2. Aviation Activity Forecasts

2.1. Introduction

This chapter presents projections of aviation activity that form the basis of future development needs for Vero Beach Regional Airport (VRB or Airport). Previous activity forecasts, industry trends, local socioeconomic conditions, and historic data were analyzed and applied to methodologies accepted by both the Federal Aviation Administration (FAA) and Florida Department of Transportation (FDOT) to develop these forecasts. The standard planning period for an airport master plan is 20 years and the key planning periods include the 5-, 10-, and 20-year horizons. Since this study was largely conducted in 2023, the forecasts are presented for 2028, 2033, and 2043, using data obtained through the federal fiscal year 2022, ending on September 30th. The aviation activity forecast was approved by the FAA on July 21, 2024. A copy of the forecast approval letter is included in **Appendix E.**

Effects of COVID-19

The 2020 outbreak of COVID-19 in the U.S. caused significant disruption to businesses, including the aviation industry, through travel restrictions, stay-at-home orders, quarantine requirements, and an increased reliance on video conferencing. While the pandemic impacted the level of activity at airports across the nation, this has been temporary as the aviation industry continues to recover. In fact, most airports in Florida are close to recording pre-COVID-19 levels of activity; especially given the migration of people and businesses that have occurred since the pandemic. Regardless, while the recommended forecasts of this study are considered conservative, they will be utilized to create planning activity levels for certain facility requirements in the following chapter.

2.2. Recent Projections of Aircraft Activity

The most recent local, state, and national forecasts for VRB include those prepared for the 2016 Airport Layout Plan Update, FDOT's Florida Aviation System Plan (FASP), and the FAA's 2022 Terminal Area Forecast (TAF). Each previous forecast projects based aircraft and annual operations for the Airport as summarized in the following sections. As required by the FAA, a direct comparison of the recommended forecasts must be made relative to the TAF. This comparison is included at the end of this chapter.

2016 Airport Layout Plan Update

The 2016 Airport Layout Plan Update included forecasts which were projected over a 20-year planning period using 2013 as the base year. The expected number of based aircraft and annual operations for the key planning horizons of that study are included in **Table 2.1**.

TABLE 2.1: 2016 AIRPORT LAYOUT PLAN UPDATE

	Based Aircraft	Annual Operations
Base Year		
2013	212	185,699
Forecast		
2018	233	199,653
2023	256	214,848
2033	310	249,460
Average Annual Change (2013-2033)	1.9%	1.5%

Source: 2016 Airport Layout Plan Update.

Florida Aviation System Plan

The Florida Aviation System Plan (FASP) is a comprehensive planning and development guide for the state's public airports. The FASP ensures that Florida has an effective statewide aviation transportation system which provides a link to the global air transportation network and effectively interfaces with regional surface transportation systems. In support of these goals, FDOT's Aviation Office provides regular updates to historic aviation data and prepares forecasts of the based aircraft, annual operations, and passenger enplanements (as applicable) for each public airport in the state. The FASP information is included as part of the Florida Aviation Database (FAD) with the most recent providing historic based aircraft through 2021 and a projection out to 2038, while the annual operations include historic data though 2016 and a projection out to 2035. FASP data for the key forecast horizons of this study, including an extrapolation to 2043, are shown in **Table 2.2**. The FASP did not include any passenger enplanement data for VRB.

TABLE 2.2: FLORIDA AVIATION SYSTEM PLAN

	Based Aircraft	Annual Operations
Base Year		
2016	232	213,611
2021	202	-
Forecast		
2028	234	247,950
2033	257	263,839
2043 (extrapolated)	313	298,738
Average Annual Change (Base Year-2043)	2.0%	1.3%

Source: Florida Aviation Database and ESA Analysis, 2023.

FAA Terminal Area Forecast

A Terminal Area Forecast (TAF) is prepared annually by the FAA to meet the budget and planning needs of the agency, as well as to provide information for use by state agencies, local authorities, the aviation industry, and the public. Projections in the FAA TAF are prepared for each airport in the National Plan of Integrated Airport Systems (NPIAS). The 2022 TAF (issued in February 2023) utilizes a 2021 base year for based aircraft and annual operations with projections through 2050. The based aircraft and annual operations for the forecast horizons of this study are included in **Table 2.3**. It should be noted that while the TAF includes annual enplanement figures for VRB, they have been flatlined at 1,107 passengers each year from 2022 to 2050.

TABLE 2.3: 2022 FAA TERMINAL AREA FORECASTS

	Based Aircraft	Annual Operations
Base Year		
2021	204	123,306
Forecast		
2028	243	260,097
2033	273	263,504
2043	349	270,557
Average Annual Change (2021-2043)	2.5%	3.6%

Note: Annual Operations based on FAA fiscal year ending September 30th.

Source: 2022 FAA Terminal Area Forecast (issued February 2023).

2.3. Factors Influencing Forecast Approach

To guide the forecasting effort, an understanding of the relationship between industry trends and the Airport operating environment is essential. Using historic information and data, it is possible to compare how changes in the general aviation industry and local area economics may have influenced activity at VRB. Additionally, projections for the commercial airline business will allow educated assumptions to be made as to how the Airport's new passenger service offerings might evolve in the future.

National, regional, and local trends with the potential to impact existing, expanded, or even create new aviation activity were identified from several sources. In addition to the historic data and recent activity forecasts, material was also collected from other reports, studies, and industry articles including, but not limited to:

- General Aviation Manufacturers Association (GAMA) Annual Aircraft Shipment Reports
- 2022 FAA Aerospace Forecast (2022-2042)
- FAA Monthly Business Jet Reports

Noteworthy information from these sources is summarized in the following sections.

State of the General Aviation Industry

General aviation encompasses all segments of the aviation industry except for activity that is conducted by commercial airlines or the military. Examples include pilot training, law enforcement flights, medical transportation, aerial surveys, aerial photography, agricultural spraying, advertising, and various forms of recreation, not to mention business, corporate, and personal travel. Historically, the industry experiences some very significant fluctuations, both positive and negative.

Data from the General Aviation Manufacturer's Association (GAMA) showed that general aviation aircraft manufactured in the U.S. fell from a high of 3,279 aircraft in 2007 to 1,334 in 2010 as a result of the Great Recession. The number of new general aviation shipments has increased most every year since; however the 1,686 delivered in 2021 are only slightly more than half the deliveries before the Great Recession.

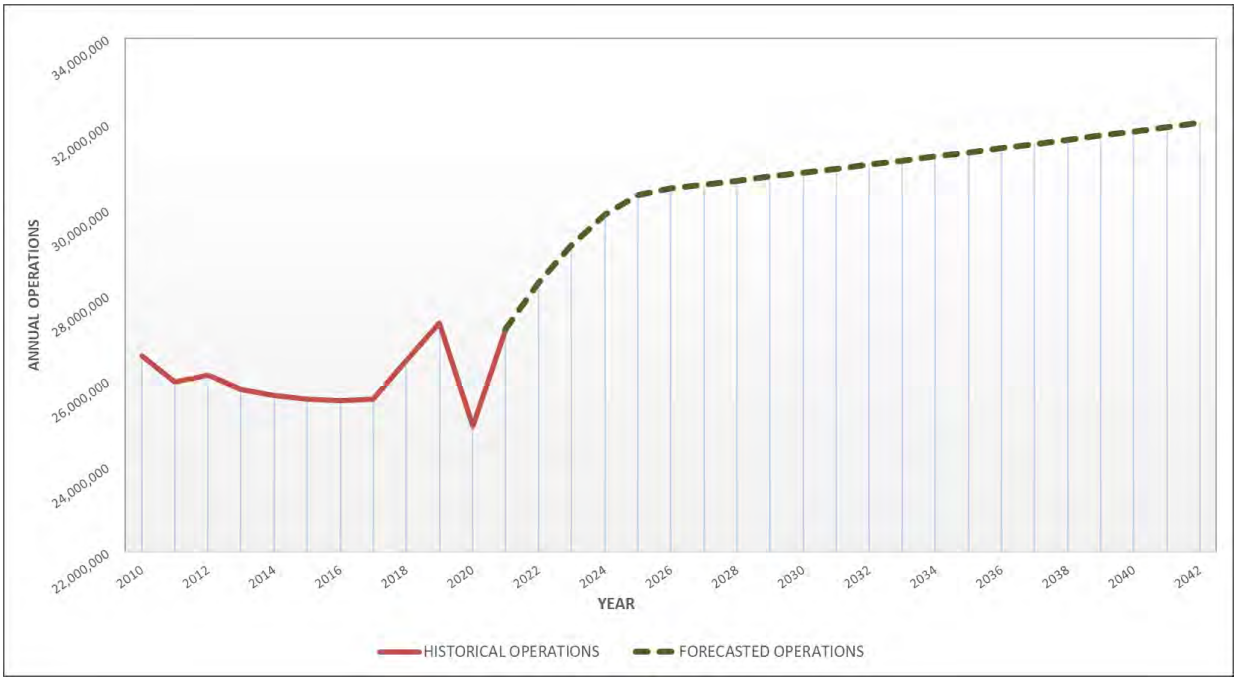
Taking both the manufacturing rates and aircraft retirements into consideration, the FAA tracks and projects the nation's active general aviation fleet. Overall, the 2022 FAA Aerospace Forecast projects the number of active general aviation aircraft to only increase slightly through 2042; however, this trend is not evenly distributed across the different aircraft types. For example, the number of the most common single-engine piston aircraft are expected to decline 0.4 percent annually through 2042 while the number of active jet aircraft are projected to increase 2.6 percent each year.

For the purposes of the forecasts, it is important to note that the headquarters and primary manufacturing facility for Piper Aircraft, Inc. is in the City of Vero Beach, adjacent to airport property. Piper Aircraft accesses the airport via a negotiated agreement with VRB as the manufacturing facilities and offices are on privately owned property. The annual operations conducted by Piper's aircraft are included in the airport traffic control tower (ATCT) counts. These operations are very limited since each newly manufactured aircraft is only flown the minimum hours required prior to customer delivery. Likewise, the new aircraft, as well as those flown in for service, are not included in the based aircraft counts for VRB since they are off airport property and do not remain at Piper Aircraft very long.

The FAA also tracks and projects the number of hours flown by general aviation aircraft, which overall is expected to increase at a rate of 1.1 percent each year through 2042. Similar to the fleet projections, single-engine piston aircraft show a decline in activity of 0.3 percent each year while the hours flown by jets are forecast to grow 3.8 percent annually. The jet aircraft projections are supported by figures in the FAA's monthly Business Jet Reports which shows that operations conducted by general aviation jet aircraft consistently increased between 2009 and 2019. In 2020, annual jet activity dropped 23 percent at the beginning of the COVID-19 pandemic, but quickly rebound 46 percent in 2021 to an all-time high.

Using the fleet size, hours flown, utilization rates, as well as other industry factors, each year the FAA projects the general aviation operations expected to be handled by the nation's towered airports. **Figure 2.1** depicts the historic trend and illustrates how general aviation activity rebounded in just two years from the impacts of the COVID-19 pandemic. In fact, the 2022 Aerospace Forecast projects general aviation activity at the nation's towered airports to increase 2.8 percent each year through 2025, with the growth slowing to 0.3 percent for the rest of the years through 2042.

FIGURE 2.1: NATION'S GENERAL AVIATION OPERATIONS (ALL TOWERED AIRPORTS)



Source: 2022 FAA Aerospace Forecast.

Passenger Airline Industry Outlook

In broad terms, the U.S. passenger airline industry is characterized by mainline and regional carriers that provide scheduled domestic and international service. The FAA defines mainline carriers as those primarily operating aircraft with 90 or more seats, while the regionals largely utilize aircraft with 89 or less seats, on routes that feed the mainline carriers.

As a certified 14 Code of Federal Regulations Part 139 airport, VRB has the ability to support commercial airline service. Using their 50 and 70 seat regional jet fleet, Elite Airways provided passenger service at VRB between 2017 and 2022. Due to the size of their aircraft, the passenger enplanements by Elite Airways were reported by the FAA as regional or commuter service. In February 2023, Breeze Airways began providing commercial passenger at VRB using their fleet of 118 and 126 seat aircraft. While this size aircraft is typically associated with mainline carriers, Breeze Airways entered the airline market in 2021 as a low cost carrier providing non-stop flights to secondary airports in underserved areas. The airline does not currently operate under any contracts with mainline carriers and in fact is focused on bypassing major hubs to provide shorter flight times. As such, characteristics and projections for both mainline and regional carriers were evaluated.

Overall, the FAA has an optimistic outlook for the mainline and regional passenger carriers in its 2022 Aerospace Forecast. For the domestic market, the mainline and regional carriers combined are projected to increase the number of passenger enplanements an average of 4.7 percent each year through 2042. System-wide capacity, also known as available seat miles (ASMs), is projected to increase an average of 4.0 percent each year through 2042. Revenue passenger miles (RPMs), the basic measure of the airline passenger traffic produced, are expected to increase at an annual rate of 4.8 percent for the domestic market of the U.S. air carriers.

Commercial airlines are also projected to continue to maximize the utilization of their aircraft. Prior to the COVID-19 pandemic, both mainline and regional carriers had consistently increased their average load factor, indicating how efficiently seats were being filled. While domestic load factors were down in 2020 and 2021, they are increasing and projected by the FAA to continue to do so through 2042. Regardless, the average load factors are not expected to reach the previous level in 2019; hence the reason the FAA has forecasted ASMs to increase at a slower rate than RPMs, as the airlines seek to restore load factors.

Local Socioeconomic Factors

A number of socioeconomic indicators were evaluated that typically have a direct relationship to the use of aviation and therefore airport activity. Overall and average annual growth rates for Indian River County, the State of Florida, and the U.S. are presented based on data obtained from Woods & Poole Economics, Inc. The Woods & Poole projections are updated annually, utilizing models which consider specific local conditions using historic data back to 1969. While the current historic data sets from Woods & Poole cover the period from 1969 to 2020, only data back to 2011 are shown in the tables that follow, reflecting the general trends over the past 10 years.

Population

Historically Indian River County has had overall and average annual population growth rates higher than both Florida and the U.S. This growth can be attributed to the fact that it is not an incredibly population-dense county compared to others in the state, with plenty of room for growth. Though at a slower rate in the future, the population growth for Indian River County is expected to continue to outpace the state and nation through 2043.

TABLE 2.4: TOTAL POPULATION

	Indian River County	Florida	United States
Historic Data			
2011	138,905	19,039,272	311,785,264
2012	140,080	19,269,341	314,280,968
2013	141,309	19,502,665	316,665,134
2014	143,663	19,788,530	319,193,123
2015	146,461	20,137,441	321,748,258
2016	149,977	20,529,207	324,281,918
2017	152,739	20,862,726	326,534,147
2018	155,285	21,124,221	328,451,784
2019	157,783	21,345,015	330,145,373
2020	160,345	21,569,932	331,501,080
Overall Growth (2011-2020)	15.4%	13.3%	6.3%
Average Annual Change (2011-2020)	1.6%	1.4%	0.7%
Forecast			
2028	178,054	23,609,587	347,672,031
2033	189,103	24,939,250	358,560,569
2043	213,298	27,617,810	378,928,870
Average Annual Change (2020-2043)	1.2%	1.1%	0.6%

Source: Woods & Poole Economics, Inc., 2022.

Employment

Employment data provides an indication of the economic stability of a geographic area. As shown in the table below, while Indian River County employment has steadily increased since 2011, the state has had the greatest growth. However, it should be noted that only Indian River County's employment increased in 2020. As the county continues to expand its population base, so too will employment to support the area's growth initially (such as real estate, banking, and construction) as well as afterwards (to include retail, health care, education, etc.). Woods & Poole's long-term projections show employment levels continuing to increase for Indian River County, albeit at a somewhat slower rate than the last decade.

TABLE 2.5: TOTAL EMPLOYMENT

	Indian River County	Florida	United States
Historic Data			
2011	138,905	10,036,635	176,091,719
2012	140,080	10,249,019	178,979,693
2013	141,309	10,539,261	182,325,107
2014	143,663	10,937,167	186,233,744
2015	146,461	11,367,159	190,325,797
2016	149,977	11,682,231	193,425,890
2017	152,739	12,097,885	196,393,122
2018	155,285	12,555,591	200,280,221
2019	157,783	12,761,512	201,644,205
2020	160,345	12,148,602	190,776,766
Overall Growth (2011-2020)	15.4%	21.0%	8.3%
Average Annual Change (2011-2020)	1.6%	2.1%	0.9%
Forecast			
2028	178,054	14,918,493	226,480,417
2033	189,103	16,155,363	240,120,076
2043	213,298	18,700,890	266,780,547
Average Annual Change (2020-2043)	1.2%	1.9%	1.5%

Source: Woods & Poole Economics, Inc., 2022.

Income

Personal income per capita represents the ratio of total personal income (before taxes) to the total resident population. Adjustments are also made if the income was earned in a different area than where the person resides. In recent years, income per capita in Indian River County has outpaced both the state of Florida as well as the nation. For the 20-year planning horizon of this study, the Woods & Poole data projects the county, state, and nation to all have higher and nearly equal growth in personal income per capita.

TABLE 2.6: TOTAL PERSONAL INCOME PER CAPITA (IN 2022 DOLLARS)

	Indian River County	Florida	United States
Historic Data			
2011	$58,125	$40,517	$42,755
2012	$61,562	$41,545	$44,557
2013	$61,301	$41,173	$44,808
2014	$66,946	$43,531	$46,898
2015	$69,527	$45,678	$48,738
2016	$72,454	$46,474	$49,626
2017	$75,823	$49,041	$51,587
2018	$80,867	$51,466	$53,832
2019	$84,273	$53,399	$55,739
2020	$85,754	$56,096	$59,147
Overall Growth (2011-2020)	47.5%	38.5%	38.3%
Average Annual Change (2011-2020)	4.4%	3.7%	3.7%
Forecast			
2028	$131,572	$84,547	$87,818
2033	$165,172	$107,256	$111,031
2043	$258,171	$172,108	$177,039
Average Annual Change (2020-2043)	4.9%	5.0%	4.9%

Source: Woods & Poole Economics, Inc., 2022.

Households

Households represent the number of occupied housing units, which include homes, apartments, a group of rooms, or single rooms occupied as separate living quarters. The number of households does not include facilities such as retirement homes, college dormitories, military barracks, or prisons. The growth in the number of households for Indian River County has been slightly higher than that of the state and considerably higher than the nation. Similarly, the projection over the next 20 years is that the household growth rate for Indian River County will continue to outpace the state and nation.

TABLE 2.7: TOTAL NUMBER OF HOUSEHOLDS

	Indian River County	Florida	United States
Historic Data			
2011	61,231	7,610,452	119,393,459
2012	61,962	7,710,497	120,622,924
2013	62,798	7,824,760	122,070,204
2014	63,556	7,898,501	122,915,304
2015	64,661	8,013,585	124,348,127
2016	65,649	8,127,749	125,657,037
2017	66,365	8,189,687	126,141,105
2018	67,292	8,311,059	127,583,148
2019	68,120	8,414,149	128,658,107
2020	68,481	8,442,415	128,614,009
Overall Growth (2011-2020)	11.8%	10.9%	7.7%
Average Annual Change (2011-2020)	1.3%	1.2%	0.8%
Forecast			
2028	78,478	9,486,327	137,739,006
2033	83,461	10,023,785	141,930,835
2043	93,598	11,015,115	148,517,499
Average Annual Change (2020-2043)	1.4%	1.2%	0.6%

Source: Woods & Poole Economics, Inc., 2022.

Gross Regional Product

Gross Regional Product (GRP) is based on the U.S. Bureau of Economic Analysis gross domestic product data for each state. The nation's figures represent a total for all states while the individual county data has been estimated by Woods & Poole. The county data is calculated by allocating the state GRP to the counties based on the proportion of total state earnings by employees originating from a particular county. As shown in the table below, all were impacted in 2020 due to the COVID-19 pandemic. Regardless, the GRP growth for Indian River County has outpaced the state and the nation over the past decade. While this trend is expected to continue, it will be at a somewhat lower rate in the future.

TABLE 2.8: GROSS REGIONAL PRODUCT (IN MILLIONS OF DOLLARS)

	Indian River County	Florida	United States
Historic Data			
2011	$4,631	$769,319	$15,777,260
2012	$4,758	$778,545	$16,140,743
2013	$4,872	$800,907	$16,506,385
2014	$5,066	$827,794	$16,947,640
2015	$5,525	$881,066	$17,547,297
2016	$6,012	$915,382	$17,845,990
2017	$6,096	$945,364	$18,265,187
2018	$6,230	$976,627	$18,835,683
2019	$6,529	$1,015,662	$19,325,095
2020	$6,312	$994,413	$18,664,909
Overall Growth (2011-2020)	36.3%	29.3%	18.3%
Average Annual Change (2011-2020)	3.5%	2.9%	1.9%
Forecast			
2028	$8,312	$1,260,652	$22,608,951
2033	$9,433	$1,432,146	$24,974,961
2043	$11,963	$1,821,430	$30,073,375
Average Annual Change (2020-2043)	2.8%	2.7%	2.1%

Source: Woods & Poole Economics, Inc., 2022.

Woods & Poole Wealth Index

Woods & Poole calculates a wealth index which provides a measure of relative total personal income per capita weighted by the source of income. In calculating the index, relative income per capita is weighted positively for income with a higher proportion from dividends, interest, and rent and negatively for income with a higher proportion from transfer payments (income where no goods or services are provided). The index is also based on weighted averages of the regional income per capita; regional income from dividends, interest, and rent; and regional income from transfer payments. Since Woods & Poole consider dividends, interest, and rent income good indicators of assets, their resulting index provides a measure of relative wealth to that of the nation as a whole. Although the county's index is marginally lower than its peaks pre-COVID-19, Indian River County is well above the national average and continues to rank among the wealthiest of Florida's 67 counties.

TABLE 2.9: WOODS & POOLE WEALTH INDEX (COMPARED TO UNITED STATES)

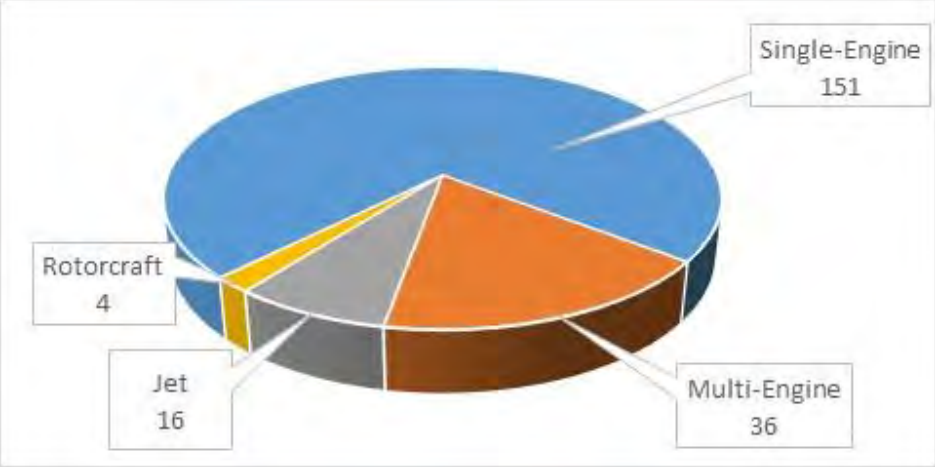
	Indian River County	Florida	United States
Historic Data			
2011	145	99	100
2012	146	98	100
2013	145	96	100
2014	150	97	100
2015	149	98	100
2016	152	98	100
2017	152	99	100
2018	155	100	100
2019	156	100	100
2020	153	100	100
Overall Growth (2011-2020)	5.1%	0.8%	-
Average Annual Change (2011-2020)	0.6%	0.1%	-
Forecast			
2028	154	100	100
2033	153	100	100
2043	151	101	100
Average Annual Change (2020-2043)	< 0.5%	< 0.4%	-

Source: Woods & Poole Economics, Inc., 2022.

2.4. Based Aircraft

Based aircraft are those aircraft that are operational, airworthy, and kept at an airport for a majority of the year (more than six months). Information on the aircraft based at an airport is documented in the FAA's National Based Aircraft Inventory Program (NBAIP). Through this program the FAA determines whether the aircraft reported have a current registration, then a check is made to see if any of the aircraft have been reported by another airport. This creates a validated number of based aircraft for a given airport. This count includes a break-out of the single-engine, multi-engine, jet, and rotorcraft models in the based fleet. It is worth noting that the NBAIP does not count glider, military, or ultralight aircraft since these may not always have a tail number for registration. These categories are however included as part of the FAA Airport Master Record (Form 5010). **Figure 2.2** illustrates the mix of the 207 aircraft based at VRB in 2022.

FIGURE 2.2: BASED AIRCRAFT MIX IN 2022



Source: FAA National Based Aircraft Inventory Program.

Based Aircraft Projections

The number of aircraft owners projected to base their aircraft at VRB is an important consideration for airfield planning since it is a key gauge of the demand for facilities. Projections of based aircraft also provide an indication of the anticipated growth in general aviation activity.

Historic Growth

Given the cyclical nature of the general aviation industry, historic changes in the number of based aircraft are important to consider when analyzing potential growth. As shown in **Table 2.10**, over the last 10 years the number of based aircraft peaked in 2016 at 232 and then began to decrease for three years down to 173 in 2019. This decline is primarily attributed to the fact that prior to the 2021 sale of Flight Safety to Skyborne Airline Academy, Flight Safety sold off approximately 50 aircraft; which represented nearly half of the flight school's fleet. Since 2019, the based aircraft count has increased every year at VRB, including throughout the COVID-19 pandemic. On average, the number of based aircraft have declined annually at a rate of 0.1 percent between 2013 and 2022. Since the historic growth was impacted by the sale of a significant number of flight school aircraft, it was not utilized to create a new forecast for based aircraft.

TABLE 2.10: HISTORIC BASED AIRCRAFT COUNTS

Year	Single-Engine	Multi-Engine	Jet	Rotorcraft	Total
2013	157	44	4	4	209
2014	159	45	6	4	214
2015	155	44	6	4	209
2016	178	44	6	4	232
2017	161	41	6	2	210
2018	148	39	6	1	194
2019	126	40	6	1	173
2020	131	44	6	2	183
2021	144	37	18	3	202
2022	151	36	16	4	207

Source: FAA National Based Aircraft Inventory Program.

Previous Projections

The 2016 Airport Layout Plan Update and FASP projected the based aircraft at VRB to increase at very similar average annual rates (1.9 and 2.0 percent respectively). When these are applied to the current count of 207, the resulting projections are for 308 or 314 based aircraft by 2043 (see **Table 2.11**). The FAA's TAF is updated annually with the most recent version projecting the based aircraft at VRB to increase at an average annual rate of 2.5 percent. When applied to the current based aircraft count, the TAF growth rate yields a forecast of 351 based aircraft by 2043 (see **Table 2.11**).

National Active Fleet Forecasts

Each year the FAA provides a long-term projection for the active general aviation fleet as part of their Aerospace Forecast. As noted previously, the 2022 FAA Aerospace Forecast only projects a slight increase in the active general aviation fleet through 2042. When applied to the current number of based aircraft, this average annual growth (0.1 percent) results in a forecast of 221 at VRB in 2043. This is only an increase of five additional based aircraft during the 20-year horizon. Given the Airport maintains a current hangar wait list with 90 aircraft in October 2022; the FAA's anticipated growth for the active general aviation fleet is not considered applicable and therefore was not utilized to create a new forecast.

Regression Analysis

Often times regression analysis can be an effective tool to forecast based aircraft since population, income, employment, industry data, and other variables typically generate reliable projection models. However, no statistically significant regression models could be created from the historic based aircraft information and area socioeconomic data. Given the that the socio-economic data for the area has had positive, linear growth over the last 10 years, none of the simple linear or multiple regression models created would correlate to the sale of approximately 50 based aircraft and an overall slight decline in the historic number of based aircraft over the same period.

Recommended Based Aircraft Forecast

For the recommended based aircraft projection, a forecast based on the average growth expected by FDOT and FAA was adopted. Even though the most recent forecasts by FDOT and FAA do not have the same base year data for the number of aircraft at VRB, they are both based on methodologies which are updated regularly. This balances the growth expected by the FAA in their overall evaluation of the nation's general aviation fleet; while also incorporating elements from FDOT's regional and local level perspectives.

As reflected in **Table 2.11**, this results in a 2.3 percent average annual growth for a total of 334 based aircraft at the end of the 20-year planning period. Within the 10-year planning horizon, the recommended forecast shows demand for an additional 59 aircraft to be based at VRB by 2033. Since the airport has a 100 percent hangar occupancy rate, there are 90 aircraft confirmed on the official hangar wait list, and there is no indication by either of the flight schools to significantly increase their fleets, this is considered to be a relatively conservative projection. This is especially true since relatively few on the current wait list are existing tenants and the master plan forecasts should be based on an unconstrained scenario. Additionally, the Airport will have the ability to accommodate additional based aircraft over the next 10 years given the Taxiway E aircraft parking apron was completed in 2021. Located in the midfield, this 32,000 square yard apron will ultimately support six clearspan hangars providing a total of approximately 86,500 square feet of space. The first two 20,000 square foot hangars are expected to be constructed in the next two years.

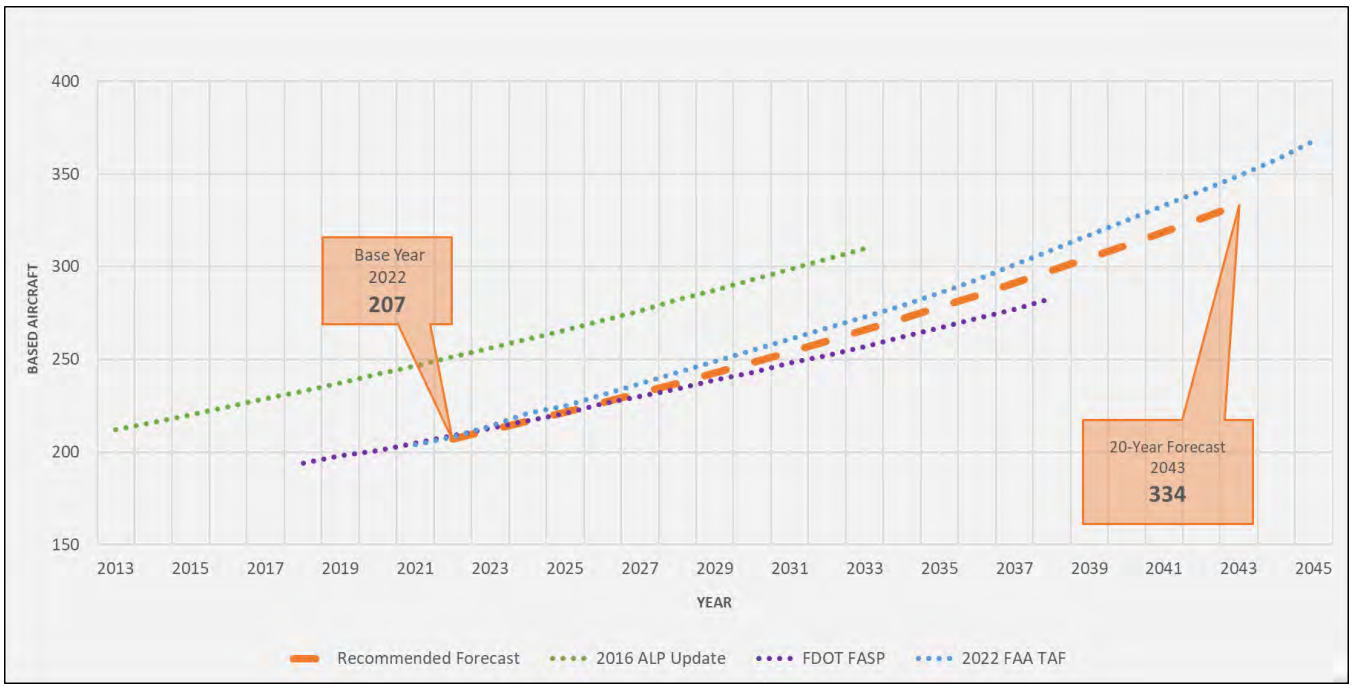
TABLE 2.11: COMPARISON OF BASED AIRCRAFT PROJECTIONS

	2016 ALPU[a]	FASP[a]	2022 FAA TAF[a]	Recommended
Base Year				
2022	207	207	207	**207**
Forecast				
2028	232	233	241	**237**
2033	255	257	273	**266**
2043	308	314	351	**334**
Average Annual Change (2022-2043)	1.9%	2.0%	2.5%	**2.3%**

[a] Applies growth projection of previous study to current based aircraft count.

Source: ESA Analysis, 2023.

FIGURE 2.3: COMPARISON OF RECOMMENDED BASED AIRCRAFT FORECAST TO PREVIOUS PROJECTIONS



Source: Previous Forecasts and ESA Analysis.

Forecast of Based Aircraft Fleet Mix

Projecting the types of based aircraft is necessary since different aircraft require different facilities. For the short-term, the future based aircraft fleet mix was primarily determined by the specific aircraft types on the current hangar wait list. For the balance of the 20-year planning horizon, the FAA's projections for the active general aviation fleet were evaluated and compared to the aircraft types at VRB. While the overall growth in the nation's active fleet was not utilized to forecast based aircraft, the individual projections of aircraft types are useful in predicting the future based aircraft fleet mix. In addition, information obtained during the master plan interviews and production data from the aircraft manufacturers was also used to estimate the future based aircraft mix.

Nation's Active General Aviation Fleet

According to the 2022 FAA Aerospace Forecast, the number of active general aviation aircraft in the nation was 204,405 in 2021. The FAA expects this figure to grow to more than 208,900 by 2042. Despite the limited growth, the Aerospace Forecast provides detail on how the individual aircraft categories are expected to evolve during the next 20 years. Additionally, while the FAA provides a number of aircraft categories, they have been simplified into the five major categories shown in **Table 2.12**. Within the single-engine grouping are the single-engine piston, experimental, and light sport aircraft categories. The multi-engine and rotorcraft groups both contain piston and turbine models. It is also assumed that single-engine turboprops are included within the multi-engine group as there is not a separate category for this small segment of the fleet. The jet category covers all ranges of turbojet general aviation aircraft, from very light jets to the heaviest business jets.

As noted previously, the FAA projects considerable growth in the number of jet aircraft in the general aviation fleet. In addition to the aircraft manufacturing and retirement trends, demand for jet aircraft is up as companies increase their use of these through various charter, lease, time-share, partnership, and fractional ownership agreements. More businesses rely on general aviation because it provides safe, efficient, flexible, and reliable transportation. Fractional ownership offers consumers a more efficient use of time by providing faster point-to-point travel, the ability to conduct business while flying, and more convenient enplaning and deplaning of flights when compared to commercial airlines. In fact, during the COVID-19 pandemic, the industry saw an increase in private business travel when commercial airline options were reduced.

TABLE 2.12: FAA FORECAST OF NATIONAL ACTIVE GENERAL AVIATION FLEET

	2021 Fleet Mix	2042 Fleet Mix	Average Annual Growth Rate
Single-Engine	152,870	141,300	-0.4%
Multi-Engine (piston & turboprop)	22,140	22,510	0.1%
Jet	15,755	27,000	2.6%
Rotorcraft	9,820	13,530	1.5%
Other	3,820	4,565	0.0%
Total	**204,405**	**208,905**	

Source: FAA 2022 Aerospace Forecast.

In the FAA's projections, growth in the U.S. Gross Domestic Product and corporate profits were also considered as catalysts to the increase in active jet aircraft. In all, jets are expected to represent 12.9 percent of the active general aviation fleet by 2042, up from 7.7 percent in 2021. Reasons for the decline in the overall number of single-engine piston aircraft and virtually no growth in the multi-engine category is attributed to cost of ownership and new aircraft deliveries not keeping pace with retirements in these aging fleets.

Expected Based Aircraft Fleet Mix

The 2022 based aircraft fleet mix at VRB is comprised of 73.0 percent single-engine, 17.4 percent multi-engine, 7.7 percent jet, and 1.9 percent rotorcraft. Throughout the planning period, the mix of based aircraft is expected to remain predominately single-engine, but those will account for a slightly lower overall percentage of the total. Following the FAA's expectation for the nation's active general aviation fleet, an increase in the number of based jets as well as some turboprop aircraft is expected during the next 20 years. This is reasonable considering that turbojet technology has developed to the point that it is truly feasible as a replacement to the more traditional piston powered fleet. The expected future based aircraft fleet mix is included in **Table 2.13**.

TABLE 2.13: PROJECTED BASED AIRCRAFT FLEET MIX

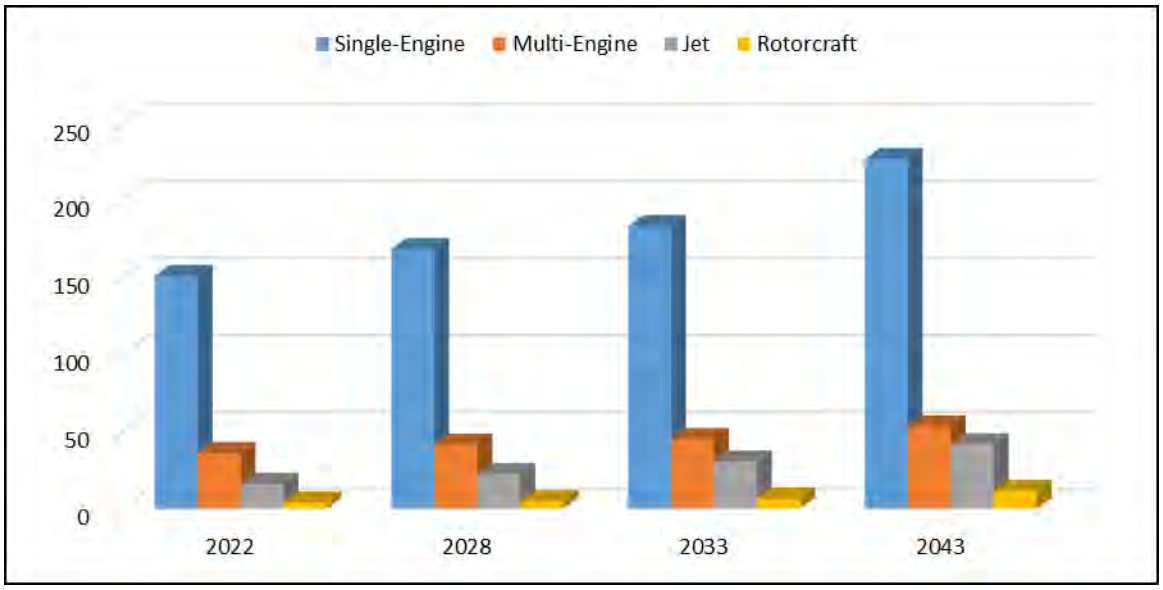
	Base Year	Forecast Year		
	2022	2028	2033	2043
Single-Engine	151	167	183	227
Multi-Engine (piston & turboprop)	36	42	45	53
Jet	16	23	31	42
Rotorcraft	4	5	7	12
Total	**207**	**237**	**266**	**334**

Source: 2022 VRB Hangar Waiting List, FAA 2022 Aerospace Forecast, and ESA Analysis, 2023.

As with most airports, the single-engine category is predominantly comprised of Beechcraft, Cessna, Cirrus, Mooney, and Piper models. Multi-engine aircraft tend to include the Cessna 300 and 400 series models and Piper aircraft including the Navajo, Seminole, and Seneca series. The additional single-engine aircraft are expected to

be similar to those currently at VRB, while those in the multi-engine category will continue to include a mix of the piston models for training and turboprops for private or business use.

FIGURE 2.4: PROJECTED BASED AIRCRAFT FLEET MIX



Source: ESA Analysis, 2023.

Based jets will continue to include a range of the aircraft flying today. These include popular models from the Bombardier Challenger, Bombardier Learjet, Cessna Citation, Dassault Falcon, and Embraer families. Rotorcraft will continue to include both piston and turbine powered models, including the Eurocopter and Schweitzer currently based at VRB and other popular models including those from Bell and Robinson in the future.

2.5. Aircraft Operations

The FAA defines an aircraft operation as either a single aircraft landing or takeoff. Further, a touch and go procedure is counted as two operations, since the aircraft lands and immediately takes off. Aircraft operations are classified by the FAA into the following categories:

- Air Carrier - an aircraft with seating capacity of more than 60 seats or a maximum payload capacity of more than 18,000 pounds carrying passengers or cargo for hire or compensation.
- Air Taxi - an aircraft designed to have a maximum seating capacity of 60 seats or less or a maximum payload capacity of 18,000 pounds or less carrying passengers or cargo for hire or compensation.
- General Aviation - all civil aircraft, except those classified as air carriers or air taxis.
- Military - all classes of military aircraft.

The ATCT at VRB operates 14 hours a day from 7 a.m. to 9 p.m. Operations conducted during ATCT hours are officially recorded in the FAA's Operations Network (OPSNET) database. **Table 2.14** summarizes the Airport's annual operations recorded by the ATCT over the last 10 years. While it only goes back to 2013, the figures for 2019, prior to the COVID-19 pandemic, represents the highest level of annual operations ever for VRB. Additionally, it should be noted that aircraft operations do occur when the tower is closed; however, the Airport has a voluntary noise abatement program for both flight training activity and jet operations.

TABLE 2.14: HISTORIC ANNUAL OPERATIONS

Fiscal Year	Annual Operations	Percent change over prior year
2013	185,699	-
2014	211,200	13.7%
2015	217,227	2.9%
2016	207,923	-4.3%
2017	205,958	-0.9%
2018	226,534	10.0%
2019	253,339	11.8%
2020	189,347	-25.3%
2021	123,306	-34.9%
2022	133,802	8.5%

Source: FAA OPSNET Database.

Prior to 2017, there were very few air carrier operations recorded at the airport. The commercial passenger flights conducted by Elite Airways between 2017 and 2022 were documented as air carrier operations, even though only a few of the aircraft in their fleet had more than 60 seats. This is not uncommon for most commercial service airports as the air taxi category is typically associated with general aviation air charter, lease, time-share, partnership, and fractional ownership operations.

Projections of Annual Operations

While VRB supported commercial airline service and military activity, during the last 10 years, their combined activity peaked at 478 annual operations in 2021. Therefore, the forecast of annual operations have been analyzed as a whole, with a breakout of the expected commercial air carrier activity provided in a separate section.

Historic Growth

Historic activity is important to evaluate given the cyclical nature of the aviation industry. As shown previously in **Table 2.14**, every two years the annual operations at VRB have fluctuated between increases and decreases. The most significant of which were the losses experienced in 2020 and 2021 due to the COVID-19 pandemic. While the Airport's activity increased 8.5 percent in 2022, the annual operations are still well below pre-COVID-19 pandemic levels. In fact, so much activity was lost that 2022 is below the 2013 level. This results in an overall average annual loss for the last 10 years; therefore, the historic data was not utilized to create a future projection of annual operations for VRB.

Previous Projections

Operations in the 2016 Airport Layout Plan Update were projected to have an average annual growth rate of 1.5 percent through 2033. When applied to the operations count for 2022, the result was a projection of nearly 183,000 annual operations by 2043 (see **Table 2.15**).

While the FASP typically benefits from being updated on a regular basis, the most recent projection of annual operations for VRB utilized 2016 as a base year. Created prior to the fluctuations in activity between 2016 and 2022, FDOT projected the Airport's activity to grow at an average rate of 1.3 percent each year. If applied to the level of activity for 2022, the FASP growth rate yields a forecast just under 175,500 annual operations by 2043 (see **Table 2.15**).

The projection of operations in the 2022 TAF utilize 2021 as the base level of activity with an average annual growth rate of 3.6 percent through 2043. When that growth is applied to the base year, it yields a forecast more than 283,000 annual operations by 2043 (see **Table 2.15**).

Utilization of the General Aviation Fleet

Each year as part of their Aerospace Forecast, the FAA provides historic data and projections on the number of hours flown by general aviation aircraft. As noted previously, in the 2022 Aerospace Forecast the FAA anticipates the general aviation fleet utilization to increase at an average annual rate of 1.1 percent between 2021 and 2042. Under the general assumption that there would be an equal distribution across the nation for general aviation operations, this rate was applied to generate an alternate forecast for the airport. When the overall utilization rate is applied to the base year operations for VRB, it results in a projection of more than 168,000 annual operations by the end of the planning period (see **Table 2.15**).

Market Share

A common methodology for forecasting aviation activity is the use of market share analysis. This approach allows a comparison to be made of the annual operations VRB has supported against a defined data set. In the 2022 Aerospace Forecast, the FAA documents the operations conducted at all of the nation's towered airports between 2010 and 2021 and projects those operations out to 2042. Their data includes a separate breakout for general aviation. **Figure 2.1** depicted the historic fluctuations in the nation's general aviation operations and despite the increase after 2020, shows that the counts for 2021 were only slightly higher than 2010. As noted, annual operations at VRB during the last 10 years have had similar year to year variations, and just like the nation, have not fully recovered to pre-COVID-19 pandemic levels.

Prior to the pandemic, the operations at VRB were contributing an increasing share of the overall general aviation activity by the nation's towered airports. Throughout this period, including the pandemic, the general aviation

activity for Florida's towered airports increased its share of the nation's towered airports (from 14.4 to 17.1 percent) as one of the leading states in post-COVID-19 recovery.

It is assumed VRB will re-establish an increasing share of the nation's general aviation activity during the 20-year planning period of this study. When the expected local market share is combined with the FAA's projected increase in general aviation activity, nearly 244,000 operations (see **Table 2.15**) would be supported at VRB by 2043.

Regression Analysis

A variety of regression models were evaluated using the different independent variables against the historic operations data. However, no significant correlations could be derived using different combinations of the independent variables used in both simple and multiple regression analyses. Essentially, none of the local socioeconomic or industry data available would generate a model that could reliably explain the historic activity. This is primarily attributed to the fact that the historic number of operations at VRB have increased and decreased every two years while most of the independent variables utilized had positive, linear growth during the same period. Additionally, it is assumed the local socioeconomic data has less of an influence on aircraft operations given the level of flight training at VRB, which brings students from outside the community. Therefore, this method was not included.

Recommended Forecast of Annual Operations

Each of the projections shown in **Table 2.15** were generated using commonly accepted methods. Therefore, selection of a preferred forecast largely depends on the potential of the Airport's users and the associated assumptions on future airport activity. In addition, the selection of a preferred forecast also needs to consider the airport improvements that have been made and that will be made in the future (unconstrained scenario). Finally, no future projection should be selected if it does not realistically account for past and future changes in the aviation industry.

TABLE 2.15: COMPARISON OF ANNUAL OPERATIONS PROJECTIONS

	2016 ALPU[a]	FASP[a]	2022 TAF Growth[a]	Utilization of National Fleet	Market Share Analysis
Base Year					
2022	133,802	133,802	133,802	133,802	133,802
Forecast					
2028	146,305	144,584	165,782	142,879	158,838
2033	157,612	154,229	198,198	150,913	183,245
2043	182,915	175,493	283,286	168,359	243,885
Average Annual Change (2022-2043)	**1.5%**	**1.3%**	**3.6%**	**1.1%**	**2.9%**

[a] Applies growth projection of previous study to current base year of operations.

Source: ESA Analysis, 2023.

Before the COVID-19 pandemic, general aviation operations at the nation's towered airports between 2010 and 2019 only increased an average of 0.3 percent each year. Activity for Florida's towered airports over the same

period had an average annual increase of 3.3 percent and for VRB the average annual growth was 5.3 percent. If 2020 and 2021 are taken into consideration, the national figures show an average increase of 0.2 percent each year and Florida with an average of 1.4 percent. Conversely, for VRB this period had an average annual decrease of 2.3 percent. This highlights the COVID-19 pandemic impacts to operations at VRB which resulted in the 25.3 percent loss from 2019 to 2020 and a 34.9 percent loss from 2020 to 2021 as shown previously in **Table 2.14**.

Despite this, the Airport has the ability to fully recover and is expected to do so within the first half of the 20-year forecast horizon. Between 2021 and 2022, annual operations at VRB increased 8.5 percent. Perhaps more noteworthy is during the first quarter of 2023, operations were up 57.7 percent over the same quarter in 2022. Given that the first quarter has not historically been the busiest for the Airport, if similar growth continues, it is reasonable to assume VRB will eclipse 200,000 annual operations within 5 years. This is supported by the fact that Paris Air and Skyborne Airline Academy have a high utilization rate for the approximate 50 some training aircraft operated by each. In 2019, the airport recorded its highest level of operations. A majority of the 253,339 operations conducted prior to the pandemic were attributed to the significant flight training that has always occurred at VRB.

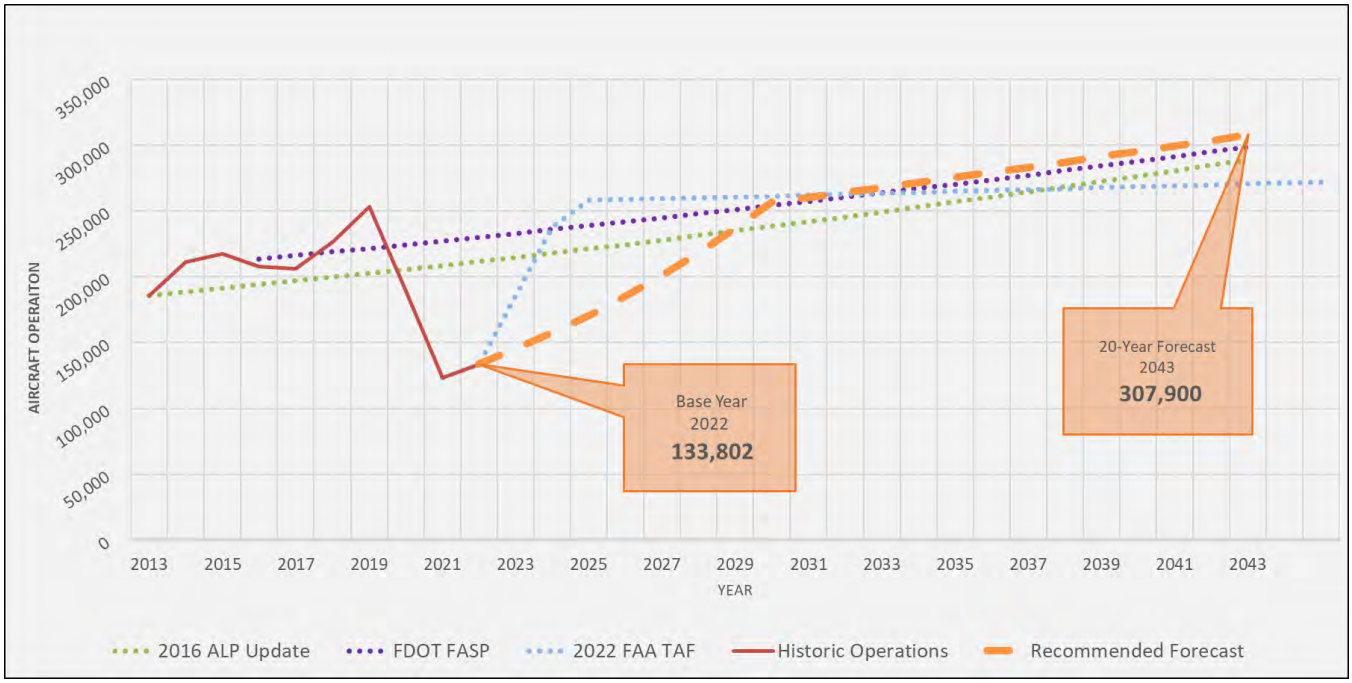
Given the above, different growth rates were applied to derive the recommended forecast of annual operations. Initially the recent 8.5 percent growth was applied each year through 2030. This results in a forecast where the Airport would more conservatively surpass 200,000 annual operations within five years and finally re-realize the highest level of activity recorded in 2019 within eight years. After 2030, it is believed the average annual growth will subside significantly, even under an unconstrained scenario. The average annual growth after 2030 is expected to be similar to the growth projected by the previous local and state projections which averaged 1.4 percent each year. **Table 2.16** reflects the recommended annual operations forecasts with the final values rounded to the nearest hundred. With the different short- and long-term growth rates applied, the recommended forecast has an overall average annual change of 4.0 percent

TABLE 2.16: FORECAST OF ANNUAL OPERATIONS

	Recommended Forecast
Base Year	
2022	133,802
Forecast	
2028	218,300
2033	267,900
2043	307,900
Average Annual Change (2022-2043)	4.0%

Source: ESA Analysis, 2023.

FIGURE 2.5: COMPARISON OF RECOMMENDED ANNUAL OPERATIONS FORECAST TO PREVIOUS PROJECTIONS



Source: Previous Forecasts and ESA Analysis.

2.6. Passenger Service Forecasts

Between 2017 and 2022, Elite Airways offered passenger service between VRB and Newark Liberty International Airport (EWR), Portland International Jetport (PWM), Westchester County Airport (HPN), and New Bedford Regional Airport (EWB). These flights were conducted primarily using Elite Airways' fleet of the 50 seat Bombardier CRJ-100 and 70 seat CRJ-700 series aircraft. Elite Airways discontinued service at the Airport in 2022.

On February 2, 2023, Breeze Airways initiated their inaugural service creating new regularly scheduled passenger service for the surrounding community. The following sections evaluate the airline's initial schedule along with established industry trends to estimate the potential passenger service that could occur during the 20-year planning horizon. This includes estimates of the annual passenger enplanements and the number of commercial service aircraft operations. Enplanements, or the number of passengers departing an airport, are the most common measure used by the FAA to gauge passenger activity.

The inaugural service by Breeze Airways includes flights from VRB to Bradley International Airport (BDL) and Westchester County Airport (HPN). These flights are operated as mainline service since they are conducted using the airline's 118 seat Embraer ERJ-195 and 126 seat Airbus 220-300 aircraft and do not feed any other carrier networks. For the purposes of forecasting future passenger service, the trends and outlook associated with both mainline and regional carriers were considered.

Passenger Service Operations

Typically for passenger service forecasts, annual enplanements are evaluated first. This helps to determine how an airport's airline(s) might react to meet the passenger demand expected. For VRB the historic enplanement data between 2017 and 2022 is sporadic, ending with 1,948 total passenger enplanements in 2022.

It is worth noting that prior to 2023, VRB was limited to 60 passengers per flight due to security requirements. This is no longer a constraint as the current security program allows for Breeze to operate their 118 and 126 seat aircraft at full capacity. Additionally, **Table 2.17** provides an overview of the passenger service options provided by the three commercial service airports which serve the Vero Beach and Indian River County communities. As noted before, Breeze is a low cost carrier providing non-stop flights to secondary airports in underserved areas. So while the other commercial service airports will continue to provide service to the communities, the niche market being served by Breeze certainly has potential for growth.

At the time these forecasts were prepared, only the initial seven month schedule from Breeze Airways was available; providing detail on the flights offered between February and the end of the fiscal year. In all a total of 208 departures are scheduled for 2023, which will generate 416 air carrier operations. The flights in the initial seven month schedule are evenly split between the two city pairs with the Embraer ERJ-195 serving the Westchester County Airport route and the Airbus 220-300 dedicated to the Bradley International Airport market. The schedule was pro-rated to estimate the number of flights for the airline's first full year of operation between October 2023 and September 2024 (to align with the other fiscal year data used in this study). This resulted in 356 departures or 712 air carrier operations for 2024 (see **Table 2.18**). Beyond 2024 it is difficult to estimate the level of commercial passenger service that can be sustained at VRB. Not only is there a lack of historic data; the flights and frequency offered by Breeze Airways are different from those provided in the past and unfortunately no projections were shared by the airline. Therefore, industry trends and predictions from the 2022 FAA Aerospace Forecast were utilized.

TABLE 2.17: OTHER NEIGHBORING PASSENGER SERVICE OPTIONS

Airport	Distance and Approximate Travel time from VRB	Number of Airlines	Destinations
Melbourne-Orlando International (MLB)	42 miles Approx. 55 minutes	6 airlines	Numerous Domestic and International Routes
Palm Beach International Airport (PBI)	82 miles Approx. 80 minutes	13 airlines	Numerous Domestic and International Routes
Orlando International Airport (MCO)	98 miles Approx. 90 minutes	38 airlines	Numerous Domestic and International Routes

Source: ESA Analysis, 2023.

Overall the FAA projects domestic passenger enplanements to continue to recover, with the expectation to reach pre-COVID-19 levels by the end of 2023. Beyond 2023 the Aerospace Forecast project domestic mainline enplanements to average 2.5 percent growth each year through 2042 (regionals are expected to increase 2.7 percent each year). As noted previously, the 2022 FAA Aerospace Forecast also documents and projects the operations conducted at the nation's towered airports. For towered airports, air carrier operations between 2023 and 2042 are also expected to increase 2.5 percent each year. Therefore, an average annual growth of 2.5 percent was applied to estimate the level of air carrier operations at VRB beyond 2024 (see **Table 2.18**).

TABLE 2.18: ESTIMATE OF AIR CARRIER OPERATIONS

	Air Carrier Operations
Base Year	
2022	56
Forecast	
2023[a]	416
2024[b]	712
2028	786
2033	889
2043	1,138
Average Annual Change (2024-2043)	2.5%

[a] Based on Breeze Airways' initial 7 month schedule.

[b] Expected operations for Breeze Airways' first full year.

Source: ESA Analysis, 2023.

Due to the evolving passenger service market at VRB under the new airline offerings, high- and low-growth scenarios were also created for the potential air carrier operations. The high-growth scenario is simply a doubling of the estimated 2.5 percent annual growth rate. There are many possibilities that could increase the level of commercial service activity. These include adding frequency to the existing market pairs, adding new destinations, or additional service by another airline. For the low-growth scenario, it was assumed that the demand for additional air carrier operations could be limited by the area's population. Therefore, the projected 1.2 percent average annual growth for Indian River County's population over the 20-year planning horizon was applied. **Table 2.19** includes the high- and low- growth scenarios, which along with the expected air carrier operations included previously **Table 2.18**, will be utilized to develop planning activity levels for certain facility requirements in the following chapter.

TABLE 2.19: HIGH- AND LOW-GROWTH SCENARIOS FOR AIR CARRIER OPERATIONS

	High-Growth Scenario	Low-Growth Scenario
Base Year		
2022	56	56
Forecast		
2028	865	747
2033	1,105	793
2043	1,799	893
Average Annual Change (2024-2043)	5.0%	1.2%

Source: ESA Analysis, 2023.

Passenger Enplanements

Enplanements are the number of passengers departing an airport; therefore, only half of the air carrier operations expected are utilized to estimate the level of passenger enplanements. The other key variables are the number of seats available on the aircraft providing the service and the anticipated aircraft load factor.

As with the air carrier operations, it is difficult to estimate the number of passenger enplanements given the lack of historic data and uncertainty of the current market, not to mention the variability in the types of aircraft and potential load factors that might occur. As such, a simplistic approach was taken with respect to the size of aircraft expected to serve the market. As noted previously, the initial schedule from Breeze Airways utilizes the 118 seat Embraer ERJ-195 on the Westchester County Airport route and the 126 seat Airbus 220-300 on the Bradley International Airport market. For the purposes of estimating the potential levels of passenger enplanements it was assumed these two aircraft and the even split between them would remain throughout the planning period. It should be noted that such an assumption could easily change at any point in the 20-year planning horizon.

For the average load factor, recent industry trends were applied. Prior to the COVID-19 pandemic, the average load factor for mainline and regional carriers combined reached a high of 85.2 percent in 2019. This average decreased below 69 percent in 2020 and was barely above 72 percent in 2021. The 2022 FAA Aerospace Forecast do not project the pre-COVID-19 level to be re-established for at least 15 years. After this period, the mainline recovery is higher at an average load factor 85.8 in the long-term while regional carriers are expected to

remain below 80 percent. In order to calculate the potential level of passenger enplanements for VRB, the more conservative 80 percent average load factor was applied across the board. Interestingly enough, an article in January 2023 documented that since its launch in May 2021, Breeze Airways has served 1.6 million passengers and after a slow start, currently has a systemwide load factor of 80 percent. **Table 2.20** provides the estimated level of passenger enplanements for 2023 and 2024.

TABLE 2.20: ESTIMATE OF INITIAL ANNUAL PASSENGER ENPLANEMENTS

Year	Aircraft	Annual Departures	Number of Seats	Average Load Factor	Annual Enplanements
2023	Embraer ERJ-195	104	118	80%	9,802
	Airbus 220-300	104	126	80%	10,466
				Total	**20,268**
2024	Embraer ERJ-195	178	118	80%	16,803
	Airbus 220-300	178	126	80%	17,942
				Total	**34,746**

Source: FAA 2022 Aerospace Forecast, and ESA Analysis, 2023.

Applying the same aircraft and load factor assumptions, **Table 2.21** provides the passenger enplanements calculated for the expected air carrier operations, as well as for the high- and low-growth scenarios. These figures have been rounded to the nearest hundred. Additionally, as with the operations, these projections will be utilized to develop planning activity levels for certain facility requirements in the following chapter.

TABLE 2.21: ANNUAL PASSENGER ENPLANEMENT PROJECTIONS

	Estimated Passenger Enplanements	High-Growth Scenario	Low-Growth Scenario
Base Year			
2022	1,948	1,948	1,948
Forecast			
2028	38,400	42,200	36,500
2033	43,400	53,900	38,700
2043	55,500	87,800	43,600

Source: ESA Analysis, 2023.

It should be noted that the passenger enplanements anticipated are only a starting point to facilitate the planning of facilities to accommodate forecasted demand. As the airline service at VRB matures and additional data becomes available, it will be necessary to revise the passenger enplanement projections along with the air carrier aircraft operations and the related requirements.

2.7. Categories of Aircraft Operations

The following sections present different categories or types of activity that will make up the forecasted operations. This includes a break out of the local, itinerant, and instrument operations, as well as estimating activity peaks and the operational aircraft fleet mix.

Local Versus Itinerant Operations

The FAA categorizes aircraft operations as either local or itinerant. Local operations are those arrivals or departures performed by aircraft that remain in the airport traffic pattern or are within sight of the ATCT. Local operations are most often associated with training activity and flight instruction. Itinerant operations are arrivals or departures other than local operations.

In 2013 the split between operations was 56 percent local and 44 percent itinerant. Between 2013 and 2019 when activity peaked, there was an increase in the number of itinerant operations which resulted in 46 percent local and 54 percent itinerant split. This trend continued through the COVID-19 pandemic to the 2022 split of 39 percent local and 61 percent itinerant. The continued shift towards more itinerant after 2019 was attributed to the decrease in flight training and an increased utilization of general aviation for personal and business travel.

Over the next five years it is anticipated that the local share of operations will return to pre-COVID-19 levels, generating around 45 percent of the operations. Despite this shift, the number of itinerant operations will still increase given the overall growth in activity expected for VRB. This split is expected to remain through the first half of the planning period. After, it is anticipated that the share of local operations will account for half of the activity by the end of the 20-year planning horizon (see **Table 2.22**), bringing the levels back to the 50/50 split averaged over the last 10 years.

TABLE 2.22: FORECAST OF LOCAL VERSUS ITINERANT OPERATIONS

	Local		Itinerant		Total
Base Year					
2022	52,340	39%	81,462	61%	133,802
Forecast					
2028	98,200	45%	120,100	55%	218,300
2033	120,600	45%	147,300	55%	267,900
2043	153,950	50%	153,950	50%	307,900

Source: FAA OPSNET Records and ESA Analysis, 2023.

Instrument Operations

A separate estimate of instrument operations conducted at VRB is important when evaluating future facility requirements. The OPSNET data includes the number of instrument flight rule (IFR) operations conducted. Over the past 10 years these instrument operations have averaged 15 percent of the total, with the highest level at nearly 23 percent in 2021. In fact, instrument activity has averaged 20 percent through the COVID-19 pandemic (2019 to 2022).

The more recent average of 20 percent has been utilized to the estimate the number of instrument operations expected in the future. While higher than the historic average, this is considered to better represent the current trends of additional business/corporate aviation as well as the fact that even the smallest general aviation aircraft have sophisticated instrument capability and conduct more IFR operations than in the past. The number of instrument operations expected are included in **Table 2.23**.

TABLE 2.23: ESTIMATE OF INSTRUMENT OPERATIONS

	Instrument Operations
Base Year	
2022	28,775
Forecast	
2028	43,700
2033	53,600
2043	61,600

Source: FAA OPSNET Records and ESA Analysis, 2023.

It should be noted that the estimate of instrument operations is different from the actual percentage of the year that the airport experiences IFR conditions. Unlike the weather observations, the count and subsequent estimate of instrument operations include those conducted during actual instrument meteorological conditions as well as the ones simply under an IFR flight plan.

Peak Activity Projections

Annual projections provide a good overview of the activity at an airport but may not reflect certain operational characteristics of the facility. In many cases, facility requirements are not driven by annual demand, but rather by capacity shortfalls and delays experienced during peak times. Therefore, estimates of the peak month, the average day in the peak month, and the peak hour demand for aircraft operations are needed.

Review of the monthly operational data for the last 10 years reveals that operations have peaked in different months. While many have occurred in March; May and August have both occurred more than once as a peak month. In 2020, January was the peak month since activity dropped significantly that year when the COVID-19 pandemic shut things down in mid-March. However, the following year March was again the peak month even though the overall level of operations were down. Regardless, the peak months during the last 10 years all had similar percentages with respect to the overall annual operations. On average the peak months generated 10.3 percent of the annual operations, which for planning purposes was rounded up to 11 percent and applied to each of the future forecast years.

For the average number of days in the peak month, 31 was applied since as expected, all of the historic peak months occurred in a month with 31 days. No historic data was available to determine the peak hour operations. The typical averages in the industry range between 10 and 15 percent of the peak month average day. Given the level of flight training at VRB and that multiple aircraft have been observed queued along the taxiways waiting to depart; the higher 15 percent was applied to estimate peak hour operations for VRB. With the exception of the peak hour, the resulting estimates in **Table 2.24** have been rounded to the nearest 10 for the forecast years.

TABLE 2.24: PEAKS IN TOTAL AIRCRAFT OPERATIONS

	Total Annual Operations	Peak Month	Average Day of Peak Month	Peak Hour of Average Day
Base Year				
2022	133,802	13,967	451	68
Forecast				
2028	218,300	24,010	770	116
2033	267,900	29,470	950	143
2043	307,900	33,870	1,090	164

Source: FAA OPSNET Records and ESA Analysis, 2023.

Operational Fleet Mix

Operational fleet mix is an important factor in determining the needs for airfield improvements. However, even at airports with an ATCT, it is difficult to estimate the type of aircraft conducting operations since this information is not typically recorded by the tower. Instead, the current operational fleet mix percentages were based on information contained in FlightAware operational data obtained for VRB. In 2022 the operational fleet mix comprised of 70.6 percent single-engine, 9.2 percent multi-engine, 18.8 percent jet, and 1.4 percent rotorcraft. The level of annual operations for each category are included in **Table 2.25**.

TABLE 2.25: PROJECTED OPERATIONAL FLEET MIX

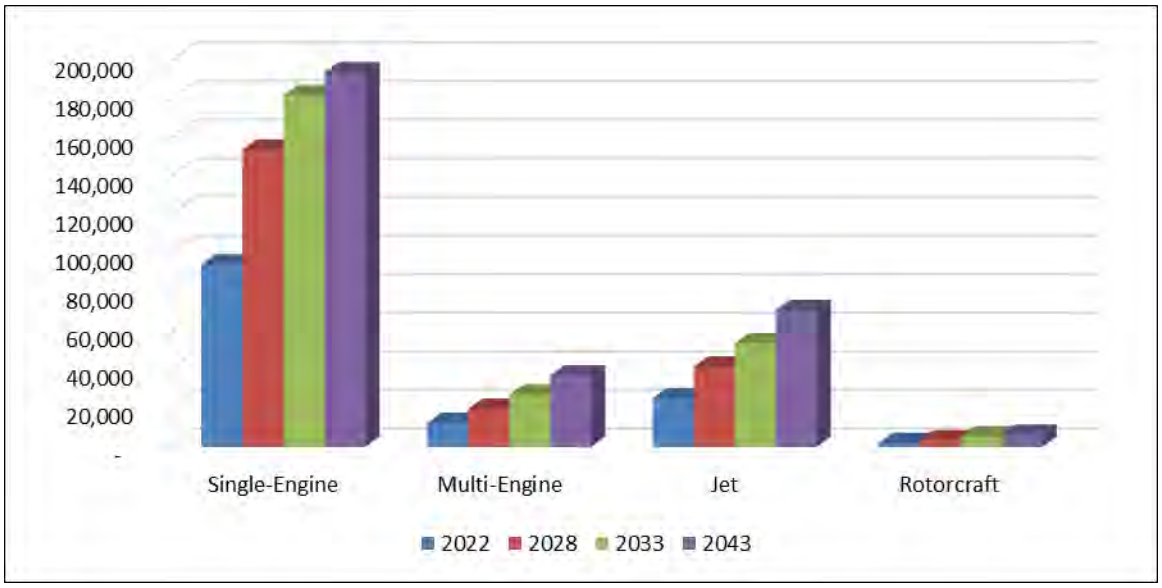
	Base Year	Forecast		
	2022	2028	2033	2043
Single-Engine	94,464	153,900	182,100	194,000
Multi-Engine (piston & turboprop)	12,310	19,600	26,800	36,900
Jet	25,155	41,500	53,600	70,800
Rotorcraft	1,873	3,300	5,400	6,200
Total	**133,802**	**218,300**	**267,900**	**307,900**

Source: 2022 FlightAware Data, FAA 2022 Aerospace Forecast, and ESA Analysis, 2023.

Information from the 2022 FAA Aerospace Forecast as well as that obtained during the inventory process and discussions with airport management was utilized to predict how the operational fleet mix would change during the next 20 years. The FAA anticipates growth and increased utilization for every aircraft category with the exception of the single-engine piston and multi-engine piston types. As described previously, the most significant growth and utilization is expected to occur in the jet and rotorcraft categories. Regardless, as shown previously in **Table 2.25**, activity by single- and multi-engine aircraft at VRB is expected to increase given the large number of these aircraft at the Airport and in Florida overall.

General aviation jet activity at VRB will continue to include nearly every type of business jet aircraft flying. In the light to medium-sized class (maximum allowable takeoff weight between 10,000 and 60,000 pounds) this includes the Embraer Phenom and Legacy, Beechcraft Hawker, Bombardier Learjet, Cessna Citation, and Dassault Falcon type jet aircraft. For the larger and heavier business jet fleet over 60,000 pounds, typical examples include the Bombardier Global, larger Dassault Falcon, and Gulfstream series aircraft.

FIGURE 2.6: PROJECTED OPERATIONAL FLEET MIX



Source: ESA Analysis, 2023.

2.8. Critical Aircraft

The airport planning criteria and design standards for various airfield elements are based on the critical design aircraft that make regular use of the airport. Regular use is defined as 500 annual operations, including both itinerant and local operations, but excluding touch and go operations. These aircraft classify airport facilities based on Approach Reference Codes (APRC), Departure Reference Codes (DPRC), Runway Design Codes (RDC), and Taxiway Design Groups defined in FAA Advisory Circular (AC) 150/5300-13B, Airport Design.

Runway Reference and Design Codes

Approach and departure codes identify the current operational capabilities for each runway with a parallel taxiway, where no special procedures are required for landing or takeoff operations. As such, runways can have more than one APRC or DPRC code for different aircraft groups and these codes may change as airfield improvements are made. In practice, the APRC defines the largest aircraft group (under a set visibility condition) that can land on a runway while an aircraft in the same group is operating simultaneously on the parallel taxiway. The DPRC defines the largest aircraft group that can depart a runway under any conditions and with any sized aircraft on the parallel taxiway. While the APRC and DPRC designations identify existing operational limitations for each runway, the RDC is utilized to plan future runway requirements.

TABLE 2.26: RUNWAY REFERENCE AND DESIGN CODE COMPONENTS

Aircraft Approach Categories		
Category	Approach Speed	
A	Less the 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	
Aircraft Approach Categories		
Group	Tail Height (feet)	Wingspan
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		
Runway Visual Range (feet)	Instrument Flight Visibility Category (statute mile)	
5000	Not lower than 1 mile	
4000	Lower than 1 mile but not lower than 3/4 mile	
2400	Lower than 3/4 mile but not lower than 1/2 mile	
1600	Lower than 1/2 mile but not lower than 1/4 mile	
1200	Lower than 1/4 mile	
VIS	Visual	

Source: FAA Advisory Circular 150/5300-13B, Airport Design.

For all three codes, the first component is the Aircraft Approach Category which is depicted by a letter and relates to the aircraft's landing approach speed (operational characteristic). The second component is the Airplane Design Group (ADG) which uses Roman numerals to identify the critical aircraft wingspan or tail height (physical characteristics). For APRC and RDC, a third component relates to the visibility minimums associated with the runway, or group of runways, expressed in the Runway Visual Range (RVR) values. For runways with only existing and future visual approaches, the third component should be "VIS" in lieu of visibility minimums. The ranges for these three components are reflected in **Table 2.26** on the previous page.

Runway 12R-30L

The 2016 Airport Layout Plan Update established the Bombardier Global Express 5000 (C-III) as the representative critical aircraft for Runway 12R-30L. This was based on a grouping of C-III aircraft having conducted approximately 580 annual operations in 2013. For 2022, a review of the FlightAware data for VRB documented that 338 annual operations of C-III and D-III aircraft combined were conducted. These consisted of 282 operations by general aviation jets and 56 by Elite Airways (see **Table 2.27**). Operations conducted by these aircraft were down from prior years given the significant drop in activity in 2020 and 2021, as well as the discontinuance of service by Elite Airways in 2022.

TABLE 2.27: OPERATIONS BY C-III AND D-III AIRCRAFT

	Total Jet Operations	General Aviation	Commercial Service	Total C-III and D-III	Percent of Total Jets
Base Year					
2022	25,155	282	56	338	1.3%
Forecast					
2023[a]	27,300	296	416	712	2.6%
2024[a]	29,700	311	712	1,023	3.4%
2028	41,500	379	786	1,165	2.8%
2033	53,600	485	889	1,375	2.6%
2043	70,800	794	1,138	1,932	2.7%

[a] Included to show impact Breeze Airways' inaugural service (7 months in 2023) and first full year (2024) will have on C/D-III operations.

Source: 2022 FlightAware Data, 2023 Breeze Airways schedule, and ESA Analysis, 2023.

Previous sections, have documented that overall operations at VRB are on a rebound and that the activity generated by general aviation jets will have the largest growth. To project the future general aviation C-III and D-III operations, the same growth in jet activity from the operational fleet mix projections was applied (see previous **Table 2.25**). In addition, the commercial service operations expected by Breeze Airways is also included in the estimate since the aircraft they are using (Embraer ERJ-195 and Airbus 220-300) are C-III aircraft. As shown, the C-III and D-III aircraft will exceed 500 annual operations in 2023.

While technically Runway 12R-30L did not meet the criteria to retain C-III as the critical aircraft in 2022; this was temporary. Even though 2022 is considered the base year, this study was largely conducted in 2023; therefore, it is fully expected, due to the current commercial service by Breeze Airways for the C-III and D-III aircraft to exceed 500 annual operations before the master plan is complete. For this reason, the current critical aircraft should remain C-III for Runway 12R-30L with the Airbus 220-300 becoming the representative aircraft. The Airbus 220-

300 has a wider wingspan, longer length, taller tail height, and heavier maximum allowable takeoff weight than the Bombardier Global Express 5000 or the Embraer ERJ-195.

For the future, the critical aircraft is expected to be D-III with the Gulfstream G650 selected as the representative aircraft. In 2022 there were 146 annual operations by D-III aircraft, most of which were conducted by Gulfstream G500 and G600 aircraft. The Gulfstream G650 characterizes the larger business jet aircraft being manufactured today and that will continue to increase activity at VRB as projected in the recommended forecast. In fact, some of the newest business jets currently being manufactured are physically larger than the Gulfstream G650 in both wingspan and tail height, but still within the D-III category. These include the newer Bombardier Global 7500/8000s and the Gulfstream 700/800 series.

Unless the current instrument minimums established to either end of Runway 12R-30L change (addressed in the facility requirements chapter and evaluated in the alternatives chapter), the existing and future RDC for Runway 12R-30L is C-III-4000 and D-III-4000, respectively. When combined with the existing visibility minimums and the minimum 400 foot centerline offset of parallel Taxiway C, the existing and future APRCs for the Runway 12R-30L are D-IV-4000 and D-V-4000. Similarly, the 400 foot offset of Taxiway C results in DPRCs of D-IV and D-V for the existing and future runway.

Runway 4-22

A crosswind runway is recommended by the FAA when the primary runway orientation cannot provide 95 percent wind coverage. The wind analysis in the previous chapter documented that during all-weather and visual flight rules conditions, a crosswind runway is needed for the 10.5 knot category (A-I and B-I aircraft). During IFR conditions a crosswind runway is needed for the 13 knot category (A-II and B-II aircraft). However, with an overall length of 4,974 feet, Runway 4-22 is capable of supporting a large portion of the general aviation fleet, including a majority of the upper mid-size business jets. In fact, jets with the runway design components of C-II and D-II utilized the crosswind runway on a regular basis. Based on the 2022 FlightAware data, this grouping of aircraft for VRB included the Bombardier Challenger 350, 601, and Lear 75 (C-II); Embraer Legacy 450 and 500 (C-II); Cessna Citation III, VI, and VII series (C-II); Gulfstream G150 and G200 (C-II); and Gulfstream IV and 450 (D-II) aircraft.

For both the existing and future conditions, the Gulfstream G450 (D-II) has been selected as the representative critical aircraft for Runway 4-22. Not only are aircraft with similar characteristics expected to continue to conduct more than 500 annual operations on the runway, the Gulfstream G450 is also representative of the type of upper mid-size business jets being manufactured in the foreseeable future. Finally, unless the current instrument minimums established to either end of Runway 14-32 change, the RDC for the runway is D-II-4000. When combined with the lowest visibility minimums on the runway (7/8 mile to Runway 4) and the minimum 350 foot offset of parallel Taxiway A, the APRC for the Runway 4-22 is B-III-4000 and D-II-4000, while the DPRC is B-III and D-II.

Runway 12L-30R

With an overall length of 3,504 feet, Runway 12L-30R can support many of the single-engine and light multi-engine general aviation fleet. For both the existing and future conditions, the Beechcraft King Air B200 (B-II) was selected as the representative critical aircraft. The King Air B200 is also known as the Super King Air 200 and the King Air 250. While a numerous King Air F90 and B200 models were documented in the 2022 FlightAware data for VRB, the King Air B200 was selected since its slightly longer overall length puts it in a higher Taxiway Design

Group (addressed in the following section). The King Air B200 and a number of other similar multi-engine aircraft operating at the Airport have a maximum certificated takeoff weight (MTOW) of 12,500 pounds or less. Within the FAA design standards, aircraft with this weight category are designated as Small Aircraft. Unless an instrument approach is established to the runway (addressed in the facility requirements chapter), the future RDC for Runway 12L-30R is B-II-VIS. When the visual approaches are combined with the 240 foot offset of parallel Taxiway F, the APRC for the Runway 12L-30R is B-II-4000 and the DPRC is B-II.

TABLE 2.28: EXISTING AND FUTURE RUNWAY CODES

Runway	Critical Aircraft	Approach Reference Code (APRC)	Departure Reference Code (DPRC)	Runway Design Code (RDC)
12R-30L (existing)	C-III Airbus 220-300	D-IV-4000 D-V-4000	D-IV D-V	C-III-4000
12R-30L (future)	D-III Gulfstream G650	D-IV-4000 D-V-4000	D-IV D-V	D-III-4000
4-22 (existing and future)	D-II Gulfstream G450	B-III-4000 D-II-4000	B-III D-II	D-II-4000
12L-30R (existing and future)	B-II Small Aircraft King Air B200	B-II-4000	B-II	B-II-VIS Small Aircraft

Source: 2022 FlightAware Data and FAA Advisory Circular 150/5300-13B, Airport Design.

Taxiway Design Group

Taxiway design standards utilize a Taxiway Design Group (TDG) which is based on the overall width of the aircraft's main gear as well as the distance between the main gear and the cockpit. The TDG is the primary design factor for taxiway or taxilane width, as well as the required turning radii and edge fillets. The minimum TDGs for both the existing and future runway critical aircraft are shown in **Table 2.29**.

TABLE 2.29: TAXIWAY DESIGN GROUPS

Runway	Existing	Future
12R-30L	3	3
4-22	2	2
12L-30R	2	2

Source: FAA Advisory Circular 150/5300-13B, Airport Design.

2.9. FAA Terminal Area Forecast Comparison

If an airport is included in the FAA TAF, any new forecasts must be reviewed and approved by the agency before they can be applied to further master plan analyses. During this review, the FAA evaluates if the recommended forecasts for based aircraft, aircraft operations, or passenger enplanements differ from the TAF by more than 10 percent in the 5-year and/or 15 percent in the 10-year planning periods.

Regarding the review, the FAA Airport Planning and Programming division published a guidance paper entitled, *Review and Approval of Aviation Forecasts*. This guidance states: "If the forecast is not consistent with the TAF, differences must be resolved if the forecast is to be used in FAA decision-making. This may involve revisions to the airport sponsor's submitted forecasts, adjustments to the TAF, or both. FAA decision-making includes key environmental issues (e.g. purpose and need, air quality, noise, land use), noise compatibility planning (14 CFR Part 150), approval of development on an airport layout plan, and initial financial decisions including issuance of LOI's (*letters of intent*) and calculation of BCA's (*benefit-cost analysis*)."

Table 2.30 compares the recommended forecasts with those in the 2022 TAF. As shown, the recommended based aircraft forecasts are within the FAA's review criteria for consistency with the TAF. However, the recommended annual operations forecast is 16 percent below the 2022 TAF in the 5-year horizon, but is within the criteria for the 10-year horizon. The discrepancy for the activity expected by 2028 is that the TAF includes nearly 39 percent growth in annual operations between 2022 and 2023, followed by 28 percent growth between 2023 and 2024. This alone results in the TAF projecting more activity in 2024 than the recommended 5-year forecast of this study for 2028. With respect to passenger enplanements, it comes as no surprise that the recommended forecast is not at all consistent with the TAF. The 2022 TAF was issued just a few days after Breeze Airways conducted their February 2, 2023 inaugural flight into VRB. In this latest TAF for VRB, the total passenger enplanements are flatlined at 1,107 each year between 2022 and 2050.

TABLE 2.30: COMPARISON OF FORECAST TO 2022 FAA TAF

	Recommended Forecast	2022 FAA TAF	Difference
Based Aircraft			
Base Year (2022)	207	208	-0.5%
5 year (2028)	237	243	-2.4%
10 year (2033)	266	273	-2.6%
Annual Operations			
Base Year (2022)	133,802	133,802	0.0%
5 year (2028)	218,300	260,097	-16.1%
10 year (2033)	267,900	263,504	1.7%
Passenger Enplanements			
Base Year (2022)	1,948	1,107	76%
5 year (2028)	38,400	1,107	3,369%
10 year (2033)	43,400	1,107	3,821%

Source: 2022 FAA Terminal Area Forecast (issued February 2023).

2.10. Aviation Activity Forecast Summary

Table 2.31 presents an overview of the recommended forecasts. The data and methods used to forecast aviation demand for the airport are consistent with those used by the FAA, FDOT, and other airports around the nation. These forecasts are considered to reasonably reflect the activity anticipated at VRB through 2043 given the information available during this study.

TABLE 2.31: SUMMARY OF AVIATION ACTIVITY FORECASTS

	Base Year	Forecast		
	2022	2028	2033	2043
Based Aircraft				
Single-Engine	151	167	183	227
Multi-Engine (piston & turboprop)	36	42	45	53
Jet	16	23	31	42
Rotorcraft	4	5	7	12
Total	**207**	**237**	**266**	**334**
Annual Operations				
Local	52,340	98,200	120,600	153,950
Itinerant	81,462	120,100	147,300	153,950
Total	**133,802**	**218,300**	**267,900**	**307,900**
Air Carrier Operations	56	786	889	1,138
Instrument Operations	28,755	43,700	53,600	61,600
Peaks in Aircraft Operations				
Peak Month	13,967	24,010	29,470	33,870
Average Day Peak Month	451	770	950	1,090
Peak Hour of Average Day	68	116	143	164
Operational Fleet Mix				
Single-Engine	94,464	153,900	182,100	194,000
Multi-Engine (piston & turboprop)	12,310	19,600	26,800	36,900
Jet	25,155	41,500	53,600	70,800
Rotorcraft	1,873	3,300	5,400	6,200
Passenger Enplanements				
Total	1,948	38,400	43,400	55,500

Source: ESA, 2023.