Contents

Contents *iii*
Tables *vi*
Illustrations *vii*

B. **Forecasts of Aviation Activity:**

Introduction B.1
Conditions and Assumptions B.1
Historical and Existing Airport Activity B.4
Aviation Activity Forecasts B.7
General Aviation Based Aircraft Forecasts B.12
Critical Aircraft and Forecasts of Operations by Runway Design Code B.15
Summary B.18

DRAFT

Tables

Table B1	**B-737 OPERATIONS AT RENTON MUNICIPAL AIRPORT**	B.3
Table B2	**HISTORICAL AVIAITON ACTIVITY, 1995-2014**	B.5
Table B3	**EXISTING OPERATIONS BY AIRCRAFT TYPE**	B.6
Table B4	**BASED AIRCRAFT AT RENTON MUNICPAL AIRPORT, 2014**	B.7
Table B5	**GENERAL AVIATION AIRCRAFT OPERATIONS PROJECTIONS, 2014-2034**	B.8
Table B6	**SUMMARY OF OPERATIONS FORECAST BY AIRCRAFT TYPE, 2014-2034**	B.10
Table B7	**SUMMARY OF LOCAL AND ITINERANT OPERATIONS FORECAST, 2014-2034**	B.11
Table B8	**PEAK PERIOD AIRCRAFT OPERATIONS FORECAST, 2014-2034**	B.11
Table B9	**GENERAL AVIATION BASED AIRCRAFT FORECAST, 2014-2034**	B.13
Table B10	**GENERAL AVIATION BASED AIRCRAFT BY TYPE, 2014-2034**	B.14
Table B11	**AIRCRAFT APPROACH CATEGORY (AAC)**	B.15
Table B12	**AIRPLANE DESIGN GROUP (ADG)**	B.15
Table B13	**SUMMARY OF OPERATIONS FORECAST BY RDC, 2014-2034**	B.16
Table B14	**SUMMARY OF AVIATION ACTIVITY FORECASTS, 2014-2034**	B.18
Table B15	**COMPARISON OF FORECASTS AND TAF FORECASTS, 2014-2029 (FAA FORMAT)**	B.19

DRAFT

Illustrations

Figure B1	**HISTORICAL TOTAL AIRPORT OPERATIONS, 1995-2014**	B.6
Figure B2	**GENERAL AVIATION AIRCRAFT OPERATIONS PROJECTIONS, 2014-2034**	B.9
Figure B3	**RECOMMEDNED GENERAL AVIATION OPERATIONS FORECAST COMPARED WITH ADJUSTED TAF LIMITS, 2014-2034**	B.9
Figure B4	**GENERAL AVIATION BASED AIRCRAFT FORECAST, 2014-2034**	B.13
Figure B5	**RECOMMENDED GENERAL AVIATION BASED AIRCRAFT FORECAST COMPARED WITH ADJUSTED TAF LIMITS, 2014-2034**	B.13
Figure B6	**REPRESENTATIVE AIRCRAFT BY RUNWAY DESIGN CODE (RDC)**	B.17

DRAFT

CHAPTER B

Forecasts of Aviation Activity:

Introduction.

Forecasting is a key element in the master planning process. The forecasts are essential for analyzing existing airport facilities and identifying further needs and requirements of the facilities. Forecasting, by its very nature, is not exact, but it does establish some general parameters for development and provides a defined rational for various development activities as demand increases. The amount and kind of aviation activity occurring at an airport are dependent upon many factors, but are usually reflective of the services available to aircraft operators, the meteorological conditions under which the airport operates (daily and seasonally), the businesses located on the airport or within the community the airport serves, and the general economic conditions prevalent within the surrounding area.

Aviation activity forecasting generally commences by utilizing the present time as an initial point, supplemented with historical trends obtained from previous years' activity and recorded information. This data has evolved from a comprehensive examination of historical airport records provided by Airport Management, previous planning documents, and the following published reports: *Washington Aviation System Plan, 2009*, *Washington State Long-term Air Transportation Study (LATS)*, Puget Sound Regional Council's *Preparing Busy Airports for NextGen Technologies*, FAA Form 5010-1 data, FAA *Terminal Area Forecasts,* FAA *Traffic Flow Management System Counts (TFMSC)*, FAA's *The Operations Network (OPSNET)* which is the FAA source that reports ATCT data, and FAA *Aerospace Forecasts Fiscal Years 2014-2034*. Most of these documents were assembled in different years, making the base year data variable, and emphasizing the need for establishing a well-defined and well-documented set of base information from which to project future aviation activity.

Conditions and Assumptions

Prior to an examination of current and future activity levels at the Airport, there are several conditions and assumptions that should be noted, which form a basis or foundation for the development of the forecasts contained herein. These statements cover a wide variety of physical, operational, and socioeconomic considerations and, although not necessarily in order of importance or priority, include:

Regional General Aviation Trends and Projections. Aviation serves a critical role in the state of Washington's overall transportation system. According to the FAA's current Terminal Area Forecast (TAF) for the State, aircraft operations are projected to increase at an average annual growth rate of 1.08 percent to a total of 1,456,184 operations by 2034.

The Washington State Long-term Air Transportation Study estimated that within the 20-year planning period, both Seattle-Tacoma International Airport (SEA) and Boeing Field (BFI) would exceed 100 percent of their operating capacity. The study also stated that Renton Municipal Airport could potentially absorb some of that general aviation demand. In fact, this is Renton's role in the local and state airport system and why is has been designated as a Reliever airport by the FAA. Renton Municipal Airport could potentially see an increase in general aviation related operations over the next 20 years as it continues to fulfill this role. The

DRAFT

type of general aviation activity that could potentially be absorbed at Renton is likely dependent on the facilities and services available to aircraft operators. There are also some limiting factors to absorbing this demand which will be discussed in later sections of this chapter. The same report also concluded hangar demand at Renton Municipal Airport would exceed the Airport's hangar storage capacity by approximately 150 percent by 2030 (the Airport is currently at 100 percent hangar storage capacity with an estimated 157 aircraft stored in hangars).

National General Aviation Trends and Projections. The long term national outlook for general aviation is considered favorable, particularly for the turbojet sector. The growth in business aviation demand over the long term continues, driven by a growing U.S. and world economy, especially in the turbojet (Cessna Citation type), turboprop (Beechcraft King Air type), and turbine rotorcraft (Bell 206 helicopter type) markets. General aviation operations at combined FAA and contract towers decreased by 1.2 percent in 2013, led by a 2.8 percent decline in itinerant operations, despite a 0.7 percent increase in local operations. General aviation activity at consolidated traffic facilities fell 2.8 percent, while the number of general aviation aircraft handled at FAA en-route centers declined by 0.5 percent.

General aviation activity at towered airports is projected to increase an average of 0.5 percent a year, to 28.7 million operations by 2034. The number of active general aviation pilots is projected to be 484,425 by 2034, an increase of over 35,000 (up 0.4 percent yearly) over the 20-year planning period. The number of student pilots is forecast to decrease at an average annual rate of 0.2 percent over the planning period, declining from 120,285 in 2013 to 116,050 in 2034 (*FAA Aerospace Forecasts Fiscal Year 2014-2034).*

Based on figures released by the General Aviation Manufactures Association (GAMA), U.S. manufacturers of general aviation aircraft manufactures delivered 1,615 aircraft in 2013, 6.4 percent more than 2012. Overall piston deliveries increased by 6.5 percent, with single-engine deliveries up 4.5 percent and the much smaller multi-engine category up 27.0 percent. In the turbine categories, turbojet delivers fell by 3.7 percent. Turboprop deliveries were up by 13.8 percent in 2013, even though a substantial portion of the deliveries were for the export market.

The total number of general aviation hours flown is projected to increase by 1.4 percent yearly over the 20-year planning period. The FAA projects faster growth in hours will occur after 2023 with increases in the fixed wing turbine aircraft fleet, as well as increasing utilization of both single and multi-engine piston as the aging of this fleet starts to slow down. Hours flown by turbine aircraft (including rotorcraft) are forecast to increase 3.2 percent yearly over the 20-year planning period, compared with a decline of 0.4 percent for piston-powered aircraft. Jet aircraft are forecast to account for most of the increase, with hours flown increasing at an average annual rate of 4.2 percent over the planning period (*FAA Aerospace Forecasts Fiscal Year 2014-2034).*

The Boeing Company. According to published reports, the Boeing Company plans to increase production on the B-737 program to 52 aircraft per month, or 624 aircraft per year by the end of 2018. Boeing currently produces 42 aircraft per month, or 504 aircraft per year, and plans to produce 47 aircraft per month, or 564 per year, by the end of 2017. (October 2, 2014 Boeing Press Release).

In July 2014, Boeing published *Current Market Outlook 2014,* which stated the fastest growing and most dynamic market segment was single-aisle jet, such as the 737, and the "heart of the market" was the Boeing 737-800. The report went on to say that between 2014, and 2033, Boeing plans to deliver 25,680 single-aisle

DRAFT

airplanes, estimated at a value of $2.5 Trillion. The following table, entitled *B-737 OPERATIONS AT RENTON MUNICIPAL AIRPORT*, depicts historical 737 operations from 2009 through 2014.

Table B1 **B-737 OPERATIONS AT RENTON MUNICIPAL AIRPORT**

Year	Airport Operations[1]	B-737-700s[2]	B-737-800s[2]	B-737-900s[2]	Total B-737s[2]	Average Per Month
2009	83,278	62	315	30	407	34
2010	80,584	45	425	21	491	41
2011	80,005	76	415	28	519	43
2012	93,007	15	365	39	419	35
2013	93,835	21	383	54	458	38
2014	98,816	13	403	69	485	40

SOURCE: [1] ATCT Records, FY2014
[2] FAA TFSMC

Community Support. The Renton Municipal Airport benefits from having the support of the local community. In 2001 the city of Renton established the Renton Airport Advisory Committee (RAAC). The RAAC convenes on a quarterly basis with the intent of facilitating communication and collaboration between the Renton Municipal Airport neighbors, users, and other stakeholders. The voluntary noise abatement procedures in place at Renton Municipal Airport are an example of a direct result of this commutative, collaborative process.

The Airport is recognized as a vital city asset, which contributes to the stability and future of the area's economy. The city of Renton has had a proud partnership with the Boeing Company for more than 70 years. Boeing's Renton B-737 sales account for nearly $7 billion (2.7 percent) of Washington's Gross State Product, 10.7 percent of the State's exports abroad and over 45,000 direct and indirect jobs. According to the Renton City Council, "Renton's highest economic development priority is to make every effort at the local, regional, state and federal levels to ensure the current B-737 NG production ramp-up and the production of the B-737 MAX re-engined airplane are successful" (*City of Renton 2012 State Legislative Agenda*).

Regional Socioeconomic Conditions. The existing socioeconomic condition of a particular region has historically impacted aviation activity within that area. The three primary socioeconomic indicators, which are typically analyzed in the forecast of aviation activity are population, income, and employment statistics.

According to the U.S. Census, between 1990 and 2013 the population of the city of Renton grew at an average annual rate of 3.67 percent per year. In 2013, it was estimated that the city of Renton population was 95,600. Over the same time period King County grew at an average annual rate of 1.25 percent per year. In 2013, it was estimated that the King County population was 2,007,779 (U.S. Census, American Community Survey). By 2035, King County is expected to have a population of 2,350,576, an average annual growth rate of 0.68 percent per year (Washington State, Office of Financial Management, 2012).

Median household income for the City of Renton has been rising at an annual rate of 0.3 percent from 1990 to 2013, and at an average annual rate of 1.33 percent between 2010 and 2013. The median household income for the City of Renton in 2013 was $62,154. In comparison the median household income for King

DRAFT

County was $70,988 in 2013, with an average annual growth rate of 2.97 percent between 1990 and 2013 (*U.S. Census, American Community Survey*).

Between 1990 and 2013, employment within the City of Renton decreased at an average annual rate of 2.0 percent, while King County's employment increased at an average annual rate of 2.6 percent between 2010 and 2013. The unemployment rate for the City of Renton was 7.2 percent in 2013, and 7.3 percent in King County (*U.S. Census, American Community Survey*).

Additional Growth Indicators. According to the *2013 Demographic Summary Profile, City of Renton*, the median home value will increase from $283,102 in 2012 to $310,850 by 2017, an almost nine percent increase. The *City of Renton Economic Forecast 2012-2016*, projects total taxable sales for the City of Renton to increase at an average rate per year of six percent from $22.2 million in 2013 to $26.3 million by 2016. The report also projects an increase in employment in the City of Renton from a total of 48,144 people in 2013, to 49,865 people in 2016.

Weather Conditions. Existing weather data (i.e., visibility, ceiling, and wind conditions) for Renton Municipal Airport were available for analysis from the National Oceanic and Atmospheric Administration (NOAA). While weather conditions are usually good in the region, there are times when weather limits use of the Airport. Visual Flight Rules (VFR) meteorological conditions are experienced approximately 90 percent of the time annually, Instrument Flight Rules (IFR) approximately 8 percent of the time, and weather below existing instrument approach minimums approximately 2 percent of the time.

Runway Length. The existing length of Runway 16/34 of 5,382 total feet occasionally limits the useful load of the aircraft operating at Renton Municipal Airport, particularly during hot summer months. This relatively short runway length could deter or restrict use of the Airport by higher performance turboprop and turbojet aircraft. This limiting factor will be further analyzed in the runway length analysis section in the following chapter.

Historical and Existing Airport Activity

Based on a review of historical airport operations data from the FAA's OPSNET database (reported Airport Traffic Control Tower data), 1995 was the peak year for operations with over 145,000 operations, while 2011 was the fewest amount of operations with just over 80,000 total takeoffs and landings. Airport operations in 2014 were below the high mark of over 20 years ago, but operations have been trending upward over the last five years. In the last five years, from 2010 through 2014, local operations have averaged 56.4 percent of total operations, while itinerant operations have averaged 43.6 percent of total operations. The review of historical operations also indicates that peaks and valleys over the past 20 years have correlated with national and local economic conditions. For instance, there were decreases in operations at Renton Municipal Airport following the market bubble in 2000 and the 2001 terrorist attacks and another decrease in operations following the 2008 recession. However, since 2010, operations at the Airport have increased at an average annual growth rate of 3.62 percent.

A tabulation of Renton Municipal Airport's historical aviation activity since 1995 is presented in the following table entitled *HISTORICAL AVIATION ACTIVITY, 1995-2014*, and figure entitled *HISTORICAL TOTAL AIRPORT OPERATIONS, 1995-2014*. This table presents a summary of historic aviation activity at the Airport.

DRAFT

Table B2 **HISTORICAL AVIATION ACTIVITY, 1995-2014**

Year[1]	Itinerant[1]					Local[1]			Total
	Air Carrier	Air Taxi	General Aviation	Military[2]	Subtotal	General Aviation	Military[2]	Subtotal	
1995	168	2,638	57,313	86	60,205	85,033	60	85,093	**145,298**
1996	87	875	43,962	55	44,979	69,643	12	69,655	**114,634**
1997	154	1,102	34,808	35	36,099	61,179	22	61,201	**97,300**
1998	299	967	37,392	91	38,749	62,810	16	62,826	**101,575**
1999	378	672	39,358	143	40,551	65,952	6	65,958	**106,509**
2000	363	683	49,037	105	50,188	81,054	32	81,086	**131,274**
2001	406	2,375	41,353	261	44,395	65,810	16	65,826	**110,221**
2002	438	1,268	41,681	74	43,461	69,779	20	69,799	**113,260**
2003	189	638	37,138	38	38,003	58,332	2	58,334	**96,337**
2004	203	939	35,669	40	36,851	50,375	0	50,375	**87,226**
2005	239	1,028	32,833	36	34,136	46,603	4	46,607	**80,743**
2006	337	1,269	34,053	58	35,717	47,046	0	47,046	**82,763**
2007	335	1,290	40,192	451	42,268	52,320	2	52,322	**94,590**
2008	346	1,093	39,468	12	40,889	60,039	6	60,045	**100,934**
2009	343	727	36,188	5	37,263	45,861	154	46,015	**83,278**
2010	400	1,337	34,457	130	36,446	43,833	427	44,260	**80,584**
2011	430	780	33,160	76	34,446	45,353	206	45,559	**80,005**
2012	394	929	39,350	128	40,810	51,970	236	52,206	**93,007**
2013	438	973	38,133	103	39,647	53,854	334	54,188	**93,835**
2014	482	1,034	41,126	129	42,771	55,915	130	56,045	**98,816**

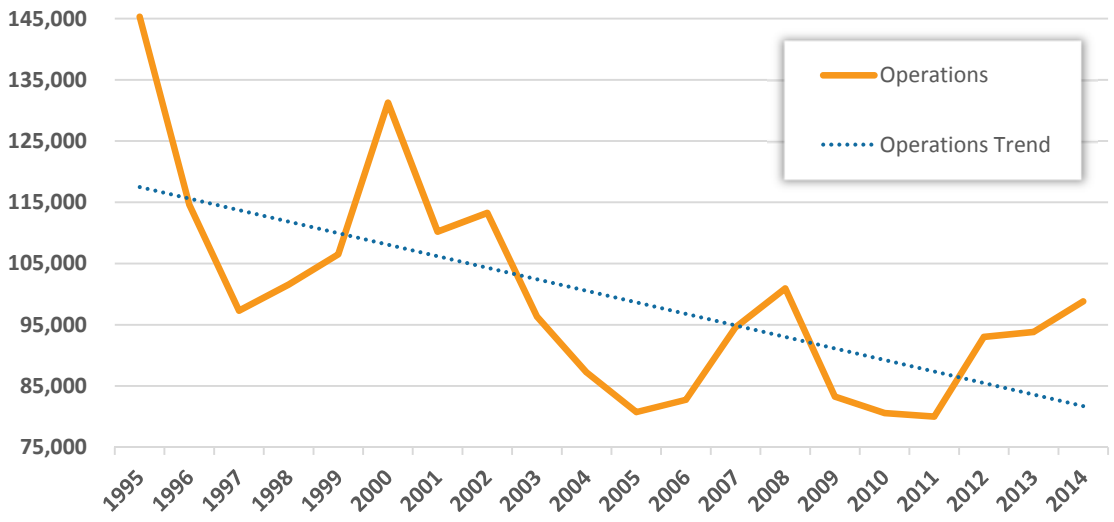
SOURCE: **ATCT Records, FY2014**

[1] **A local operation is defined as any operations performed by an aircraft operating in the local traffic pattern or within sight of the tower, or known to be departing or arriving from flight operations in the local practice area, or aircraft executing practice instrument approaches at the Airport. An itinerant operation is any other operation not defined as local.**

[2] **Military operations are infrequent at Renton Municipal Airport and primarily consist of military helicopter related operations. Itinerant military operations are those that occasionally perform full stops and often buy fuel at the Airport, while local military operations are primarily operations training operations (practice instrument approaches, touch and goes, and general pattern work).**

DRAFT

Figure B1 **HISTORICAL TOTAL AIRPORT OPERATIONS, 1995-2014**



Existing Operations by Aircraft Type. The following table, entitled *EXISTING OPERATIONS BY AIRCRAFT TYPE*, indicates the percentage of operations for each aircraft type as estimated by Airport Management and the Air Traffic Control Tower (ATCT).

Table B3 **EXISTING OPERATIONS BY AIRCRAFT TYPE**

Aircraft Type	Operations	Percentage
Boeing 737s	*485*[2]	*0.49%*
700	13	2.7%
800	396	81.7%
900	69	14.2%
P-8 Poseidon	7	1.4%
General Aviation	*98,072*[2]	*99.25%*
Single Engine Piston	88,755[1]	90.5%
Multi-Engine Piston	1,471[1]	1.5%
Turboprop	2,452[1]	2.5%
Business Jet	3,923[1]	4.0%
Helicopter	1,471[1]	1.5%
Military	*259*[2]	*0.26%*
Total	*98,816*[2]	*100%*

SOURCE: [1] Airport Management/ATCT estimates
[2] ATCT Records, FY2014

DRAFT

Existing Based Aircraft. There are currently 274 based aircraft at Renton Municipal Airport according to the National Based Aircraft Inventory Program, and Airport Management. The breakdown of based aircraft by type was estimated by Airport Management and is presented in the following table entitled *BASED AIRCRAFT AT RENTON MUNICIPAL AIRPORT, 2014.*

Table B4 **BASED AIRCRAFT AT RENTON MUNICIPAL AIRPORT, 2014**

Year	Total	Single Engine Piston (SEP)	Multi Engine Piston (MEP)	Turboprop (TP)	Jet	Helicopter
2014	274[1]	243[2]	8[2]	8[2]	5[2]	10[2]

SOURCE: [1] National Based Aircraft Inventory Program
[2] Airport Management

Aviation Activity Forecasts

Projections of aviation demand at Renton Municipal Airport for the next 20-year planning period are presented here using various methodologies. The results of these different methodologies are compared and a recommendation is made for each projection

The following assumptions were made in developing the unconstrained projections of aviation demand at Renton Municipal Airport:

- **The national and local economies will continue to grow through the overall forecast period.**
- **Economic disturbances may cause year-to-year traffic variations, but the long term projections will likely be realized.**
- **Aviation activity at Renton Municipal Airport will generally reflect national industry trends. The FAA projects growth in all aspects of aviation throughout the 20-year planning period.**
- **The Boeing Company will continue to use Renton Municipal Airport for first flight operations of all 737 platforms.**

General Aviation Aircraft Operations Forecast. Different factors impact the number of general aviation operations at an airport including but not limited to, the total based aircraft, area demographics, activity and policies of neighboring airports, and national trends. These factors were examined and a number of forecast scenarios were developed. The forecast scenarios assume, for the most part, straight-line growth. While it is recognized that straight-line (consistent) growth never occurs year after year for many years, these average annual growth scenarios illustrate a range in which actual operations are likely to occur through the 20-year planning period.

The following scenarios were considered in the development of the general aviation operations forecast:

- **<u>Historical Trend</u>. The historical general aviation operations growth rate at the Airport from 2010 through 2014 is an average annual growth rate of approximately 3.62 percent. Applying this growth rate to the base year operations level results in just under 200,000 annual operations by the end of the 20-year planning period.**

DRAFT

- **Scenario 1. This scenario applied the FAA Aerospace Forecasts Fiscal Years 2014-2034 average annual growth rate of 1.4 percent for the increase in general aviation hours flown.**
- **Scenario 2. This scenario applied an average annual growth rate of 1.23 percent as forecasted in the FAA TAF for the growth of general aviation operations in the State of Washington throughout the 20-year planning period.**
- **Scenario 3. The Washington State Office of Financial Management has forecasted the population of King County, Washington to grow at an average annual growth rate of 0.68 percent.**
- **Scenario Average: The average of the three scenarios results in a 1.10 percent average annual growth rate.**

A comparison of these scenarios is presented in the following table and figure entitled *GENERAL AVIATION AIRCRAFT OPERATIONS PROJECTIONS, 2014-2024.* For the purposes of this Airport Master Plan, the Scenario Average is the recommended forecast as it reflects a positive growth rate and increased activity levels through the 20-year planning period, but also recognizes that the pace of growth for the past five years is likely not sustainable.

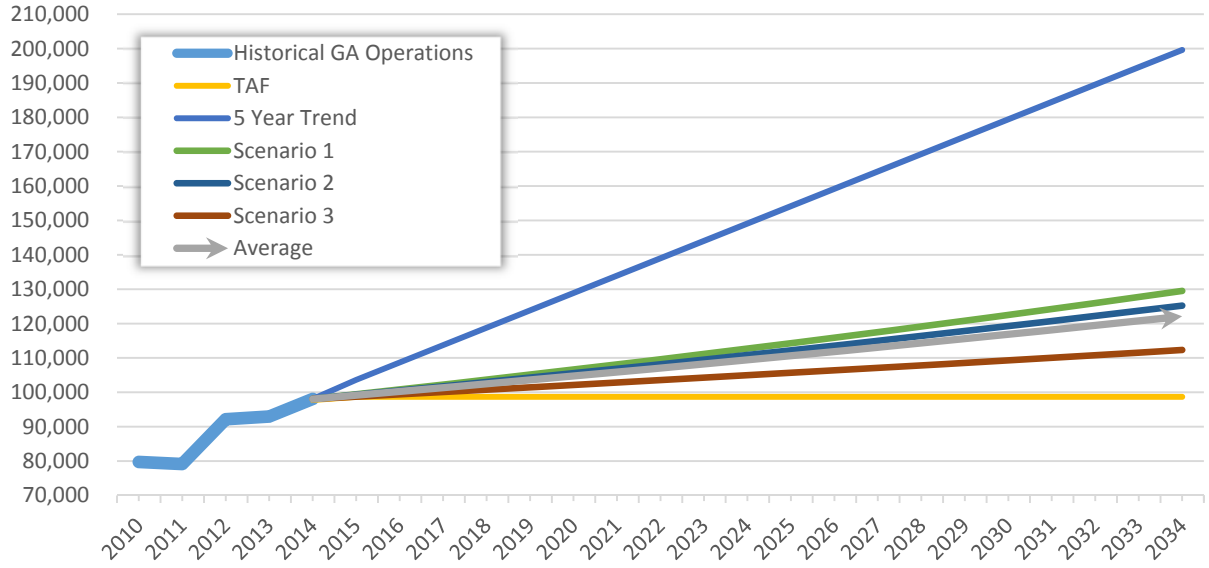
Table B5 **GENERAL AVIATION AIRCRAFT OPERATIONS PROJECTIONS, 2014-2024**

Year	TAF	Historical Trend[1]	Scenario 1	Scenario 2	Scenario 3	Average
2014	97,746	98,072[2]	98,072[2]	98,072[2]	98,072[2]	98,072[2]
2019	98,677	123,840	105,132	104,254	101,452	103,603
2024	98,682	149,097	112,700	110,825	104,949	109,446
2029	98,687	174,353	120,813	117,810	108,566	115,618
2034	98,692	199,610	129,510	125,236	112,308	122,139
AAG	*0.05%*	*3.62%*	*1.4%*	*1.23%*	*0.68%*	*1.10%*

SOURCE: [1] **FY2010 through FY2014, five-year historical trend**
[2] **ATCT Records, FY2014, Total operations minus military and Boeing 737 operations**

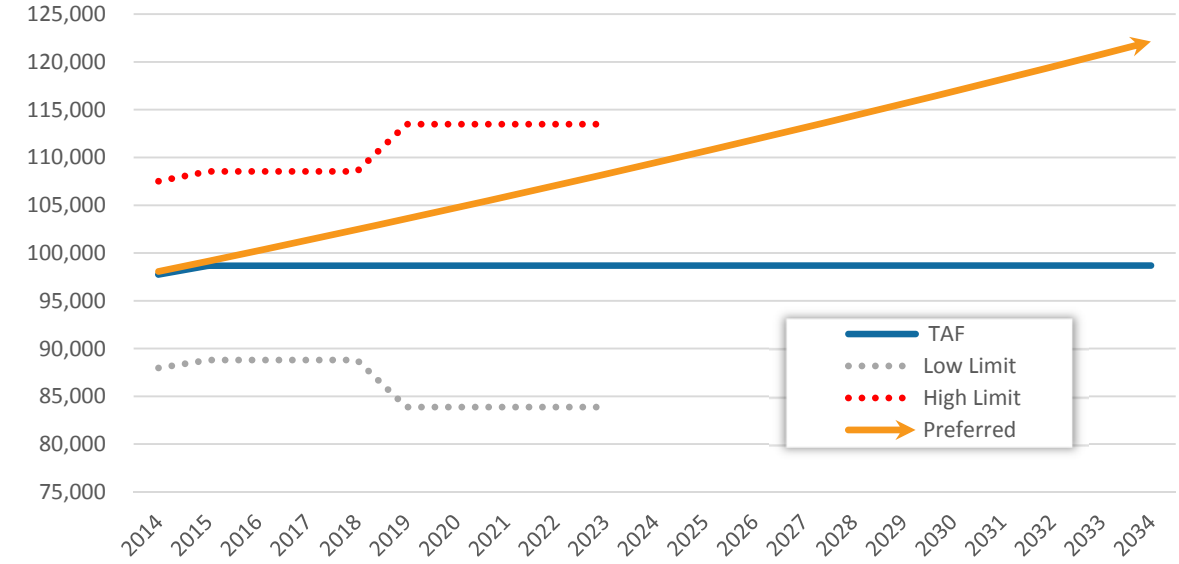
DRAFT

Figure B2 **GENERAL AVIATION AIRCRAFT OPERATIONS PROJECTIONS, 2014-2034**



The comparison of the recommended forecast for general aviation operation with the adjusted TAF limits is presented in the following figure entitled *RECOMMENDED GENERAL AVIATION OPERATIONS FORECAST COMPARED WITH TAF LIMITS, 2014-2034*.

Figure B3
RECOMMENDED GENERAL AVIATION OPERATIONS FORECAST COMPARED WITH TAF LIMITS, 2014-2034



Military Aircraft Operations Forecast. As a percentage of annual aircraft operations, the number of military operations at the Airport has historically been relatively insignificant. No factors have been identified that would significantly increase the number of military operations in the future; therefore, the number of military aircraft operations is projected to remain at historic levels through the end of the planning period.

Operations Forecast by Aircraft Type. A further assessment of the forecast involves the individual and collective use of the Airport by various type of aircraft. Knowing the types of aircraft expect to use the Airport assists in determining the amount and type of facilities needed to meet the aviation demand.

The following table, entitled *SUMMARY OF TOTAL OPERATIONS FORECAST BY AIRCRAFT TYPE, 2014-2034*, depicts the approximate level of use by aircraft types that are projected to use Renton Municipal Airport.

Table B6 **SUMMARY OF TOTAL OPERATIONS FORECAST BY AIRCRAFT TYPE, 2014-2034**

Aircraft Type	2014	2019	2024	2029	2034
Boeing 737s	*485*	*624*	*624*	*624*	*624*
Aircraft per Month	40	52[2]	52[2]	52[2]	52[2]
General Aviation	*98,072*	*103,603*	*109,446*	*115,618*	*122,139*
Single Engine Piston	88,755	93,761	99,049	104,365	110,536
Multi-Engine Piston	1,471	1,554	1,642	1,734	1,832
Turboprop	2,452	2,590	2,736	2,890	3,053
Business Jet	3,923	4,144	4,375	4,625	4,886
Helicopter	1,471	1,554	1,642	1,734	1,832
Military	259	*259*	*259*	*259*	*259*
Total	*98,816[1]*	*104,486*	*110,329*	*116,501*	*123,022*

SOURCE: **Mead & Hunt**

[1] **ATCT Records, FY2014**

[2] **The Boeing Company, October 2014**

Local and Itinerant Operations Forecast. Forecast of operations have also been categorized accordingly into local and itinerant operations. The *Air Traffic Control Handbook* defines a local operation as any operation performed by an aircraft operating in the local traffic pattern or within sight of the tower, or aircraft known to be departing or arriving from flight operations in the local practice area, or aircraft executing practice instrument approaches at the Airport. Itinerant operations are then defined as any aircraft operation not considered local.

Local operations at Renton Municipal Airport according to the ATCT records, accounted for approximately 57 percent of all airport operations in fiscal year 2014. This percentage has been relatively constant over the years at Renton Municipal Airport, and is expected to remain relatively consistent through the end of the planning period. Forecasts of local and itinerant operations are shown on the following table entitled *SUMMARY OF LOCAL AND ITINERANT OPERATIONS FORECAST, 2014-2034.*

DRAFT

Table B7 **SUMMARY OF LOCAL AND ITINERANT OPERATIONS FORECAST, 2014-2034**

Year	Local	Itinerant	Total
2014	55,881	42,935	98,816[1]
2019	59,557	44,929	104,486
2024	62,888	42,441	110,329
2029	66,406	50,095	116,501
2034	70,123	52,899	123,022

SOURCE: **Mead & Hunt**

[1] **ATCT Records, FY2014**

Peak Period Forecast. An additional element in assessing airport use and determining various capacity and demand considerations is to ascertain peak period activities. In lieu of air traffic records or other reliable sources of information, FAA statistics and assumptions from airport with similar activity and operational characteristics have been applied to Renton Municipal Airport. These included: 10 percent of annual operations occur in the peak month, a 31-day peak month is assumed, and existing peak hour operations are 10 percent of the average day of the peak month. The peak period operational activities are illustrated in the following table entitled *PEAK PERIOD AIRCRAFT OPERATIONS FORECAST*, 2014-2034.

Table B8 **PEAK PERIOD AIRCRAFT OPERATIONS FORECAST, 2014-2034**

Year	Annual	Peak Month	Average Day of Peak Month	Peak Hour/ Average Day Ratio	Average Peak Hour
2014	98,816[1]	9,882	319	10%	32
2019	104,486	10,449	337	11%	37
2024	110,329	11033	356	12%	43
2029	116,501	11,605	376	13%	49
2034	123,022	12,302	397	14%	56

SOURCE: **Mead & Hunt**

[1] **ATCT Records, FY2014**

DRAFT

General Aviation Based Aircraft Forecasts

The number of general aviation aircraft, which can be expected to base at an airport facility, is dependent on several factors, such as airport radio communications, available facilities, airport operator services, airport proximity and access, aircraft basing capacity available at adjacent airport and similar considerations. General aviation operators are particularly sensitive to both the quality and location of their basing facilities, with proximity of home and work often being identified as the primary consideration in the selection of an aircraft basing location.

Based aircraft are those aircraft that are permanently stored at an airport. Estimating the based aircraft demand over the next 20 years impacts the planning for future facility and infrastructure requirements. However, it is again important to note the constrained nature of based aircraft demand at the Renton Municipal Airport. The Airport maintains a paid deposit waiting list with 60 names of individuals and organizations desiring indoor aircraft storage but has a very limited amount of developable property for the construction of additional hangars. However, the following forecasts assume unconstrained demand.

Based aircraft at the Renton Municipal Airport were projected using several scenarios as follows:

- **Adjusted FAA TAF.** Data from the January 2014 FAA TAF indicated an average annual growth rate of approximately 0.07 percent for Renton based aircraft. The base year (2014) TAF number was also adjusted to reflect the current based aircraft levels.
- **Scenario 1.** This scenario assumes based aircraft growth in accordance with the historical average annual population growth rate of 2.7 percent for the City of Renton between 1990 and 2010.
- **Scenario 2.** This scenario assumes based aircraft growth at the rate of 1.04 percent which is equal to the based aircraft growth rate for the State of Washington from the FAA Terminal Area Forecast, for the 20-year planning period
- **Scenario 3.** This scenario assumes based aircraft growth at the rate of 0.96 percent which is equal to the based aircraft growth rate for the Northwest Mountain Region from the FAA Terminal Area Forecast, for the 20-year planning period.
- **Scenario 4.** This scenario assumes that the majority of future based aircraft owners will desire indoor storage for their aircraft and recognizes the significant constraint of lack of developable property for the construction of aircraft storage hangars. Consequently, Scenario 4 projects a modest increase in based aircraft at Renton Municipal Airport to 285 based aircraft by 2034 or an average annual growth rate of 0.19 percent.

Scenario 2 is the recommended forecast scenario for the purposes of this Airport Master Plan as this scenario projects an increase in the total number of based aircraft by 63 aircraft, which is slightly higher the current waitlist demand. Each of the forecast scenarios are shown in the following table and figure entitled *GENERAL AVIATION BASED AIRCRAFT FORECAST, 2014-2034.*

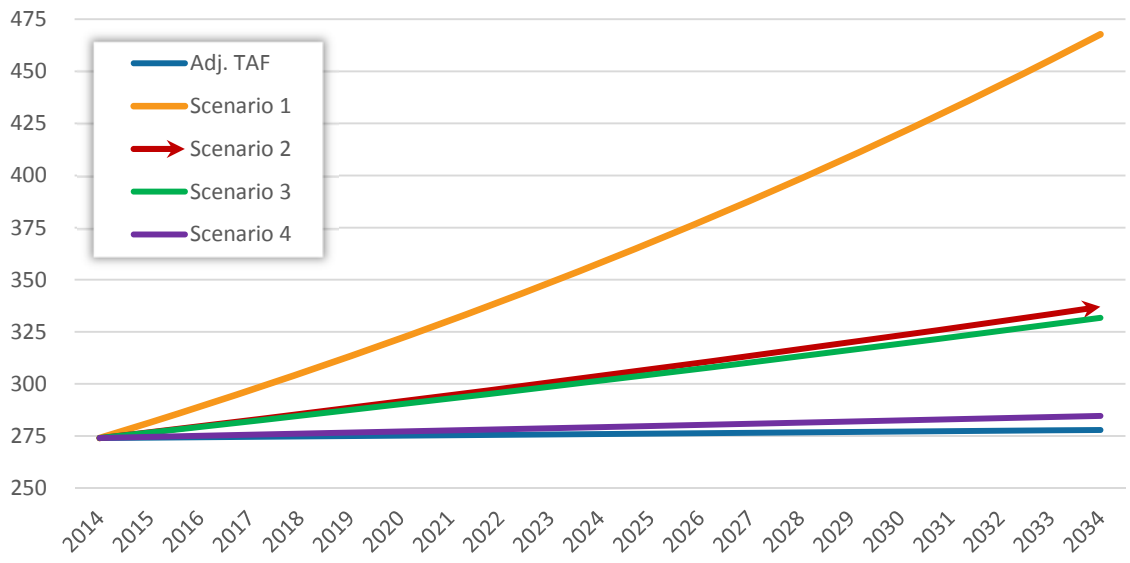
DRAFT

Table B9 **GENERAL AVIATION BASED AIRCRAFT FORECAST, 2014-2034**

Year	TAF	Adjusted TAF	Scenario 1	Scenario 2	Scenario 3	Scenario 4
2014	358	274[1]	274[1]	274[1]	274[1]	274[1]
2019	360	275	313	289	287	277
2024	361	276	358	304	301	279
2029	363	277	409	320	316	282
2034	363	278	468	337	332	285
AAG	*0.07%*	*0.07%*	*2.71%*	*1.04%*	*0.96%*	*0.19%*

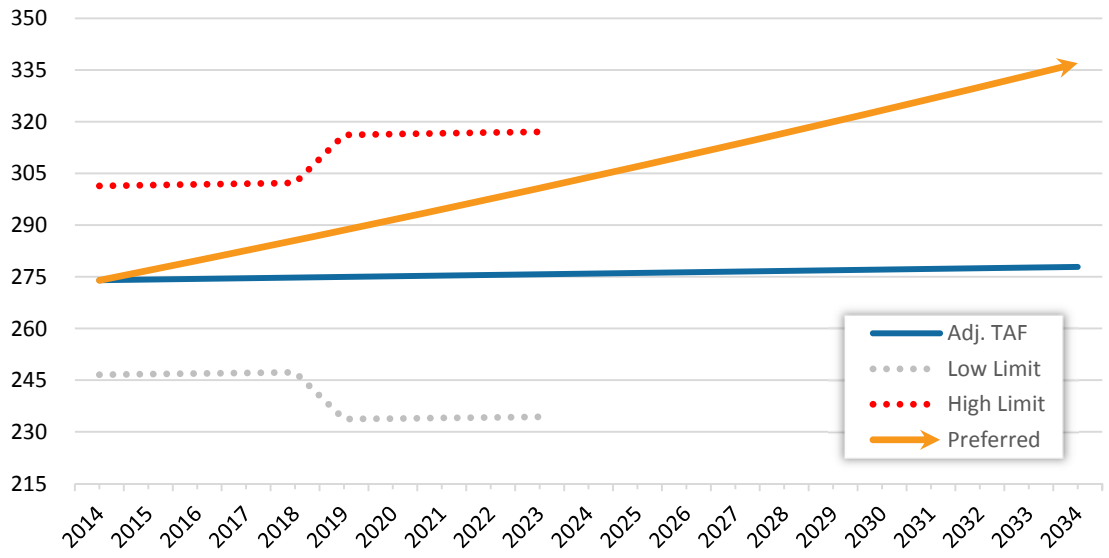
SOURCE: Mead & Hunt
[1] National Based Aircraft Inventory

Figure B4 **GENERAL AVIATION BASED AIRCRAFT FORECAST, 2014-2034**



The comparison of the recommended forecast based of aircraft with the TAF limits is presented in the following figure entitled *RECOMMENDED GENERAL AVIATION BASED AIRCRAFT FORECAST COMPARED WITH ADJUSTED TAF LIMITS, 2014-2034*.

Figure B5
RECOMMENDED GENERAL AVIATION BASED AIRCRAFT FORECAST COMPARED WITH ADJUSTED TAF LIMITS, 2014-2034



General Aviation Based Aircraft by Type Forecast. The projected demand for based aircraft at Renton Municipal Airport is expected to be an additional 63 based aircraft by 2034. The mix of based aircraft by type is shown in the following table entitled *GENERAL AVIATION BASED AIRCRAFT BY TYPE, 2014-2034*. The future mix is expected to continue the historical trend of primarily consisting of smaller single engine piston type aircraft.

Table B10 **GENERAL AVIATION BASED AIRCRAFT BY TYPE, 2014-2034**

Aircraft Type	2014	2019	2024	2029	2034
Single Engine Piston	243	256	269	284	299
Multi-Engine Piston	8	9	9	9	10
Turboprop	8	8	9	9	10
Business Jet	5	5	6	6	6
Helicopter	10	11	11	12	12
Total	274[1]	289	304	320	337

SOURCE: Mead & Hunt
[1] National Based Aircraft Inventory

DRAFT

Critical (Design) Aircraft Analysis and Forecasts of Operations by Runway Design Code

The types of aircraft presently utilizing the Renton Municipal Airport and those projected to utilize the Airport in the future have an impact on the planning and design of airport facilities. These standards are based on the "critical aircraft", often referred to as the design aircraft that currently utilizes the Airport on a regular basis. A number of FAA guidance documents (including, FAA Advisory Circular 150/5070-6B, *Airport Master Plans*, FAA Order 5090.3C, F*ield Formulation of the National Plan of Integrated Airport Systems,* and FAA Advisory Circular 150/5325-4B, *Runway Length Requirements for Airport Design*) define regular basis as 500 or more annual operations (landings and takeoffs are considered as separate operations). As of February 2015, the FAA is in the process of writing additional guidance related to this definition of regular use (often referred to as substantial use). This guidance document is still internal to FAA and not yet publicly available. However, it is assumed that the guidance will provide some clarifying language, but will still use the 500 annual operations substantial use threshold. It is also important to note that the 500 annual operations substantial use threshold is not a cap or limit on aircraft operations, but rather a planning metric for consideration of the potential need to upgrade airport facilities. The design aircraft can also be only one aircraft or a composite of more than one aircraft representing the highest Aircraft Approach Category (AAC) and Airplane Design Group (ADG).

The selected AAC and ADG are combined to form the Runway Design Code (RDC) of a particular runway. The RDC provides the information needed to determine the dimensional criteria standards that apply to that runway. The first component, depicted by a letter, is the AAC and relates to the aircraft approach speed. The second component, depicted by a roman numeral, is the ADG and relates to the aircraft wingspan, and tail height. The AAC and ADG are presented in the following tables entitled *AIRCRAFT APPORACH CATEGORY (AAC)* and *AIRPLANE DESIGN GROUP (ADG)*.

Table B11 **AIRCRAFT APPROACH CATEGORY (AAC)**

AAC	V_{REF}/Approach Speed
A	Approach speed less than 91 knots
B	Approach speed 91 knots or more but less than 121 knots
C	Approach speed 121 knots or more but less than 141 knots
D	Approach speed 141 knots or more but less than 166 knots
E	Approach speed 166 knots or more

SOURCE: FAA AC 150/530-13A, Airport Design, Change 1, February 2014

Table B12 **AIRPLANE DESIGN GROUP (ADG)**

ADG	Tail Height	Wing Span
I	Less than 20 Feet	Less than 49 Feet
II	Greater than 20, but less than 30 Feet	Greater than 49, but less than 79 Feet
III	Greater than 30, but less than 45 Feet	Greater than 79, but less than 118 Feet
IV	Greater than 45, but less than 60 Feet	Greater than 118, but less than 171 Feet
V	Greater than 60, but less than 66 Feet	Greater than 171, but less than 214 Feet
VI	Greater than 66, but less than 80 Feet	Greater than 214, but less than 262 Feet

SOURCE: FAA AC 150/530-13A, Airport Design, Change 1, February 2014

DRAFT

While the Renton Municipal Airport has historically served as the initial flight location for the majority of the Boeing Company's narrow body aircraft, the number of aircraft produced annually (and associated number of annual aircraft operations) has always been less than 500. Consequently, the current Airport Master Plan designates the design aircraft as the Beechcraft King Air 200 which has a RDC of B-II. However, given the current and published production rates of B-737 aircraft, it is recommended that the B-737 family of aircraft now be considered the design aircraft with an associated RDC of D-III. Aircraft depicting various RDCs are presented in the following figure entitled *REPRESENTATIVE AIRCRAFT BY RUNWAY DESIGN CODE (RDC).* An estimate of the current number of operations by RDC as well as a forecast of future operations by RDC is presented in the following table entitled *SUMMARY OF OPERATIONS FORECAST BY RDC, 2014-2034*.

Table B13 **SUMMARY OF OPERATIONS FORECAST BY RDC, 2014-2034**

RDC	2014	2019	2024	2029	2034
A-I, B-I	92,087	97,256	102,728	108,510	114,620
A-II, B-II	4,405	4,965	5,245	5,538	5,482
C-I, C-II	1,285	1,358	1,435	1,515	1,600
D-I, D-II	494	522	555	584	615
C-III, D-III (737s)	485	624	624	624	624
C-III, D-III (GA)	21	21	22	23	25
Total	98,816[1]	104,486	110,329	116,501	123,022

SOURCE: **Mead & Hunt**

[1] **ATCT Records, FY2014**

DRAFT

RDC A-I
Single-Engine Aircraft - 2 to 6 Seats
Beech Bonanza
Cirrus SR22
Cessna-172

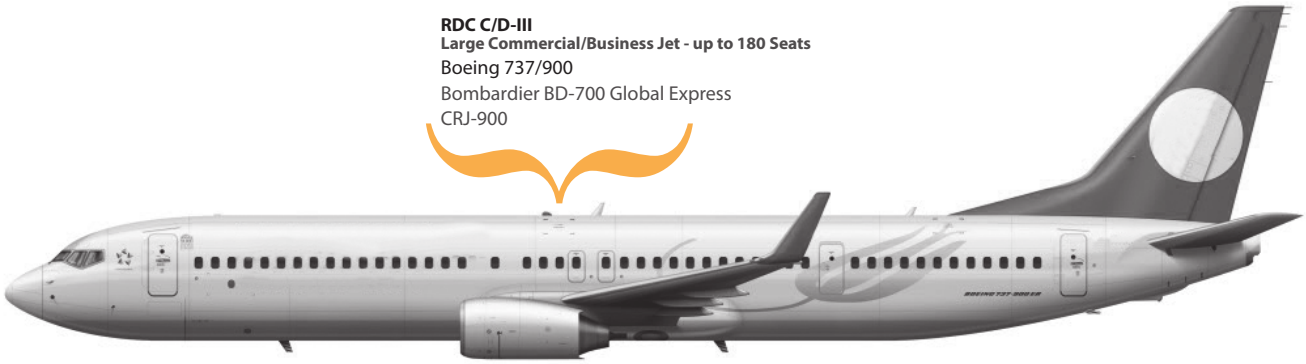
RDC B-I
Twin-Piston Aircraft - 4 to 10 Seats
Piper 31-310 Navajo
Beech Baron 58
Cessna 414

RDC B-II
Twin-Turboprop/Business Jet/Small Cabin Aircraft
6 to 12 Seats - *Includes most commercial turboprop aircraft.*
Citation Excel/XLS
Beach King Air 200
Pilatus PC-12

RDC C/D-I
Business Jets - 6 to 12 Seats
Lear 45
1124 Westwind
Hawker 400

RDC C/D-II
Commercial/Business Jet - 6 to 70 Seats
Bombardier CRJ-200
Bombardier CL-600 Challenger
Embraer ERJ-145

RDC C/D-III
Large Commercial/Business Jet - up to 180 Seats
Boeing 737/900
Bombardier BD-700 Global Express
CRJ-900



Representative Aircraft not to scale.

FIGURE B6 **Representative Aircraft by Runway Design Code (RDC)**

Summary

A summary of the aviation forecasts prepared for this Airport Master Plan is presented in the following table entitled *SUMMARY OF AVIATION ACTIVITY FORECASTS, 2014-2034*. This information is used as a background to develop the remaining portions of the report (analyze facility requirements, to aid development of alternatives and to guide the preparation of the plan and program of future airport facilities). In other words, the aviation activity forecasts are the foundation from which plans will be developed and implementation decisions will be made.

In addition, a comparison of total operations with the FAA TAF is summarized in the following table entitled *COMPARISON OF FORECAST AND TAF FORECAST, 2014-2029 (FAA FORMAT)*. This comparison will be used to determine the consistency of the airport forecasts with the TAF.

Table B12 **SUMMARY OF AVIATION ACTIVITY FORECASTS, 2014-2034**

Operations	2014	2019	2024	2029	2034
Boeing 737	485	624	624	624	624
Aircraft Per Month	40	52	52	52	52
General Aviation	98,072	103,603	109,446	115,618	122,139
Single Engine Piston	88,755	93,761	99,049	104,635	110,536
Multi-Engine Piston	1,471	1,554	1,642	1,734	1,832
Turboprop	2,452	2,590	2,736	2,890	3,053
Business Jet	3,923	4,144	4,378	4,625	4,886
Helicopter	1,471	1,554	1,642	1,734	1,832
Military	259	259	259	259	259
Total Operations	98,816[1]	104,486	110,329	116,501	123,022
Local Operation	55,881	59,557	62,888	66,406	70,123
Itinerant Operations	42,935	44,929	47,441	50,095	52,899
Based Aircraft By Type					
Single Engine Piston	243	256	269	284	299
Multi-Engine Piston	8	9	9	9	10
Turboprop	8	8	9	9	10
Business Jet	5	5	6	6	6
Helicopter	10	11	11	12	12
Total	274[2]	289	304	320	337

SOURCE: **Mead & Hunt**
[1] **ATCT Records, FY2014**
[2] **National Based Aircraft Inventory**

Table B13 **COMPARISON OF FORECASTS AND TAF FORECASTS, 2014-2029 (FAA FORMAT)**

Operations	Airport Forecast	TAF	AF/TAF % Difference
PASSENGER ENPLANEMENTS			
Base Year (2014)	0	0	0%
2019	0	0	0%
2024	0	0	0%
2029	0	0	0%
BASED AIRCRAFT			
Base Year (2014)	274[1]	358	-23.5%
2019	289	360	-19.7%
2024	304	363	-16.3%
2029	320	363	-11.8%
TOTAL OPERATIONS			
Base Year (2014)	98,816[2]	98,487	0.3%
2019	104,486	99,423	5.1%
2024	110,329	99,428	11.0%
2029	116,501	99,433	17.2%

SOURCE: **Mead & Hunt**

[1] **National Based Aircraft Inventory**
[2] **ATCT Records, FY2014**

DRAFT