

The above data are used in the primary runway determination; however, the FAA does not provide a specific formula or rubric to identify the primary vs crosswind or secondary runway.

- **Runway 11-29** provides a slightly longer length, greater width, and slightly better crosswind coverage during VFR conditions. Also, Runway 11-29 is the preferred runway for noise abatement. The FAA Airport/Facility Directory recommends use of Runway 11-29 when winds are less than 5 Knots, and runway length is adequate per wind conditions.

- **Runway 6-24** provides the only ILS, with better instrument approach capability, and slightly better crosswind coverage during IFR conditions. The runway was recently reconstructed and has higher utilization rates for all aircraft types, including jets. Runway 6 is the only runway end with an entrance taxiway, which increases its hourly capacity.

Neither runway at BDR provides ≥95% wind coverage during all weather conditions for the 10.5 or 13 knot crosswind components as illustrated in **Table 2-9**. Specifically, at 13 knots, both runways provide approximately 94% coverage, and 90%, or less coverage for 10.5 knots. As such, per FAA Order 5100.38D, a crosswind runway is justified to serve the lighter aircraft that comprise the majority of the total airport activity. With both runways available, the Airport's combined wind coverage is approximately 97% for 10.5 knots, 99% for 13 knots and nearly 100% for 16 Knot crosswind components.

It is noted that currently, Runway 6-24 with higher utilization, available ILS, and recent reconstruction, serves as the existing Primary Runway at BDR, with Runway 11-29 as the crosswind or potentially secondary runway.

Table 2-11 – BDR Current Runway Designation

Runway	Classification
Runway 6-24	Primary
Runway 11-29	Crosswind/Secondary

However, this designation may change in the future based on study recommendation. Runway 11-29 has greater length and has potential to provide improved landing distance in the future. If the runway is reconstructed, it is anticipated that Runway 11-29 will receive additional utilization, especially for the existing and future jet aircraft that operate at BDR. Thus, while Runway 6-24 is currently the primary runway, the runway designations may change based on the Master Plan Recommendations.

2.4.2 Airspace and Air Traffic Control

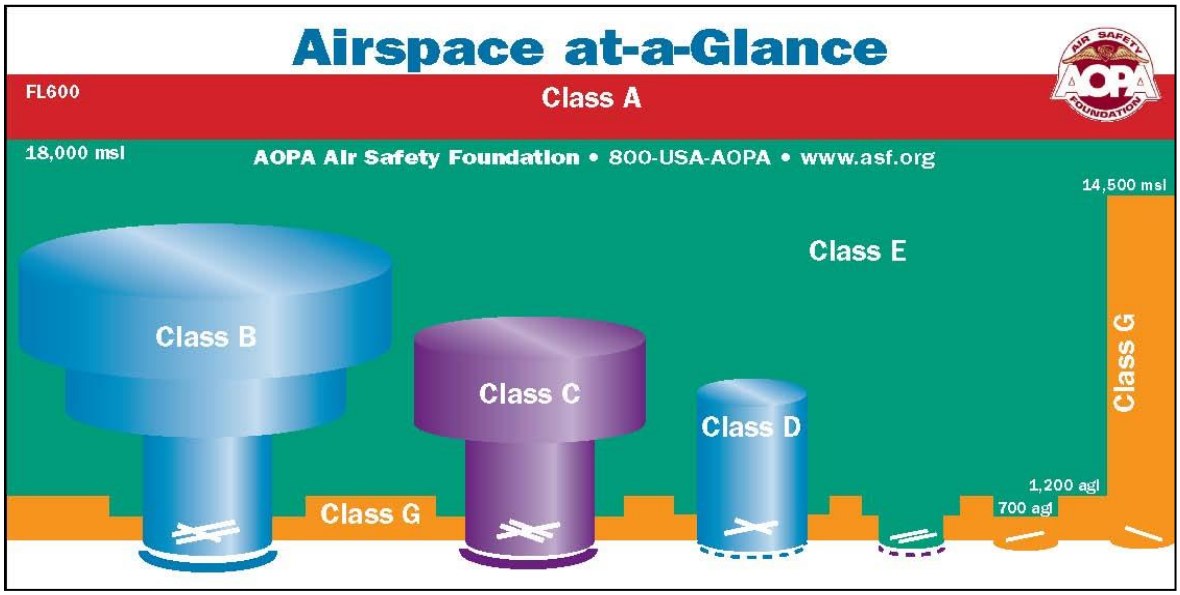
There are two types of aircraft flight operations in the National Airspace System (NAS): Visual Flight Rules (VFR) and Instrument Flight Rules (IFR). VFR operations rely on pilots maintaining visual separation from aircraft and objects and require minimum weather conditions for operation. Conversely, IFR operations rely on radar detection, instrument navigation, and separation by Air Traffic Control (ATC). IFR flights permit operations below VFR weather minimums (i.e., during IMC). As discussed above, Runways 6-24 and 29 all have published instrument procedures to enable approached and landings during IMC.

The NAS classifies airspace uses a lettering-system (e.g., Class A, B, C, D, E, and G) and includes controlled and uncontrolled areas of airspace. Class A airspace is a controlled airspace and is generally reserved for business and commercial aircraft as it begins at 18,000 feet above Mean Seal Level (MSL). Class A airspace requires operation under IFR flight plan and communication with ATC. The Class B, C, and D airspaces are also considered controlled airspace and are generally centered about larger airports. Communication with ATC must be established prior to entering the Class B, C, or D airspaces. The Class E and G airspaces encompass the majority of the NAS's airspace below 18,000 feet MSL. Class E airspace can be either controlled or uncontrolled, depending on the type of operation (i.e., VFR or IFR). Class G airspace is always uncontrolled.

BDR is a towered airport located within Class D airspace. Above BDR, Class E airspace begins at 2,500 feet Above Ground Level (AGL) and extends vertically to the Class A airspace at 18,000 feet MSL. As shown in **Figure 2-5**, BDR is considered Class D airspace. As such, from the ground elevation up to 2,500 feet. The outer radius of the airspace is variable and individually tailored,

when instrument procedures are published, the airspace is normally designed to contain the procedures, or otherwise is generally four nautical miles in radius.

Figure 2-5 – National Airspace System



Source: FAA Aeronautical Information Manual, CHA, 2019.

Figure 2-6 – BDR Airspace

Source: FAA Sectional Aeronautical Chart (Connecticut, May 2019), CHA, 2019.

2.4.2.1 Runway classification by aircraft category

The FAA uses a classification system, known as the Airport Reference Code (ARC), to signify the airport's highest Runway Design Code (RDC), the design standards to which the runway is to be built. RDC consists of three components:

- aircraft approach speed (AAC),
- airplane design group (ADG) relating to either the aircraft wingspan or tail height (whichever is more restrictive), and
- visibility minimums.

The overall ARC is determined by taking the highest RDC minus the visibility component. ARC affects runway and taxiway dimensions, separation standards, pavement marking standards, and other safety standards. Furthermore, it is used for airport planning and design but does not limit the aircraft that may be able to operate safely at the airport. The relationship between the ARC

and design standards is further in FAA AC 150/5300-13A, *Airport Design* and summarized in **Table 2-11**. BDR is currently designated with an ARC C-II.

Table 2-12 – FAA Airport Reference Code Classification

Approach Categories			
Approach Category	**Airspeed (Knots)**		**Example Aircraft**
A	<91		Cessna 152
B	91 ≤ 121		Citation X
C	121 ≤ 141		Gulfstream 450
D	141 ≤ 166		Boeing 757
E	166+		B-2 Spirit
Airplane Design Group			
Design Group	**Tail Height (feet)**	**Wingspan (feet)**	**Example Aircraft**
I	<20	<49	Piper Cherokee
II	20-<30	49 ≤ 79	King Air B250
III	30-<45	79 ≤ 118	Gulfstream 550
IV	45-<60	118 ≤ 171	Boeing 757
V	60-<66	171 ≤ 214	Boeing 747
VI	66-<80	214 ≤ 262	Airbus A380

Source: FAA AC 150/5300-13A *Airport Design*, CHA, 2019.

2.4.2.2 Approach and Departure Procedures

All runways except for Runway 11 approach end have Instrument Approach Procedures (IAPs). All runways with IAPs offer RNAV (GPS). Additionally, Runway 6 approach end includes a full Instrument Landing System (ILS).

Table 2-13 – Runway Minimums

Approach Procedure	Minimum Ceiling (AGL)	Minimum Visibility (MI)
RWY 6 – ILS or LOC	250	3/4
RWY 6 – RNAV (GPS)	250	3/4
RWY 24 – RNAV (GPS)	333	1
RWY 24 – VOR	533	1
RWY 29 – RNAV (GPS)	373	1

Source: FAA Form 5010-1, CHA, 2019.

BDR has one published Departure Procedure named “Bridgehaven Nine”. The Airport has two published Standard Terminal Arrivals procedures named “Bridgeport One” and “Denna Two” and a Standard Instrument Departure procedure named “Bridgehaven Nine Departure.”

2.4.2.3 Noise Abatement Procedures

BDR has implemented Fixed Wing Visual Flight Rules (VFR) Traffic Pattern Procedures in order to reduce noise to nearby residential neighborhoods. Runway 11-29 is the preferred runway for noise abatement. Furthermore, the Airport has adopted a number of restrictions to operations to reduce noise including: touch and go operations are prohibited between 10 pm and 7 am; all runups will be performed on Taxiways "J" and "K" when the ATCT is closed; maintenance runups are prohibited between 10 pm and 7 am unless prior approval has been provided by airport management; and departures between 10 pm and 7 am with takeoff noise levels which exceed 82 dBA are prohibited.

2.4.3 Primary Airport Tenants and Users

BDR has three Fixed Based Operators (FBO): Atlantic Aviation, Volo Aviation, and Three Wing Aviation. All three FBOs provide fuel and lease a total of 8 hangars; Atlantic leasing 4 while Volo and Three Wing lease 2 each.

In addition to the FBOs, BDR leases buildings to the Connecticut Air & Space Center, the Stratford School for Aviation Maintenance Technicians, and Gama Aviation.

2.5 Socioeconomic, Land Use, and Community Data

The percentage of aircraft ownership and utilization of GA airports is often relative to the strength of the economy along with the cost and availability of airport facilities and services. On a macro scale, the factors that have the greatest impact on the growth prospects of an airport are the socioeconomic characteristics, such as population, per capita income, and employment, present within the airport's service area. Therefore, an understanding of local economic trends is important to understand an airport's regional environment.

2.5.1 Population

Table 2-13 shows the historic and projected populations and corresponding average annual growth rates (AAGR) for the BDR Metropolitan Statistical Area (MSA), the State of Connecticut, and the United States for years 2008 through 2018 (historic) and 2019 through 2039 (projected).

These trends indicate that the local (i.e., BDR MSA) historic population has grown at a rate significantly above that reported for the State of Connecticut, but well below (0.2%) the United States as a whole. For future projections of population within the State and the MSA, its shown that the service area for BDR and the State of Connecticut are expected to incrementally grow significantly below the rate at which the United States as a whole is projected.

Table 2-14 – Population Growth Trends

Year	Bridgeport MSA (1,000)	AAGR	State of Connecticut (1,000)	AAGR	United States (1,000)	AAGR
2008	904		3,546		304,094	
2013	942	0.83%	3,599	0.30%	316,498	0.80%
2018	963	0.44%	3,665	0.36%	330,535	0.87%
AAGR 2009-2018		**0.63%**		**0.33%**		**0.84%**
2019	967	0.42%	3,683	0.49%	333,598	0.93%
2024	991	0.49%	3,772	0.48%	349,344	0.93%
2029	1,013	0.44%	3,858	0.45%	365,568	0.91%
2034	1,032	0.37%	3,933	0.39%	381,548	0.86%
2039	1,047	0.29%	3,992	0.30%	396,688	0.78%
AAGR 2019-2039		**0.40%**		**0.40%**		**0.87%**

Source: Woods & Poole Economics, Inc., CHA, 2019

** The Bridgeport MSA and Fairfield County share the same boundaries

2.5.2 Per Capita Income

Table 2-14 shows the historic and projected per capita income for the BDR service area, State of Connecticut and the United States. As shown, the historic per capita income for each category is relatively the same, and stable over time. This trend is expected to continue, however, as shown is it projected that the MSA will outpace that of the State and Nation as a whole with income trends the highest amongst the three categories throughout the forecast period.

Table 2-15 – Per Capita Income Trends

Year	Bridgeport MSA ($)	AAGR	State of Connecticut ($)	AAGR	United States ($)	AAGR
2008	88,722		57,776		41,082	
2013	94,393	1.25%	62,112	1.46%	44,438	1.58%
2018	110,318	3.17%	72,246	3.07%	51,009	2.80%
AAGR 2009-2018		**2.20%**		**2.26%**		**2.19%**
2019	114,099	3.43%	74,707	3.41%	52,712	3.34%
2024	138,505	3.95%	90,651	3.94%	63,834	3.90%
2029	174,898	4.78%	114,370	4.76%	80,420	4.73%
2034	223,355	5.01%	145,590	4.95%	102,114	4.89%
2039	285,761	5.05%	185,557	4.97%	129,841	4.92%
AAGR 2019-2039		**4.70%**		**4.65%**		**4.61%**

Source: Woods & Poole Economics, Inc., CHA, 2019

2.5.3 Employment

Table 2-15 shows the historic and projected number of persons employed and percent of the population group employed (i.e., persons within the working age currently with employment) for

each category. As shown, employment within the BDR MSA is very strong and steadily increased historically. Additionally, the MSA is projected to outpace the State and the Nation as a whole in terms of percent employed, and the number of jobs available over the course of the forecast period.

Table 2-16 – Employment Trends

Year	Bridgeport MSA (1,000)	AAGR	State of Connecticut (1,000)	AAGR	United States (1,000)	AAGR
2008	616		2,250		179,640	
2013	632	0.51%	2,235	-0.13%	182,390	0.30%
2018	675	1.33%	2,376	1.23%	197,685	1.62%
AAGR 2009-2018		**0.92%**		**0.55%**		**0.96%**
2019	683	1.19%	2,404	1.18%	200,555	1.45%
2024	723	1.14%	2,540	1.11%	214,840	1.39%
2029	760	1.00%	2,664	0.96%	228,826	1.27%
2034	793	0.85%	2,776	0.83%	242,288	1.15%
2039	823	0.75%	2,875	0.70%	255,384	1.06%
AAGR 2019-2039		**0.80%**		**0.77%**		**1.10%**

Source: Woods & Poole Economics, Inc., CHA, 2019

2.5.4 Socioeconomic Summary

On a National level, aviation activity has experienced gains and losses throughout the historical period. These cyclical fluctuations can be attributed to several different variables, mainly the Great Recession amongst others, but most recently, the economy has begun to rebound and brought the aviation industry along with it. As such, socioeconomic and demographic data continues to provide valid insight regarding the strengths and weakness of an economy.

Although the population within the BDR service area is not expected to grow significantly, other factors including employment and per capita income within the MSA are very strong and shows that area, overall, remains economically viable to continue supporting demand for aviation activity. It is acknowledged that future growth in aviation activity may be gradual, and dependent on the Airport to accommodate the demand with infrastructure and development improvement opportunities.

3 Forecasts of Aviation Demand

3.1 Introduction

This chapter of the Master Plan Update projects aviation demand over a 20-year planning horizon for Igor I Sikorsky Memorial Airport (BDR). Facility sizing and capacity recommendations, both airside and landside, are directly impacted by the projected aviation activity levels presented in this chapter. The projections are derived from methodologies in accordance with the requirements provided in Federal Aviation Administration (FAA) Advisory Circular (AC) 150/5070-6B, *Airport Master Plans*.

The assumptions, methodologies, and data used to create the various projections are presented and analyzed in the sections to follow. The specific activity elements include the operational activity that directly affect the facilities and immediately adjacent land use. As such, the evaluations presented in this chapter include assessments and projections of general aviation (GA) based aircraft and operations.

3.1.1 Airport Categorization

Per FAA, BDR is categorized as a General Aviation Airport (nonprimary) within the National Plan of Integrated Airport Systems (NPIAS). According to 49 U.S. Code 47102(8), General Aviation airports are public-use airports that do not have scheduled service or have less than 2,500 annual passenger boardings. General aviation activity can be broken down into several subcategories (i.e., instructional, personal, aerial observation, corporate, etc.), with the largest single category being for personal use (31.7 percent); however, the combined nonpersonal uses of GA aircraft represent the majority of all general aviation activity (54.3 percent).

Table 3-1 shows the categories of airports by type of activity, including commercial service, primary, cargo service, reliever, and general aviation as set forth in 49 U.S. Code 47102.

Based on the information shown below, and the FAA National Forecast for all commercial service airports, BDR will remain in the general aviation (nonprimary) category, unless airline service is re-started. If that does occur, the category of commercial service airport would be based on the annual number of airline passengers. It is noted that most small airports with airline service are classified as a “non-hub, commercial service” airport.

Table 3-1 – NPIAS Airport Classifications

Airport Classifications		Hub Type: Percentage of Annual Passenger Boardings	Common Name
Commercial Service: Publicly owned airports that *have at least 2,500* passenger boardings each calendar year and receive scheduled passenger service **§47102(7)**	**Primary:** *Have more than 10,000* passenger boardings each year **§47102(16)**	**Large:** 1% or more	**Large-Hub**
		Medium: At least 0.25 % but less than 1%	**Medium-Hub**
		Small: At least 0.05% but less than 0.25%	**Small-Hub**
		Non-hub: More than 10,000 but less than 0.05%	**Non-hub Primary**
	Nonprimary	**Non-hub:** At least 2,500 and no more than 10,000	**Non-primary Commercial Service**
Nonprimary (Except Commercial Service)		**Not Applicable**	**Reliever §(47102(23))**
			General Aviation §(47102(8))

Source: FAA, CHA, 2019.

3.1.2 Forecast Data Sources

Information regarding aviation trends is factored into both the planning and the forecasting efforts. The data and assumptions used to define baseline conditions and future activity trends were derived from the following data sources:

- Airport Management – Airport management representatives typically provide the most accurate historical data and future assumptions at the Airport. This includes passenger and operational activity, facility needs, gate requirements, fleet mix transition, and anticipated service growth.
- FAA Terminal Area Forecast (TAF)[1] – TAF activity estimates are derived by the FAA from national estimates of aviation activity. These estimates are then assigned to individual airports based upon multiple market and forecast factors. The FAA looks at local and national economic conditions, as well as trends within the aviation industry, to develop each forecast.
- FAA Operational Network (OPSNET)/Air Traffic Activity System (ATADS) – contains the official NAS air traffic data available for public use. The data systems contain information relating to airport operations and can be separated by IFR/VFR itinerant operations and local operations at the airport, as reported by the Air Traffic Control Tower (ATCT).

[1] Note, the 'FAA 2018 TAF', which was retrieved in March 2019, represents the TAF containing all data from FY 2018.

3.2 General Aviation Forecast

GA includes all segments of the aviation industry except commercial air carriers/commuter service, scheduled cargo, and military operations. GA represents the largest percentage of civil aircraft in the U.S. and accounts for most operations handled by towered and non-towered airports. Its activities include flight training, sightseeing, recreational, aerial photography, law enforcement, and medical flights, as well as business, corporate, and personal travel via air taxi/commuter/charter operations. GA aircraft encompass a broad range of types, from single-engine piston aircraft to large corporate jets, as well as helicopters, gliders, and amateur-built aircraft.

Military activity is often included in the operations projections but are not forecast in the same manner as general aviation activity since their number, location, and activity levels are not a function of anticipated market and economic conditions, but are rather a function of military decisions, national security priorities, and budget pressures that cannot be predicted over the course of the forecast period. Typically, military operations, for forecasting purposes, remain static at baseline year levels throughout the forecast period.

Airport operations are further categorized as either itinerant or local operations. Local operations are those performed by aircraft that remain in the local traffic pattern or within a 20-mile radius of the tower. Local operations are commonly associated with training activity and flight instruction and include touch and go operations. Itinerant operations are arrivals or departures, other than local operations, performed by either based or transient aircraft that do not remain in the airport traffic pattern or within a 20-nautical mile radius. It is important to note that as shown in **Table 3-2**, the FAA's TAF indicates very little growth in GA operations at BDR, with an AAGR of 0.1 percent and 2.9 percent growth from 2019 through 2039. For GA operations, the FAA TAF uses trend models to project growth in the future.

Table 3-2 – FAA TAF (Condensed to GA and Military Only)

Fiscal Year	Itinerant Operations			Local Operations			Total Operations	Based Aircraft
	GA	Military	Total	Civil	Military	Total		
2018	23,640	103	23,743	25,694	108	25,802	49,545	154
2019	23,728	103	23,831	27,490	108	27,598	51,429	157
2024	24,075	103	24,178	27,490	108	27,598	51,776	180
2029	24,435	103	24,538	27,490	108	27,598	52,136	205
2034	24,811	103	24,914	27,490	108	27,598	52,512	230
2039	25,204	103	25,307	27,490	108	27,598	52,905	258
AAGR 2019-2039	**0.3%**	**0.0%**	**0.3%**	**0.0%**	**0.0%**	**0.0%**	**0.1%**	**2.5%**
Growth 2019-2039	**6.2%**	**0.0%**	**6.2%**	**0.0%**	**0.0%**	**0.0%**	**2.9%**	**64.3%**

Source: FAA 2019 TAF, CHA, 2019.

3.2.1 Historical General Aviation Activity

Much like national GA activity trends, BDR has seen a decline in GA activity at the Airport over the historical 10-year period, which can be partially attributed to factors associated with base aircraft.

The Great Recession, which occurred from 2007-2009, impacted national based aircraft and GA activity trends. During this time, the aviation industry saw an increase in costs to purchase aircraft, as well as in increase in the cost of aviation fuel. According to the U.S. Energy Information Administration (EIA), the cost of aviation fuel[2] increased by 39.9 percent from 2007 to 2014. From 2007 to 2018, aviation fuel suppliers[3] experienced an 18.9 percent decrease in sales and deliveries. The recession also resulted in individuals having less disposable income, thus decreasing recreational GA activity and single-engine aircraft operations. However, corporate jet operations have increased due to cost efficiency compared to commercial air travel costs, thus more fixed base operators are transitioning to jets for based aircraft. Although the aviation has a rebound from the recession, recreational and GA as a whole has seen a slower return to pre-2007 activity levels.

At BDR, GA operations are dominated by the based aircraft at the Airport. As shown in **Table 3-3**, itinerant and local traffic have decreased at a similar rate (2.0 percent) as based aircraft (3.4 percent).

Table 3-3 – BDR's Historical General Aviation Activity

Year	Itinerant	Local	Total Operations	Based Aircraft
2009	28,828	32,009	60,837	211
2010	36,635	36,420	73,055	190
2011	32,644	31,591	64,235	190
2012	33,081	28,538	61,619	190
2013	32,112	30,677	62,789	190
2014	31,198	26,888	58,086	190
2015	25,302	17,855	43,157	176
2016	25,279	22,321	47,600	176
2017	23,660	22,122	45,782	149
2018	23,355	26,481	49,836	150

Source: FAA TAF, FAA OPSNET/ATADS, CHA, 2019.

[2] U.S. Energy Information Administration (EIA), Independent Statistics & Analysis (2019). Petroleum & Other Liquids. Retrieved from https://www.eia.gov/dnav/pet/PET_SUM_MKT_DCU_NUS_A.htm

[3] U.S. Energy Information Administration (EIA), Independent Statistics & Analysis (2019). Petroleum & Other Liquids. Retrieved from https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=pet&s=c400000001&f=a

3.2.2 GA Based Aircraft Forecasts

Forecast Methodologies

The FAA provides guidance on multiple acceptable methodologies to be used to project GA based aircraft. To determine the most reasonable scenario for BDR, it is necessary to compare and eliminate forecasts that do not support the key factors and variables that comprise the specific direction of the Airport and its market. This section identifies and describes the methodologies included in this forecast evaluation for the development of the recommended forecast of GA based aircraft at BDR. The following methodologies, and results therein, are described in the following sections and the results are shown in **Table 3-4**. See **Appendix B** for the year-by-year results of each forecast presented in this section.

- FAA Aerospace Forecast Scenario – A forecasting approach that analyzes data provided in the FAA Aerospace Forecasts (FY 2018-2038), such as annual based aircraft projections by category, and then projects growth for based aircraft at the Airport using these growth rates. This methodology assumes that the Airport's GA based aircraft will grow at the FAA projected national rates while maintaining their respective share of fleet throughout the forecast period. The FAA Aerospace Forecast follows the trend of Single and Multi-Engine in decline but strong growth in Turbo-Props and Jets. As shown in **Table 3-4**, the FAA Aerospace Forecast Scenario would show an overall decline in based aircraft. This is a result of a large proportion of Single Engine aircraft based at BDR which skews the results. See **Appendix B** for a breakdown by aircraft type.
- TAF Growth Scenario – This scenario uses the FAA's projected based aircraft annual growth for 2019-2039 and applies that assumption to actual airport-reported based aircraft data. In other words, the TAF growth is applied to an airport- reported 2018 based aircraft count and projected throughout the forecast period. For example, the 2018 TAF has an estimated 2018 based aircraft count of 154. According to airport records, the actual number of based aircraft was 150. The year to year TAF growth rate was then applied to the actual 150 based aircraft and projected from 2019 through 2039. The result of this methodology is 253 based aircraft in 2039, approximately 0.02 percent below the 258 reported in the TAF. **Table 3-4** depicts the results of this evaluation. This scenario was believed to be an unreasonable scenario for projecting-based aircraft at BDR as the growth of 64.3 percent from 2019 – 2039 was considered unrealistic.
- Market Share Scenario (Static)[4] – A Market Share forecast is a "top-down" method where projected growth rates of larger aggregates (e.g., the nation, state, region) are used to derive forecasts for smaller areas (e.g., airports). Future BDR based aircraft were estimated by multiplying the future market share trend and the TAF for National, the New England Region, and State based aircraft. BDR's national and regional market share of

[4] BDR's GA Based Aircraft Percent Market Shares in 2018: National (0.1), New England Region (2.6), and State (14.1).

based aircraft have shown slight decline in the past 10 years. The Airport's state market share experienced a fluctuation in 2012 but has since also experienced a steady decline. However, the market shares have stayed relatively constant in the past few years and thus it was deemed appropriate to use the current market share throughout the forecasting period (see **Appendix A**). **Table 3-4** and **Appendix B** depict the results of this evaluation. As shown, between the State, New England Region, and National projections, this scenario ranges from 177 to 204 based aircraft in 2039.

Table 3-4 – Based Aircraft Forecast Comparisons

Year	TAF	FAA Aerospace Forecast	TAF-Based Growth	Market Share		
				National	Regional	State
2018	154	150	150	150	150	150
2019	157	150	154	151	151	152
2024	180	149	174	158	159	165
2029	205	148	197	164	166	178
2034	230	148	223	170	173	191
2039	258	149	253	177	181	204
AAGR 2019-2039	**2.5%**	**0.0%**	**2.5%**	**0.8%**	**0.9%**	**1.5%**
Growth 2019-2039	**64.3%**	**-0.7%**	**64.3%**	**17.2%**	**19.6%**	**34.3%**

Source: FAA 2019 TAF, FAA Aerospace Forecast, CHA, 2019.

Additionally, BDR experiences high fluctuations in seasonal aircraft activity. During the summer months, a local sea plane business commences, offering private charters to New York City and the Hamptons with a fleet of up to 10 Cessna Caravans on floats. Other factors contributing to the increase in aircraft based at BDR during the summer months include seasonal coastal businesses and seasonal residents. Approximately 15 to 25 additional aircraft utilize BDR as their base of operations during the summer months. While these aircraft are not considered in forecasting based aircraft, they will be incorporated into the facility planning.

3.2.3 GA Operations Forecasts

Like the GA based aircraft forecasts, several methodologies exist that can be used to forecast GA operations. To determine the most reasonable scenario for BDR, it is necessary to compare and eliminate those forecasts that do not support the specific operational direction of the Airport. This section provides the methodology used, as well as methodologies that were analyzed, for the development of the forecasts of general aviation operations at BDR.

- Historical Growth Scenario – Historical Growth is a time trend analysis that uses the airport's historical activity as a metric to provide future growth projections. These historical trends are typically developed as five- and ten-year historical trends. These historical growth rates are then extrapolated over the forecast horizon (20 years). Over

the last decade, BDR has experienced fluctuations in GA activity, ranging between a low of 45,782 in 2017 and a high of 73,055 operations in 2010. In 2018, the Airport received 23,355 itinerant GA operations and 26,481 local GA operations, for a total of 49,836 GA operations. The Historical Growth Scenario was considered unreliable and was not used for this forecasting effort.

- Operations Per Based Aircraft (OPBA) Scenario[5] – A straightforward forecasting methodology which assumes the total number of annual operations is representative of the number of aircraft based at BDR. At BDR, itinerant traffic makes up approximately 47 percent of all GA activity at the Airport. These operations are typically performed by aircraft based at BDR flying charter and corporate aviation operations or flight training (where the flights leave the local airport airspace and return, i.e., cross country flight training). The historical 10-year OPBA (see Appendix A) has shown to be cyclical in nature, fluctuating between 385 (2010) and 245 (2015), averaging 313 over the historical period. However, declines in OPBA can be attributed to local economic fluctuations (i.e., the Great Recession, transition from smaller aircraft to larger GA jet activity, demographic variables, etc.). Most recently, the OPBA at the Airport has been steadily increasing to 332 in 2018. Therefore, for the purposes of this forecast, it was assumed the OPBA for BDR would continue to be stable and would remain relatively static over the forecast period. As such, this forecast scenario assumes that the OPBA will remain as the base year activity level of 332 OPBA throughout the forecast period. See **Table 3-5** and **Appendix B** (includes a breakdown between itinerant and local GA operations.)
- Market Share Scenario (Static)[6] – Compares local GA activity levels with aggregate level trends. This methodology assumes that the activity of any one airport is regular and predictable in accordance with the average of airports within the market. As shown in **Appendix A**, BDR has experienced fluctuation in market share in the past 10 years. A common trait across all three markets (national, regional, and state) is that BDR's share in itinerant and local operations experience a drop from 2014 to 2015. Since BDR is a GA airport, this can be attributed to the loss of approximately 15 based aircraft during the same time period, resulting in fewer operation. Over the past 4 years, BDR's market share has remained relatively stable in itinerant operations and experienced growth in local operations. Since it is anticipated that there will also be a growth in based aircraft, it was

[5] Tower activity was used to identify the existing OPBA. Based on the evaluation of traditional and non-traditional methodologies, correlation between variables (GA operations and based aircraft) were not compatible. Although GA activities are not always directly related to based aircraft, in the case of BDR, it is dependent on based aircraft. However, the FAA projects based aircraft to increase within the forecast period but does not forecast growth in GA activity at the Airport. GA activity can be directly correlated to based aircraft; therefore, the evaluation presented in this section used OPBA in conjunction with based aircraft growth to revise the GA activity at BDR.

[6] BDR's GA Operations Percent Market Shares in 2018: National (Itinerant 0.1) (Local 0.07), Regional (Itinerant 2.4) (Local 2.2), State (Itinerant 13.8) (Local 15.7).

assumed that the Airport will maintain its current (2018) market share throughout the forecast period. An evaluation of local, regional, State, and national FAA GA projections was performed and is detailed in **Table 3-5**. (See **Appendix B** for the full results of the methodology).

Table 3-5 – General Aviation Operations Forecast Comparisons

Year	TAF	Historical Trends		Market Share			OPBA
		5-Year Time Series	10-Year Time Series	National	Regional	State	
2018	49,334	49,836	49,836	49,836	49,836	49,836	49,836
2019	51,218	48,332	48,852	50,252	49,975	49,956	50,262
2024	51,565	41,468	44,215	51,133	50,173	50,161	52,681
2029	51,925	35,578	40,018	52,076	50,374	50,370	55,048
2034	52,301	30,525	36,220	53,091	50,579	50,584	57,475
2039	52,694	26,189	32,782	54,190	50,788	50,802	60,102
AAGR 2019-2039	**0.1%**	**-3.0%**	**-2.0%**	**0.4%**	**0.1%**	**0.1%**	**0.9%**
Growth 2019-2039	**2.9%**	**-45.8%**	**-32.9%**	**7.8%**	**1.6%**	**1.7%**	**19.6%**

Source: FAA 2019 TAF, FAA OPSNET/ATADS, CHA, 2019.

3.3 Commercial Service Forecast

BDR formerly offered scheduled air service from the 1950s to 1999. Destinations included various cities along the East Coast, including Philadelphia, Washington, D.C., Boston, and Newark. Air service returned in 2006 in the form of scheduled helicopter flights to New York's Downtown Manhattan and JFK Airport, however, operations ceased in 2009. Recently, BDR anticipates a return to offering regular commercial air service during the forecasting period. The forecasted commercial service scenario was provided by BDR. It is expected that 3 departures per day (6 total daily operations) would begin before 2024 and gradually increase to 8 daily departures (16 daily operations) by 2039. Passenger enplanements were assumed for a 150-seat airliner at a 90 percent Load Factor (135 enplanements per departure). As discussed above, this airline forecast is for planning purposes. If airline service is formally announced, the Master Plan forecast can be updated.

Table 3-6 – Commercial Service Forecast

Year	Daily Departures	Commercial Annual Operations	Commercial Annual Enplanements	Commercial Service Peak Hour
2019	0	-	-	-
2024	3	2,190	147,825	1
2029	5	3,650	246,375	2
2034	7	5,110	344,925	2
2039	8	5,840	394,200	3

Source: BDR, CHA, 2019.

3.4 Recommended Forecast Summary

The following tables present a summary of the preferred aviation activity forecasts for GA activity (based aircraft and operations), military activity, and air carrier (operations and enplanements), as detailed in the previous sections.

Upon review of the GA based aircraft forecast scenarios, the Regional Market Share scenario was chosen as the recommended based aircraft forecast, which takes into consideration national and regional trends, while staying relatively conservative. **Table 3-7** presents the recommended based aircraft forecast as well as the breakdown by aircraft type.

As BDR is primarily a GA airport with many local operations, the OPBA Scenario for operations is believed to be the most reasonable scenario for the BDR forecast, as GA activity is significantly driven by based aircraft. For forecasting purposes, it was assumed that military activity will remain static at baseline year levels throughout the forecast period, as military operations are a function of military decisions, national security priorities, and budget pressures that cannot be predicted over the course of the forecast period.

The air carrier forecasts were developed in conjunction with Airport Management (**Table 3-6**) and are speculative at this time. The FAA will consider and review these forecasts when a certified airline announces the proposed start of service. As BDR has no schedule passenger services (as of 2019) and has not had service within the past 10 years, the forecasts are based solely on airline operational plans.

Table 3-8 presents the complete summary of the preferred forecasts for based aircraft and activity at BDR. In addition to a summary of the preferred aviation activity forecasts, direct comparisons to the FAA's TAF for BDR are provided for evaluation purposes, as provided in **Table 3-9**. FAA parameters require master plan forecasts to be within 15% of the TAF operations forecast for the 10-year planning period. As indicated in **Table 3-9**, the difference between the TAF and recommended forecast is 5.9% in year 2029, well within the FAA parameter. It is important to note that due to the TAF not accounting for a potential scheduled air service provider, the comparison between the TAF and recommended forecast does not include commercial operations in the total counts.

Table 3-7 – Recommended Based Aircraft Forecast

Year	Single	Multi	Turboprop	Jet	Rotorcraft	Total
2019	103	7	7	32	2	151
2024	103	7	8	38	2	159
2029	102	7	9	44	3	166
2034	101	8	11	51	3	173
2039	100	8	12	58	3	181
AAGR 2019-2039	**-0.2%**	**0.4%**	**2.9%**	**3.0%**	**2.6%**	**0.9%**
Growth 2019-2039	**-3.2%**	**7.4%**	**76.0%**	**79.9%**	**67.7%**	**19.6%**

Source: FAA Aerospace, FAA TAF, CHA, 2019

Table 3-8 – Recommended Forecast

Year	Based Aircraft	Enplanements	Itinerant Operations				Local Operations			Total Operations*
			Commercial	GA	Military	Total	Civil	Military	Total	
2018	150	0	0	23,355	108	23,463	26,481	74	26,555	50,018
2019	151	0	0	23,555	108	23,662	26,708	74	26,782	50,444
2020	153	0	0	23,779	108	23,887	26,962	74	27,036	50,923
2021	154	0	0	24,007	108	24,115	27,221	74	27,295	51,410
2022	155	0	0	24,199	108	24,307	27,438	74	27,512	51,819
2023	157	0	0	24,456	108	24,563	27,729	74	27,804	52,367
2024	159	147,825	2,190	24,688	108	26,986	27,993	74	28,067	52,863
2025	160	167,535	2,482	24,908	108	27,498	28,242	74	28,317	53,333
2026	161	187,245	2,774	25,129	108	28,010	28,492	74	28,566	53,803
2027	163	206,955	3,066	25,353	108	28,526	28,746	74	28,821	54,281
2028	164	226,665	3,358	25,573	108	29,039	28,996	74	29,070	54,751
2029	166	246,375	3,650	25,797	108	29,555	29,250	74	29,325	55,230
2030	167	266,085	3,942	26,022	108	30,071	29,504	74	29,579	55,708
2031	169	285,795	4,234	26,242	108	30,583	29,754	74	29,829	56,178
2032	170	305,505	4,526	26,470	108	31,104	30,013	74	30,087	56,665
2033	171	325,215	4,818	26,698	108	31,624	30,272	74	30,346	57,152
2034	173	344,925	5,110	26,935	108	32,153	30,540	74	30,614	57,657
2035	174	354,780	5,256	27,167	108	32,531	30,804	74	30,878	58,153
2036	176	364,635	5,402	27,404	108	32,913	31,072	74	31,146	58,658
2037	178	374,490	5,548	27,648	108	33,304	31,349	74	31,424	59,180
2038	179	384,345	5,694	27,905	108	33,707	31,640	74	31,715	59,728
2039	181	394,200	5,840	28,166	108	34,114	31,936	74	32,011	60,284
AAGR 2019-2039	**0.9%**	-	-	**0.9%**	**0.0%**	**1.8%**	**0.9%**	**0.0%**	**0.9%**	**1.4%**
Growth 2019-2039	**19.6%**	-	-	**19.6%**	**0.0%**	**44.2%**	**19.6%**	**0.0%**	**19.5%**	**31.1%**

Source: FAA 2019 TAF, FAA OPSNET/ATADS, CHA, 2019.
*Total Operations do not include Commercial Operation numbers

Table 3-9 – Recommended Forecast vs. FAA TAF

Year	FAA TAF	Recommended Operations Forecast			FAA TAF vs. Recommended Forecast
		GA	Military	Total	
2018	49,545	49,836	182	50,018	1.0%
2019	51,429	50,262	182	50,444	1.9%
2024	51,776	52,681	182	52,863	2.1%
2029	52,136	55,048	182	55,230	5.9%
2034	52,512	57,475	182	57,657	9.8%
2039	52,905	60,102	182	60,284	13.9%
AAGR 2019-2039	**0.1%**	**0.9%**	**-**	**0.9%**	**-**
Growth 2019-2039	**2.9%**	**19.6%**	**-**	**19.6%**	**-**

Source: FAA 2019 TAF, FAA OPSNET/ATADS, CHA, 2019.

3.5 Peak Activity Forecast

To properly plan, size, and design general aviation facilities at the Airport, an understanding of peak month and peak month-average day (PMAD) operational demand is necessary. The peak month and PMAD forecasts are key elements in defining the future facility requirements needed to accommodate above average levels of utilization (i.e., peak activity).

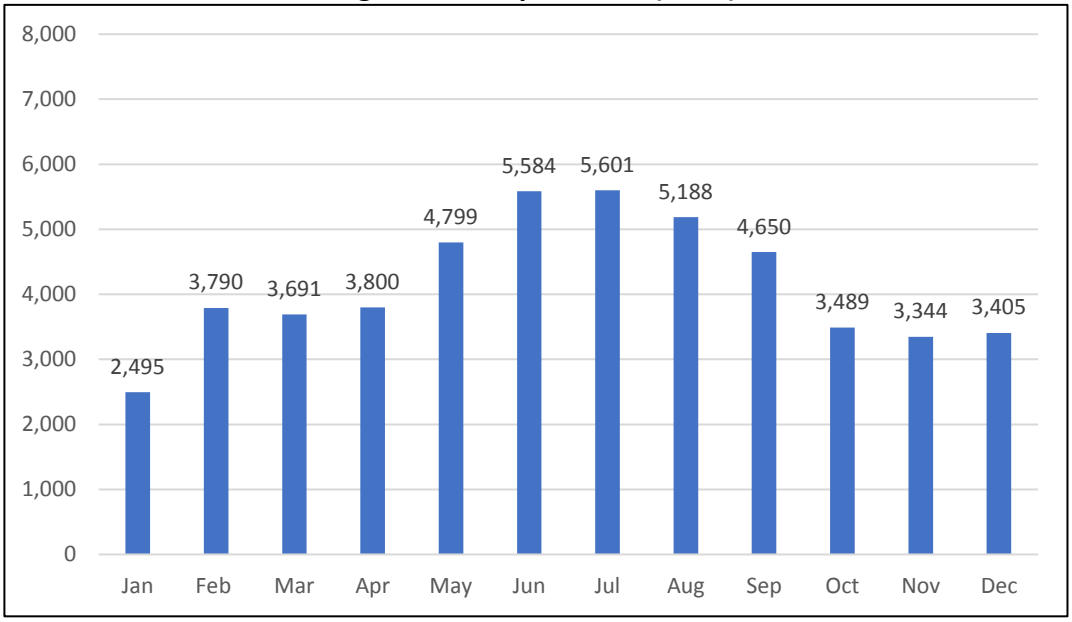
The peak month is the calendar month of the year when the highest level of general aviation operations typically occur. Peak month-average day is simply the total GA operations divided by the number of days in the peak month. Peak hour is the busiest hour of operations on the PMAD, which will later be used when determining airfield capacity.

3.5.1 General Aviation Peak Operations

Historical Peak GA Operations

A review of historical data was developed to identify the peak month for general aviation operations at BDR. When developing the forecast, July was determined to be the peak month in 2018.

Figure 3-1 – Operations (2018)



Source: FAA OPSNET/ATADS, CHA, 2019.

Peak Month - Average Day (GA Operations)

During the month of July in 2018, BDR experienced approximately 5,601 operations related to general aviation activity. To calculate the PMAD, the peak month GA operations (5,601) were divided by the number of days in the peak month of July (31) to define the PMAD. It was assumed that the peak hour would be 11 percent of the PMAD, the same share of Peak Month operations compared to annual operations.

Table 3-10 – Peak General Aviation Activity Forecast Summary

Year	Annual GA Operations	Annual Percent	Peak Month GA Operations	Peak Month Average Day	Peak Hour
2018	49,836	11%	5,601	181	20
2019	50,262	11%	5,649	182	20
2024	52,681	11%	5,921	191	21
2029	55,048	11%	6,187	200	22
2034	57,475	11%	6,460	208	23
2039	60,102	11%	6,755	218	24

Source: FlightAware, FAA OPSNET/ATADS, CHA, 2019.

3.6 Current and Future Critical Aircraft

Evaluating the Airport's current fleet mix and determining the current and projected design aircraft, are important aspects of the Master Plan Study. The critical aircraft (commonly referred to as the "design aircraft") determination is a key consideration in FAA decision making on project justification. The "critical aircraft" or "critical aircraft family" represent the most demanding

aircraft or grouping of aircraft with similar characteristics (relative to AAC, ADG, TDG)[7], that are currently using or are anticipated to use an airport on a regular[8] basis. While the Study is not limited to planning for design aircraft, they must still be considered when planning airfield and landside facilities, as they may require specific facility design accommodations within their designated areas of operation.

The Airport's previous 2009 Airport Layout Plan (ALP) update identified the Gulfstream III (ARC C-II, TDG 2) as the critical aircraft for airfield and pavement design. Upon review of the FAA's TFMSC and OPSNET data, operations at BDR over the past three years has averaged over the necessary 500 annual AAC "C" and ADG "III" operations to designate ARC C-III as the critical aircraft family. Additionally, the recommended forecast shows increase in jet operations. **Table 3-11** depicts the breakdown of operations by AAC and ADG. It is recommended that the critical aircraft remain ARC C-III throughout the planning period. Sample aircraft of this category include the Bombardier Global Express and Gulfstream 550. **Appendix B** further breaks down operations by aircraft type.

Table 3-11 – Annual Operations by AAC and ADG

Category	I	II	III	Total
2016				
B	234	1,160	6	**1,400**
C	280	254	398	**932**
D	14	270	92	**376**
Total	**528**	**1,684**	**496**	**2,708**
2017				
B	194	1,202	12	**1,408**
C	284	438	440	**1,162**
D	8	272	148	**428**
Total	**486**	**1,912**	**600**	**2,998**
2018				
B	302	1,292	16	**1,610**
C	308	656	328	**1,292**
D	4	308	128	**440**
Total	**614**	**2,256**	**472**	**3,342**

Source: FAA TFMSC, 2019

[7] AAC (Aircraft Approach Category), ADG (Airplane Design Group), TDG (Taxiway Design Group).

[8] According to FAA AC 150/500017, *Critical Aircraft and Regular Use Determination*, the terminology of "regular use" is defined as 500 annual operations, including itinerant and local operations but excluding touch-and-go operations. An operation is either a takeoff or landing.

Table 3-12 – Three Year Average Annual Operations

Year	Total C	Total D	Total III
2016	932	376	496
2017	1,162	430	600
2018	1,292	440	472
Three Year Average	**1,129**	**415**	**523**

Source: FAA TFMSC, 2019

Appendix A – Historical Data Sets

A. Airport Operations

Year	Itinerant					Local			Total Ops
	Air Carrier	Air Taxi	GA	Military	Total	Civil	Military	Total	
2009	0	2,452	26,376	518	29,346	32,009	58	32,067	61,413
2010	0	2,102	34,533	441	37,076	36,420	195	36,615	73,691
2011	0	1,666	30,978	246	32,890	31,591	152	31,743	64,633
2012	8	2,477	30,604	198	33,287	28,538	86	28,624	61,911
2013	0	2,219	29,893	100	32,212	30,677	40	30,717	62,929
2014	0	2,354	28,844	162	31,360	26,888	76	26,964	58,324
2015	2	1,828	23,474	107	25,411	17,855	44	17,899	43,310
2016	0	2,876	22,403	39	25,318	22,321	12	22,333	47,651
2017	3	3,013	20,647	107	23,770	22,122	132	22,254	46,024
2018	0	3,122	20,233	123	23,478	26,481	108	26,589	50,067

Source: FAA OPSNET, 2019

B. Historical Based Aircraft

Year	Based Aircraft
2009	211
2010	190
2011	190
2012	190
2013	190
2014	190
2015	176
2016	176
2017	149
2018	150

Source: FAA TAF, 2019

C. Historical Market Share: Based Aircraft

Year	BDR % Market Share		
	National	Regional	State
2009	0.1%	3.0%	14.8%
2010	0.1%	3.0%	14.0%
2011	0.1%	3.1%	14.3%
2012	0.1%	3.3%	15.9%
2013	0.1%	3.2%	14.9%
2014	0.1%	3.0%	14.8%
2015	0.1%	3.1%	14.7%
2016	0.1%	3.0%	14.4%
2017	0.1%	2.6%	14.2%
2018	0.1%	2.6%	14.1%
Average	**0.1%**	**3.0%**	**14.6%**

Source: CHA, FAA TAF, 2019

D. Historical Market Share: GA Operation

Year	Itinerant Operations			Local Operations		
	National	Regional	State	National	Regional	State
2009	0.08%	2.10%	13.75%	0.08%	2.02%	11.81%
2010	0.11%	2.71%	17.03%	0.10%	2.38%	14.00%
2011	0.10%	2.71%	16.25%	0.09%	2.24%	15.00%
2012	0.10%	2.69%	15.59%	0.08%	1.99%	13.49%
2013	0.10%	2.77%	16.42%	0.09%	2.29%	15.95%
2014	0.10%	2.76%	16.23%	0.08%	2.08%	13.70%
2015	0.08%	2.33%	13.95%	0.05%	1.43%	10.09%
2016	0.08%	2.44%	13.56%	0.06%	1.83%	12.90%
2017	0.07%	2.34%	13.89%	0.06%	1.90%	13.41%
2018	0.07%	2.36%	13.84%	0.07%	2.23%	15.70%
Average	**0.1%**	**2.5%**	**15.1%**	**0.1%**	**2.0%**	**13.6%**

Source: FAA TAF, 2019

Appendix B – General Aviation Forecasts

A. Based Aircraft Forecast Methodologies

FAA Aerospace Forecast

Period	Single Engine	Multi-Engine Piston	Turbo-Prop	Jet	Rotor-craft	Military	Total
2018	107	10	0	31	2	0	150
2019	106	10	0	32	2	0	150
2020	105	10	0	33	2	0	150
2021	104	10	0	33	2	0	149
2022	103	10	0	34	2	0	149
2023	102	10	0	35	2	0	149
2024	101	10	0	36	2	0	149
2025	100	10	0	37	2	0	149
2026	99	10	0	37	2	0	148
2027	98	10	0	38	2	0	148
2028	97	10	0	39	2	0	148
2029	96	10	0	40	2	0	148
2030	95	10	0	41	2	0	148
2031	94	10	0	42	3	0	147
2032	93	9	0	42	3	0	147
2033	92	9	0	43	3	0	147
2034	91	9	0	44	3	0	147
2035	90	9	0	45	3	0	147
2036	89	9	0	46	3	0	147
2037	89	9	0	47	3	0	148
2038	88	9	0	48	3	0	148
2039	87	9	0	49	3	0	148
AAGR 2019-2039	**-1.0%**	**-0.4%**	**0.0%**	**2.2%**	**1.8%**	**0.0%**	**-0.1%**
Growth 2019-2039	**-17.7%**	**-8.5%**	**0.0%**	**53.6%**	**42.7%**	**0.0%**	**-1.2%**

Source: FAA 2019-2039 Aerospace Forecast

TAF Growth Scenario

Year	TAF-Based Growth
2018	150
2019	154
2020	158
2021	162
2022	166
2023	170
2024	174
2025	178
2026	183
2027	188
2028	192
2029	197
2030	202
2031	207
2032	212
2033	218
2034	223
2035	229
2036	235
2037	240
2038	246
2039	253
AAGR 2019-2039	**2.5%**
Growth 2019-2039	**64.3%**

Source: FAA TAF, OPSNET, 2019

Market Share Scenario

Year	Market Share		
	National	Regional	State
2018	150	150	150
2019	151	151	152
2020	152	153	155
2021	154	154	157
2022	155	155	159
2023	156	157	163
2024	158	159	165
2025	159	160	168
2026	160	161	170
2027	161	163	173
2028	163	164	176
2029	164	166	178
2030	165	167	181
2031	166	169	183
2032	168	170	186
2033	169	171	188
2034	170	173	191
2035	172	174	193
2036	173	176	196
2037	174	178	199
2038	176	179	201
2039	177	181	204
AAGR 2019-2039	**0.8%**	**0.9%**	**1.5%**
Growth 2019-2039	**17.2%**	**19.6%**	**34.3%**

Source: FAA TAF, 2019

B. GA Operations Forecast Methodologies

Historical Growth Scenario

Year	Historical Trends		
	3-Year Time Series	5-Year Time Series	10-Year Time Series
2018	49,836	49,836	49,836
2019	50,604	48,332	48,852
2020	51,385	46,874	47,887
2021	52,177	45,460	46,941
2022	52,982	44,088	46,014
2023	53,799	42,758	45,106
2024	54,628	41,468	44,215
2025	55,470	40,216	43,342
2026	56,326	39,003	42,486
2027	57,194	37,826	41,647
2028	58,076	36,685	40,824
2029	58,972	35,578	40,018
2030	59,881	34,504	39,228
2031	60,804	33,463	38,453
2032	61,742	32,454	37,694
2033	62,694	31,474	36,949
2034	63,660	30,525	36,220
2035	64,642	29,604	35,504
2036	65,639	28,711	34,803
2037	66,651	27,844	34,116
2038	67,679	27,004	33,442
2039	68,722	26,189	32,782
AAGR 2019-2039	**1.5%**	**-3.0%**	**-2.0%**
Growth 2019-2039	**35.8%**	**-45.8%**	**-32.9%**

Source: FAA OPSNET, 2019

Operations Per Based Aircraft (OPBA) Scenario

Year	OPBA
2018	49,836
2019	50,262
2020	50,741
2021	51,228
2022	51,637
2023	52,185
2024	52,681
2025	53,151
2026	53,621
2027	54,099
2028	54,569
2029	55,048
2030	55,526
2031	55,996
2032	56,483
2033	56,970
2034	57,475
2035	57,971
2036	58,476
2037	58,998
2038	59,546
2039	60,102
AAGR 2019-2039	**0.9%**
Growth 2019-2039	**19.6%**

Source: FAA OPSNET, TAF, 2019

Market Share Scenario

Year	Market Share		
	National	Regional	State
2018	49,836	49,836	49,836
2019	50,252	49,975	49,956
2020	50,422	50,014	49,997
2021	50,598	50,053	50,038
2022	50,774	50,093	50,079
2023	50,953	50,133	50,120
2024	51,133	50,173	50,161
2025	51,316	50,213	50,203
2026	51,502	50,253	50,244
2027	51,691	50,293	50,286
2028	51,882	50,333	50,328
2029	52,076	50,374	50,370
2030	52,273	50,415	50,413
2031	52,473	50,456	50,455
2032	52,676	50,497	50,498
2033	52,882	50,538	50,540
2034	53,091	50,579	50,584
2035	53,304	50,621	50,627
2036	53,520	50,662	50,670
2037	53,740	50,704	50,714
2038	53,963	50,746	50,758
2039	54,190	50,788	50,802
AAGR 2019-2039	**0.4%**	**0.1%**	**0.1%**
Growth 2019-2039	**7.8%**	**1.6%**	**1.7%**

Source: FAA TAF, 2019

C. Critical Aircraft Type Breakdown

2016					
Critical Aircraft	Aircraft Approach Category			Aircraft Design Group	
	B	C	D	II	III
Dassault Falcon F7X	6				6
Embraer 175					
Bombardier Global 5000		110			110
Bombardier Global Express		286			286
Gulfstream V			80		80
Gulfstream VI			12		12
Bombardier Challenger 300		174		174	
Bombardier Challenger 600		44		44	
Embraer 135140/Legacy					
Embraer 135 LR					
Gulfstream G150		26		26	
Gulfstream G280		2		2	
IAI Galaxy					

Learjet 75		2		2	
Total	**6**	**644**	**92**	**248**	**494**

Source: FAA TFMSC, 2019

2017					
Critical Aircraft	**Aircraft Approach Category**			**Aircraft Design Group**	
	B	**C**	**D**	**II**	**III**
Dassault Falcon F7X	12				12
Embraer 175		4			4
Bombardier Global 5000		130			130
Bombardier Global Express		306			306
Gulfstream V			82		82
Gulfstream VI			66		66
Bombardier Challenger 300		232		232	
Bombardier Challenger 600		20		20	
Embraer 135140/Legacy		4		4	
Embraer 135 LR		2		2	
Gulfstream G150		98		98	
Gulfstream G280		78		78	
IAI Galaxy		2		2	
Learjet 75		2		2	
Total	**12**	**878**	**148**	**438**	**600**

Source: FAA TFMSC, 2019

2018					
Critical Aircraft	**Aircraft Approach Category**			**Aircraft Design Group**	
	B	**C**	**D**	**II**	**III**
Dassault Falcon F7X	16				16
Airbus A320		2			2
Bombardier Global 5000		116			116
Bombardier Global Express		210			210
Gulfstream V			78		78
Gulfstream VI			50		50
Bombardier Challenger 300		352		352	
Bombardier Challenger 600		32		32	
Embraer 135140/Legacy		92		92	
Embraer 135 LR		14		14	
Gulfstream G150		72		72	
Gulfstream G280		90		90	
IAI Galaxy					
Learjet 75		2		2	
Total	**16**	**982**	**128**	**654**	**472**

Source: FAA TFMSC, 2019