SECTION TWO
FORECAST OF AVIATION DEMAND

Consistent with the scope of work for this Master Plan Update, the recommended aviation forecasts for the Virginia Tech Montgomery Executive Airport (BCB) over the 20-year planning horizon (2005-2025) were generally updated using the methodologies described in the 2003 VATSP. Utilizing the 2003 VATSP methodologies and other commonly accepted forecasting methods (i.e. market share, historical growth, growth by aircraft type), three reasonable forecast scenarios were evaluated. These resulted in a *low, median/base* and *high* range forecast of based aircraft and took into consideration the latest FAA Terminal Area Forecasts (TAF), the 2000 U.S. Census, and other published socio-economic data. For this forecasting effort, the Airport Service Area (ASA) is generally defined as Montgomery County, the towns of Blacksburg and Christiansburg, the City of Radford, and portions of Floyd and Giles counties. In general, the following recommended forecasts of general aviation activity will provide the basis for the determination of facility requirements necessary to accommodate the forecasted demand. The various forecasts presented in this section should be considered a planning guideline and ultimate development of aviation facilities will be driven by experienced demand for those facilities.

2.1 NATIONAL AVIATION TRENDS

Since the late 1980s, new business/general aviation aircraft have been added to the national fleet at a rate of approximately 1,000 aircraft per year. While business and general aviation (GA) aircraft shipments decreased as a result of the national recession in the early 1990s, the passage of the General Aviation Revitalization Act of 1994 and the national economic rebound later in the decade helped boost the manufacturing of new aircraft, aircraft utilization, and pilot population. 2001 was a difficult year for general aviation as fuel costs rose and the national economy and high tech industries started to lag. Even so, according to the 2002-2013 FAA forecasts, the outlook for general aviation appears promising with the industry's continued development and introduction of new, and more affordable, business type aircraft such as the Embraer Legacy, Raytheon Premier, Piper Malibu Meridian, Cessna Turbo Skylane, Hawker Horizon, Cirrus SR22, Cessna X, and the Eclipse 500. The aggregate GA fleet is anticipated to grow at an annual rate of 0.3 percent. Active turbo-prop and jet aircraft are anticipated to increase at an annual rate of 2.1 percent and 3.4 percent respectively. After a decline in business aircraft deliveries, 2004 ended with the delivery of more than 900 business aircraft, equaling the peak recorded in 2001. The General Aviation Manufactures Association stated that this strong trend in deliveries is expected to continue through the decade. Bombardier, Cessna, and Raytheon led all manufacturers in turbine-powered business aircraft sales during 2005, accounting for approximately 45 percent of all new-aircraft transactions worldwide. Honeywell Aerospace's

12th Annual Business Aviation Outlook projects continuing demand for new business aircraft with customers accepting more than 7,724 units, valued at over $121 billion, for the period from 2003 to 2013.[1]

According to Bob Johnson, president and CEO of Honeywell Aerospace, "businesses worldwide continue to recognize the value of business aircraft in providing time-saving and on-demand point-to-point transportation as a business productivity tool."[1] The popularity of business aircraft has increased as more companies realize the efficiency and productivity of this powerful business tool. The number of companies operating business aircraft in the United States grew more than 50 percent, from 6,584 companies operating 9,504 aircraft in 1991 to 10,661 companies operating 15,879 aircraft in 2003. The continuing popularity of travel by general aviation aircraft is partly because these aircraft have access to nearly 5,300 airports in the United States, compared to the 558 served by the scheduled air carriers. The ability to use smaller, less-congested airports located closer to one's final destination is a vital part of the utility and flexibility of general aviation aircraft.

The tragic events of September 11, 2001, had a significant impact on the aviation industry. Initially, all U.S. air traffic was grounded, but by the end of September, more than 90 percent of the nation's airspace system was available to most of the business aircraft operators. As new security procedures at the nation's commercial service airports increased, so did the interest in business aviation. Additional companies were motivated by the productivity, efficiency, safety, and security of business aircraft.

A major contributor to the strength of the business aircraft market is *fractional ownership*, in which companies or individuals own a fraction of an aircraft and receive management and pilot services associated with the aircraft's operation. Fractional ownership allows companies that have never before used business aircraft to experience many of the advantages of business aviation without the many costs and considerations of developing a traditional flight department. It also allows existing flight departments to supplement their current aircraft when needed.

The fractional ownership concept was led by companies such as Executive Jet Aviation (NetJets), which began its fractional program in 1986, and was closely followed several years later by Bombardier's Business Jet Solutions (FlexJet). Other large scale fractional aircraft providers include Raytheon Travel Air, Flight Options, and Citation Shares. This segment of general aviation continues to grow. In 1986, there were three owners of fractionally held aircraft. By 1993, there were 110. From 2000 to 2004, the number of companies and individuals using fractional ownership grew by 62 percent, from 3,834 to 6,217 shares; the growth from 1999 (2,607) was 138 percent.[1] Honeywell estimates that roughly 45 percent of the current aircraft order backlog is from fractional operators. By 2012, the fractional ownership fleet is anticipated to comprise 10 percent to 12 percent of the active business aircraft in the world.

[1] NBAA Business Aviation Fact Book 2004

According to the "Air Charter Guide", aircraft charter activity (i.e. Part 135) in the United States increased 30 percent in 2001, due mostly to access and security concerns after September 11, 2001. Despite that activity, the number of aircraft has decreased in total, due to a decline in the number of piston aircraft. However, the number of jets has increased substantially. The end of 2002 was the slowest period for the Part 135 industry since September 11, 2001. The decline appeared to be based on the general economy and the increased tensions in the Middle East.

Of the more than 211,000 general aviation aircraft in service today in the United States, more than 158,000 are dedicated primarily to personal use, according to the FAA. The agency estimates that nearly 30,000 general aviation aircraft are utilized primarily for business and corporate missions. It should be noted that at least some of the aircraft flown primarily for personal use and other missions are sometimes operated for business purposes.[1] Utilization of aircraft is reflective of the forecast growth in the various types of active GA aircraft. With most of the industry's production focused on business type aircraft, the average age of the single and twin engine piston fleet is increasing, corresponding with a decrease in utilization. The FAA anticipates that it will take until 2013 for the number of hours flown by these aircraft to equal the same level as in 2000. Utilization of turbo-prop and jet aircraft is anticipated to increase with fractional aircraft flying three times as much (900 hrs) as the typical corporate jet.

The pilot population in the United States remains fairly stable. While the number of U.S. student pilots and private pilots declined for several years, the FAA predicts an upturn in the number of student and private pilots in the future. Numbers for 2004 show that more than 123,000 aviators possess a commercial pilot certificate, and more than 142,000 have an airline transport pilot certificate. The vast majority of business aircraft pilots possess the most advanced pilot licenses. The FAA projected the total number of GA pilots to increase at an annual rate of 1.6 percent through 2016. Increases are anticipated for all categories of pilots, including commercial (1.7 percent annually), airline transport (1.7 percent annually), recreational (1.6 percent annually), and private pilots (1.2 percent annually). Pilots with instrument ratings are also projected to increase at a 1.6 percent annual rate.

As of 2004, general aviation accounts for roughly 39 percent of the 18.3 million instrument operations recorded at FAA facilities each year, the largest share of any segment of aviation. By comparison, air carriers account for 29 percent of instrument operations, air taxis account for 24 percent, and military aviation accounts for less than 7 percent of the total.

Satellite communication and navigation (i.e. GPS) is fast becoming the system of the future for air traffic control. As these systems improve, traffic will no longer be tied to ground-based navigational systems that have remained essentially unchanged since the 1940s, and will be able to use routes that are based on efficiency. As air traffic service begins to take advantage of the benefits satellite systems can provide, as well as a comprehensive redesign of the airspace by the FAA, efficiencies in terms of safety, time, and money will be realized by the general aviation operators.

2.2 HISTORICAL & EXISTING AIRPORT ACTIVITY

Along with knowledge of the regions' demographic trends and the national aviation trends, an integral part in determining any future airport needs is an understanding of historical aviation trends at the airport. Traditional measures of airport activity are *based aircraft* and levels of *aircraft operations*. Due to the nature of non-towered GA airports (such as BCB), and their based aircraft reporting requirements, the most historically accurate account of based aircraft for the Virginia Tech-Montgomery Executive Airport is considered to be the annual DOAV *Annual Based Aircraft Survey*. This survey is submitted by the airport sponsor, being the most familiar with the tenant base, which is then made available to the Commonwealth's Department of Taxation. These figures may vary from other sources, such as the FAA Terminal Area Forecasts, 5010 Airport Master Record, or other on-site surveys performed for various planning studies. By cross-referencing the many available data sources, the analyses and subsequent forecasts presented herein appear reasonable and should be considered a fair representation of the aviation trends in this geographic area.

Regardless of these forecasts, which will be used to identify a general timeline of anticipated development at the airport, actual development will occur with evidence of demand in such a manner that the needed facilities will be available for use "just in time". This way, the intended users will not be displaced or severely inconvenienced, and the airport authority and its associated service area will not miss economically important opportunities.

2.2.1 Based Aircraft

The airport manager reported in the Annual Based Aircraft Survey (January, 2006), that there are 37 permanently based aircraft at the airport. This is consistent with the reported 2003 VATSP count and its forecast for 2005 (36 aircraft). When compared to the recorded based aircraft count of 29 in 1990, the net increase represents an annualized growth rate of about 1.6 percent over the last 15 years. However, this growth, as at most airports, was not evenly spread over the 15 year period. Instead, the growth appeared to come in bursts. For example, 31-32 aircraft were based at the airfield from 2000-2004, before growing by five aircraft within a 12 month period in 2004-2005. A growth rate of 1.6 percent is healthy; however, it is reasonable to believe that this based aircraft growth rate could have been higher if facilities, such as aircraft storage, space, and operation related amenities, were provided.

Figure 2-1: Tie-Downs on Old Runway 8-26, 2005

As can be seen from the following comparison of the area's peer group airports, six of the nine airports in the general vicinity of Virginia Tech - Montgomery Executive Airport have lost based aircraft from 1990 to 2005, while Roanoke Regional Airport has gained aircraft. This analysis also indicates that Virginia Tech-Montgomery Executive Airport maintained a market share of 7.1 percent to 8.5 percent of the total based aircraft population within this regional group. When the commercial service airport (i.e. Roanoke Regional) is eliminated from consideration, Virginia Tech - Montgomery maintained between 8 percent and 12.5 percent of the market share.

FIGURE 2-2: *Historical Based Aircraft at Virginia Tech - Montgomery Executive and Area Airports*

AIRPORT	NPIAS	2003 VATSP	1990	1995	2000	2005	Avg. Annual Growth ('90-'05)	Avg. AC/Yr. ('90-'05)
Virginia Tech-Mont. (BCB)	GA	GC	29	31	33	35[1]	1.3%	0.4
Roanoke Regional (ROA)		CM	101	113	117	125	1.5%	1.6
William M. Tuck (W78)	GA	GR	25	27	19	19	-1.9%	-0.4
Danville Regional (DAN)	GA	GR	44	35	41	43	-0.2%	-0.1
Smith Mountain Lake (W91)	GA	LO	9	16	13	13	2.6%	0.3
New River (PSK)	GA	GR	30	21	24	24	-1.5%	-0.4
Blue Ridge (MTV)	GA	GR	62	64	56	56	-0.7%	-0.4
Mountain Empire (MJK)	GA	GC	37	30	26	26	-2.4%	-0.7
Virginia Highlands (VJI)	GA	GR	60	57	55	55	-0.6%	-0.3
Twin County (HLX)	GA	GC	10	11	14	17	3.8%	0.5
All			407	405	398	414	0.1%	0.5

Sources:
2003 VATSP unless otherwise noted
[1] BCB Airport Manager September 2005

FIGURE 2-3: *Historical Market Share of Based Aircraft 1990 - 2005*

Peer Group	% Based at BCB			
	1990	1995	2000	2005
All 9 Area Airports	**7.1%**	**7.7%**	**8.3%**	**8.5%**

Source: Figure # 2-2

The based aircraft population at Virginia Tech-Montgomery Executive (BCB) Airport has been historically comprised of single engine, piston driven general aviation aircraft. As of 2007, the airport authority is continuing the development of leasable corporate/group hangar facilities and associated apron improvements at the airport, which could accommodate business jet aircraft. Development of new hangars is in direct response to the need to replace the aging 1930's era maintenance hangar, and house the corporate aircraft operated by the University and others. Other prospective tenant opportunities would add at least one business jet aircraft and one helicopter to the field; therefore, the fleet mix at BCB will likely change in the very near future. When comparing the mix of aircraft at the peer group airports (**Figure 2-5**), the statistics suggest that the BCB Fleet mix appears to most closely resemble that of Danville Regional Airport.

Figure 2-4: Citation on the Terminal Apron

FIGURE 2-5: *Based Aircraft by Type at Virginia Tech-Montgomery Executive and Area Airports - 2005*

AIRPORT	NPIAS	2003 VATSP	Single Engine Piston	Multi Engine Piston	Turbo Prop	Jet	Hel.	Other	Total Aircraft
Virginia Tech-Mont. (BCB)	GA	GC	24	3	3	1	1	4	36
Roanoke Regional		CM	95	18	7	4	1		125
William M. Tuck (W78)	GA	GR	19						19
Danville Regional (DAN)	GA	GR	37	3		3			43
Smith Mountain Lake (W91)		LO	9	4					13
New River	GA	GR	19	3	1	1			24
Blue Ridge	GA	GR	47	5	1	1	2		56
Mountain Empire	GA	GC	23	2				1	26
Virginia Highlands	GA	GR	40	5			3	7	55
Twin County	GA	GC	12					5	17
All			325	43	11	11	7	17	414

Sources: 2003 VATSP: 2005 Based Aircraft Fleet Mix

2.2.2 Aircraft Operations

An aircraft operation is defined as either an aircraft takeoff or landing. As such, “touch and go” practice is reported as two operations. As Virginia Tech-Montgomery Executive Airport does not have an Air Traffic Control Tower, determining the actual volume of aircraft activity at the airport is rather difficult because no formal mechanism exists to continuously count aircraft operations. In this situation, planning documents typically extrapolate one or two week traffic counts which may have been observed at various times during the census year and may not account for cyclical variations in activity levels. As a result, historical aircraft operations reported for an airport can show a rather large variation in operation levels. The 2003 VATSP indicated that in 2000, annual operations at BCB were estimated to be 13,800, increasing to 15,936 by 2005. The previous 1995 Master Plan cited the FAA’s Terminal Area Forecast of 34,270 operations in 1995. The FAA TAF assumes no growth or change in the number of operations and that the airport will remain the same over the planning horizon. The FAA Terminal Area Forecast generally assumes that there is an average of 750 operations per based aircraft, but it should be noted that

the FAA/WADO has accepted the 2003 VATSP methodologies as reasonable for general aviation planning within the Commonwealth. These operation forecasts result in average operations per based aircraft count of 443. The historical operation counts at BCB using the 2003 VATSP numbers are presented in **Figure 2-6.**

FIGURE: 2-6 *Historical Annual Operations at Virginia Tech-Montgomery Airport*

YEAR	REPORTED ANNUAL OPERATIONS	REPORTED BASED AIRCRAFT	AVG. OPBA
1990	34,270 [2]	29	1181
2000	13,800 [1]	33	418
2005	15936 [1]	36	443

Sources:
[1] 2003 VATSP
[2] 1995 Airport Master Plan - FAA TAF (by Greiner) and included operations by an active flight school.

2.2.3 Transient Aircraft

As stated previously, one unique characteristic of this airport is its relatively high utilization by transient turbo-prop and jet aircraft during sports events at Virginia Tech. These aircraft demand a large amount of apron space, particularly during the football season, when events occur on six to seven weekends from September through November. These "football weekend" aircraft are operated primarily by the spectators. These activities generate a significant portion of the estimated annual economic impact that can be attributed to the airport, and help make sports and tourism a valuable industry in the region. Although unique when compared to many of the general aviation airports throughout the nation, these demands are an integral part of the Airport Service Area, and should be regarded as essential to the economic health of the region.

Figure 2-7: Game Day Traffic 2005

Figures 2-7 and **2-8** illustrate this peak transient demand, which results in an over-crowded apron with poor circulation and the use of non-standard parking positions that sometimes include the parallel taxiway and taxilanes. While this "annoyance" to the pilots/patrons/tenants may only last a day, the lack of adequate organized apron space lends to an increased opportunity for accident, injury, and property damage, particularly at night. Peak period transient demands, similar to that depicted in **Figures 2-7** and **2-8**, can be expected to occur on at least 6 to

7 weekends during the football season. There are other events such as graduation and semester starts where transient demands increase, but not necessarily to the same extent (both in volume and aircraft size) as the football events. During the major event weekends, 20 to 25 Group-II business type aircraft (including Lears, Citations, Gulfstreams, Falcons, King Airs, etc) typically utilize the field and apron over the same period of time. This is in addition to several other small single and twin engined aircraft. Some of these aircraft may also require overnight parking. During the smaller events, the transient mix tends to be predominately the smaller piston aircraft with the occasional turbo-prop (i.e. King Air). Airport Management has indicated that on average there are approximately 10 events each year that attract 37-38 transient aircraft per event. During a normal business day, the number of aircraft parked on the transient apron at the same time will range from 2-5 Group II aircraft.

Figure 2-8: Game Day Traffic 2005

The constraints and potential hazards of the existing apron configuration are not only an issue during sports events, but also anytime that a transient Group-II aircraft visits the field. Since the development of the Corporate Research Center, airport personnel have noticed an increase in the weekday traffic by business use aircraft.

2.3 FORECAST SCENARIOS

A Low, Median, and High forecast scenario was prepared for based aircraft for this Master Plan Update. All of these scenarios begin with the 2003 VATSP based aircraft count of 36 for year 2005. The results are described below.

2.3.1 LOW Forecast Scenario

The Low Forecast applies the FAA Terminal Area Forecast (TAF) growth rates for the region to the Virginia Tech-Montgomery Executive Airport facility. The 2005 TAF predicts an annual growth rate of 0.6 percent through 2020 for the Eastern Region. Applying this rate to the 2005 based aircraft count of 36 results in the potential for 41 aircraft being based at Virginia Tech-Montgomery Airport by 2025.

Figure 2-9: *Low Forecast Scenario Based Aircraft*

	Methodology
YEAR	TAF Regional
2005	36
2010	37
2015	38
2020	39
2025	41
Avg. Annual Growth	0.6%
Avg. Aircraft/Year	0.25

Sources: 2003 VATSP
FAA TAF

2.3.2 MEDIAN/BASE Forecast Scenario

The next methodology includes the application of the 2003 VATSP growth rate for Virginia Tech-Montgomery Executive to the 2005 Based Aircraft Count. The 2003 VATSP used a linear trend methodology based on each airport's historical average annual growth of based aircraft, which was then adjusted manually if the resulting forecasts seemed unrealistic. The overall annual growth rate in based aircraft BCB is 1.6 percent. Application of this 1.6 percent rate to the 36 based aircraft at Virginia Tech-Montgomery Executive Airport in 2005 results in a total of 49 aircraft by 2025. This is only one additional based aircraft by 2025 than the 2003 VATSP produces by projecting 2020 forecast to 2025. This method is consistent with the 2003 VATSP forecast provided for Virginia Tech-Montgomery Executive Airport.

Figure 2-10: *"Median-Base" Forecast Scenario of Based Aircraft*	
YEAR	AIRCRAFT
2005	36
2010	39
2015	42
2020	46
2025	49
Avg. Annual Growth	1.6%
Avg. Aircraft/Year	0.6
Source: 2003 VATSP	

2.3.3 HIGH Forecast Scenario

The last methodology is projection of the growth rate forecasted by the previous 1995 Master Plan. The 1995 Master Plan forecasted a growth of 28 based aircraft from 1992 to 2012, for a total of 62 planes. This included 12 multi-engine, 2 jet, and one rotor aircraft. This resulted in an average annual growth rate of 3.1 percent or 1.5 aircraft per year. Projection of this growth rate from 2005 through 2025 results in almost doubling the based aircraft by 2025, for a total of 66 aircraft. This "high" forecast scenario appears to be somewhat unattainable, though not impossible.

FIGURE 2-11: *High Forecast Scenario of Based Aircraft*	
YEAR	AIRCRAFT
2005	36
2010	42
2015	49
2020	57
2025	66
Avg. Annual Growth	3.1%
Avg. Aircraft/Year	1.5
Source: 1995 Master Plan	

2.4 RECOMMENDED GENERAL AVIATION FORECAST

2.4.1 Based Aircraft

The three forecast scenarios are summarized in **Figure 2-13**. From this analysis, the "Median" forecast scenario of 49 based aircraft is recommended for the 20 year planning horizon. This will be referred to as the "base" forecast and will be used for generating the recommended operational forecasts utilizing the 2003 VATSP methodology. It should be noted that the "base" forecast entails an increase of only 13 based aircraft over a 20 year planning horizon. At general aviation airports of this size, there are many factors that could greatly alter the level of anticipated facility demand. For example, the development of a new t-hangar building, if maintained with affordable lease rates, has the potential to increase the based aircraft count almost instantly. Situations at nearby airports could also force the relocation of their tenants to other airports, such as Virginia Tech-Montgomery Executive. The marketing efforts by the Towns, Montgomery County and the Airport Authority will have a direct, and hopefully positive, influence on demand for general aviation facilities at Virginia Tech-Montgomery Executive Airport. This recommended forecast should be considered a reasonable estimation of future demand. Regardless of these forecasts, however, the long range development plan presented in this Master Plan Update will provide the Authority with flexibility in meeting whatever yet unforeseen demand may arise in the future. For purposes of this report, the "low" forecast scenario would be considered "no growth" and would result in only minimal, demand driven, new facility requirements. The "high" forecast scenario would be considered "event driven" (i.e. loss of capacity at a nearby airport, additional hangar capacity at BCB, etc.) that would require additional facilities to accommodate a greater than normal growth in demand.

FIGURE 2-12: *Summary of Forecast Scenarios (2005-2025)*

	LOW	MEDIAN/BASE -	HIGH
YEAR	TAF-Regional	VATSP	1995 MP
2005	36	36	36
2010	37	39	42
2015	38	42	49
2020	39	46	57
2025	41	49	66
Avg. Annual Growth	0.6%	1.6%	3.1%
Avg. Aircraft/Year	0.25	0.6	1.5

2.4.2 Based Aircraft by Type (Aircraft Mix)

The 2003 VATSP utilized three sets of growth rates in an effort to capture the faster historic growth rates at Commonwealth airports when compared to the nation. As within the 2003 VATSP, these growth rates were applied to the 2005 based aircraft mix at BCB, as reported by the Airport Manager, and matched to the total projected growth of 49, as determined previously. This recommended growth takes into account the 2007 corporate hangar improvements underway at BCB, and anticipates the aircraft mix to change slightly over time to include more complex aircraft, consistent with the national and regional increase in business/corporate aviation. As such, it should be noted that the forecast Jet growth will include aircraft of or similar to the airport's critical aircraft.

FIGURE 2-13: *Forecast of Based Aircraft Fleet Mix for Virginia Tech-Montgomery Executive Airport (2005-2025) Medium Forecast*

YEAR	SE Piston	ME Piston	TurboProp	Jet	Helo	Other	Total
2005	26	3	3	2	0	2	36
2010	26	3	3	3	1	3	39
2015	27	3	4	4	1	3	42
2025	31	3	4	5	2	4	49
Avg. Annual Growth	0.9%	0.0% (1)	1.4%	4.7%		3.0%	1.6%
Avg. Aircraft/Year	0.3	0.0	0.1	0.2	0.1	0.1	0.7

Source: Campbell & Paris PC

2.4.3 Operations by Aircraft Type

The 2003 VATSP utilized an operations per based aircraft (OPBA) methodology for forecasting total aircraft operations, by type. This is a similar methodology to that used in the 1990 VATSP, but with updated activity ratios based in part on 1998 Civil Air Patrol traffic counts and recent tower counts for airports within Virginia. These 2003 VATSP ratios were compared to FAA forecasts for validation. This is a commonly accepted method for forecasting operations at non-towered airports, and OPBA ratios utilized in the 2003 VATSP were consistent with FAA planning guidelines. These ratios were also assumed to increase at a rate of 0.6 percent annually, based on national rates identified in the FAA Aerospace Forecasts (2000-2011). The projected OPBA ratios and those used in this Master Plan Update are presented in **Figure 2-15**.

FIGURE 2-14: *Operations per Based Aircraft (OPBA)*

YEAR	SINGLE ENGINE	MULTI ENGINE	TURBO-PROP/JET	HELO/OTHER
2005	379	374	765	616
2010	391	385	788	635
2015	403	397	812	654
2025	427	422	862	694
Avg. Annual Growth	0.6%	0.6%	0.6%	0.6%

Source: Campbell & Paris, derived from 2003 VATSP methodology

As per the 2003 VATSP methodology, these OPBA rates were applied to the recommended based aircraft count by type. The resultant operations forecast were further refined to acknowledge the difference in *transient* aircraft mix experienced at the various airports, based on available runway length. While transient aircraft are estimated to account for approximately 30 percent of an airport's total operations, the airports with runways over 4000-feet are considered to be jet capable (including BCB), therefore the transient aircraft mix must account for these types of operations. To reflect this in the recommended forecasts, the initial operations forecasts were reduced by 30 percent for all types of aircraft, and that 30 percent was replaced with the distribution of transient operations (based on the greater than 4000-foot runway length) as presented in **Figure 2-16.**

FIGURE 2-15: *Transient Aircraft Distribution by Aircraft Type*

METHOD	SINGLE ENGINE	MULTI ENGINE	TURBO-PROP	TURBO-JET	HELO	OTHER	TOTAL
2003 VATSP	71%	10%	7%	3%	7%	2%	100%

Sources:
2003 VATSP Methodology
Campbell & Paris, PC

For BCB, this results in a total forecast average annual growth rate of 2.5 percent (2005-2025). This is consistent with growth rates identified in the 2003 VATSP for general aviation airports within the Commonwealth, and reflects the potential operations performed by business jet aircraft that are anticipated to become based at the airport. The forecast presented in **Figure 2-17** is titled the Baseline Forecast (also referred to as the constrained forecast) as it does not include the event operations discussed in Section 2.2.3.

FIGURE 2-16: *Baseline Forecast of Total Annual Operations by Aircraft Type*

FORECAST PERIOD	SINGLE ENGINE	MULTI ENGINE	TURBO-PROP	TURBO-JET	HELO	OTHER	TOTAL
2005	9,918	1,266	1,493	911	836	1,609	**16,033**
2010	11,276	1,366	1,865	1,357	933	1,802	**18,589**
2015	12,605	1,449	2,205	1,840	1,053	2,032	**21,184**
2025	15,494	1,719	2,825	2,569	1,298	2,520	**26,425**
Avg. Annual Growth	2.2%	1.5%	3.2%	5.2%	2.2%	2.3%	**2.5%**

Source: Campbell and Paris, P.C. 2003
*Baseline Forecast does not includes the 750 operations generated by event traffic

As discussed in Section 2.2.3, University events attract additional transient traffic and account for approximately 750 operations (37-38 aircraft per event per airport fuel sale records). These operations are added to the Baseline Forecast to account for this unique demand at the airfield. These events average 400 single/multi- engine piston, 150 transient jets and approximately 200 turbo prop operations per year (See **Figure 2-18**).

FIGURE 2-17: *Event Aircraft Traffic by Aircraft Type*

	SINGLE ENGINE	MULTI ENGINE	TURBO-PROP	TURBO-JET	HELO	OTHER	TOTAL
Transient Ops. For Event Aircraft	350	50	200	150	0	0	750

Source:
BCB Airport Management
Campbell & Paris, PC

Using these 750 event operations and adding them to the Baseline Forecast is titled the Event Forecast (also referred to as the unconstrained forecast). No growth factor was added to the number of events or the number of aircraft attracted to these events, so for each year 750 operations are added to account for event traffic. For BCB, adding the event traffic results in a total forecast average annual growth rate of 2.4 percent (2005-2025). The recommended total operations forecast by type (including event traffic) are presented in **Figure 2-19**.

It should also be noted that the Jet operation forecast of 1,061included in **Figure 2-19** for 2005 primarily include B-II type aircraft, such as the Falcon 900 and Cessna Citation, however based on observations approximate 100-150 operations per year are preformed by C-II type aircraft. If the runway is extended the forecasted growth in jet operations will include operations by larger more demanding aircraft.

FIGURE 2-18: *Baseline + Event Traffic Forecast of Total Annual Operations by Aircraft Type*

FORECAST PERIOD	SINGLE ENGINE	MULTI ENGINE	TURBO-PROP	TURBO-JET	HELO	OTHER	TOTAL
2005	10,268	1,316	1,693	1,061	836	1,609	**16,783**
2010	11,626	1,416	2,065	1,497	933	1,802	**19,339**
2015	12,955	1,499	2,405	1,990	1,053	2,032	**21,934**
2025	15,844	1,769	3,025	2,719	1,298	2,520	**27,175**
Avg. Annual Growth	2.2%	1.5%	2.9%	4.8%	2.2%	2.3%	**2.4%**

Source: Campbell and Paris, P.C. 2003
* Baseline + Event Forecast includes 750 operations generated by event traffic

2.4.4 Daily and Peak Hour Operations

Peak period operations typically occur during good weather (VFR), when the local traffic is most active. The weather analysis indicates that VFR conditions exist approximately 89.2 percent of the year, or about 325 days (refer to Section 1.5). The capacity-based assumptions are derived from FAA Advisory Circular 150/5070-6B "Airport Master Plan and Advisory Circular 150/5060-5 'Airport Capacity'". This suggest that the average daily demand for the peak month can typically be estimated by dividing the total annual activity by 12 months and then 30 days, then adjusting up by 10%. This method results in an estimated average daily activity for the peak month of 49 operations for 2005. This uses the Baseline Forecast of 16,033 operations. No data is available to confirm the actual peak month; however, it is reasonable to expect peak month activity to occur when school is in session and during periods of predominantly good, temperate weather and generally light winds. In the ASA, that period is generally associated with the fall months. However, as it is anticipated that future traffic will be driven by additional University events and more Corporate Research Center and industrial users, the distribution of monthly traffic will become more evenly spread throughout the year.

Using the estimated average daily rate of 49 operations, the average hourly operations (using a ten hour period) is roughly 5. Using a 10 percent factor for average peak hour activities yields a rate of about 6 operations per hour. This rate is consistent with the procedures identified in the "Airport Capacity" circular, which suggests an average peak hour during the peak month can typically be calculated by dividing average daily operations by a factor of 9, which also yields about 5.4 operations per hour. These peak hours are generated using the Baseline Forecast and do not include the unique demands present at the airport during University related events.

Peak daily and hourly activities at general aviation airports such as BCB will easily vary, due in part to the sporadic nature of "touch-and-go" training, and event related transient activity generated by the nearby University. Therefore, these average daily and peak hour rates should be viewed as reasonable, but *minimal* factors for

planning facilities needed to accommodate peak period activities and for evaluating overall airfield capacities. The aircraft mix comprising the peak hour operations (i.e., aircraft types) will also vary, but on average should follow the relative percentages described previously and as contained in the 2003 VATSP.

FIGURE 2-19: *Peak Period Forecasts*

FORECAST PERIOD	TOTAL OPERATIONS *	AVG. DAILY OPERATIONS (PEAK MONTH)	AVG. PEAK HOUR (PEAK MONTH)
2005	16,033	49	6
2010	18,589	57	6
2015	21,184	65	7
2025	26,425	81	9

Source: Campbell and Paris, P.C. 2003
* Uses Baseline Forecast, does not include event traffic

Event traffic, discussed in Sections 2.2.3 & 2.4.3, accounts for 750 operations a year or 75 operations for each of the ten events (37.5 landings and 37.5 takeoffs). Depending on the event, approximately 50% to 66% of these operations occur 1-2 hours prior and 1-2 hours after the event. This results in an event specific peak hour traffic volume of 18-25 operations at the airfield.

2.4.5 Instrument Approach Forecasts

The FAA Air Traffic Activity Data System (ATADS) indicates that there were 530 reported instrument approaches into BCB handled by Roanoke (ROA) from 1994 - 2004. It should be noted, however, that for non-towered airports, the number of recorded instrument approaches is typically far less than the true figure of non-precision instrument approaches that are initially filed and used for en-route navigational aids. One reason for this discrepancy is the amount of flight training which can typically occur at lower traffic airports like BCB. Training for pilots seeking an instrument rating does not usually occur during IFR weather conditions when the instrument approaches are truly necessary.

A 1990 study accomplished at Manassas Regional Airport[2] (prior to the activation of the Control Tower) indicated that FAA recorded instrument approaches were estimated to account for only 10 percent of the total number of instrument approaches (as counted in both VFR and IFR weather conditions). Experience at Manassas Regional Airport is considered to be greater in terms of flight training due to the existing ILS and proximity to the DC Metro area, than the instrument activity that might be expected at BCB.

The 2003-2014 FAA Aerospace Forecasts indicate that general aviation instrument operations will have an average annual growth rate of 1.4 percent through the year 2014. General aviation and commuter/air charter aircraft are

[2]Manassas Regional Airport Master Plan Update, Campbell & Paris PC, 1990

anticipated to perform 64 percent of all instrument operations by the year 2014. These are higher growth rates than previously forecasted by the FAA for the years 2002-2013. Instrument activity at BCB is anticipated to increase commensurate with this national average. However, it should be noted that the number of instrument approaches is also limited by Roanoke's ability to see air traffic as it approaches BCB, thereby making it less convenient for pilots to use instrument approaches. Additional instrumentation that provides Roanoke the ability to see BCB air-traffic will significantly increase the number of aircraft that can perform instrument approaches in any given time.

FIGURE 2-20: *Instrument Approaches*

FORECAST PERIOD	TOTAL ANNUAL APPROACHES *	INSTRUMENT APPROACHES	PERCENTAGE
2005	8,392	58	0.7%
2010	9,670	62	0.6%
2015	10,967	67	0.6%
2025	13,588	77	0.6%

Source: Campbell and Paris, P.C. 2005

* Uses Baseline + Event Operations Forecast

2.4.6 Touch and Go Activity

The forecast model used for this Master Plan Update assumes that the average number of operations per based aircraft by type is generated in part by "touch-and-go" activities. Specifically, it is assumed that 45 percent of single-engine operations, 20 percent of multi-engine operations, 4 percent of the jet/turboprop operations, and 20 percent of helicopter operations are associated with "touch-and-go" activity. Touch-and-go is often associated with pilot training. As the aircraft mix at BCB changes to include the more complex and larger business type aircraft, it is logical that the associated percentage of "touch-and-go" activity will decline as well. As presented in the following figure, the forecast number of "touch-and-go" operations continues to increase over the twenty-year planning period, while the relative percentage of "touch-and-go" operations to the total operations decreases.

FIGURE 2-21 *Touch & Go Activity Forecast*

FORECAST PERIOD	TOTAL ANNUAL OPERATIONS*	TOUCH & GOs	PERCENTAGE
2005	16,033	4,979	31.1%
2010	18,589	5,475	29.5%
2015	21,184	5,999	28.3%
2025	26,425	7,290	27.5%

Source: Campbell and Paris, P.C. 2005

*Baseline Forecast, does not include event traffic

2.4.7 Itinerant and Local Operations

The FAA defines local operations as "arrivals and departures of aircraft which operate in the local traffic pattern, or within site of the tower, and are known to be departing to or arriving from flights in local practice areas within a twenty-mile radius of the airport, plus simulated instrument approaches or low passes executed by any aircraft." Most of these operations are typically attributed to smaller single and twin engine aircraft based at the airport and flight training activities. Conversely, the definition of itinerant operations is "all aircraft departures and arrivals other than the local operations described above." Many, of the itinerant operations at BCB result from transient aircraft (i.e. based at other airports) operating into the ASA. Therefore for purposes of this study, the estimated percentage of local and itinerant activity associated with based and transient aircraft is presented in **Figure 2-23**.

FIGURE 2-22: *Estimated Distribution of Local -vs- Itinerant Operations*

	SINGLE ENGINE	MULTI ENGINE	TURBO-PROP	TURBO-JET	HELO	OTHER
BASED AIRCRAFT						
Local Operations	70%	50%	25%	5%	40%	90%
Itinerant Operations	30%	50%	75%	95%	60%	10%
TRANSIENT AIRCRAFT						
Local Operations	40%	30%	20%	5%	30%	20%
Itinerant Operations	60%	70%	80%	95%	70%	80%

Source: Campbell and Paris, P.C. 2003

FIGURE 2-23: *Forecast of Local -vs- Itinerant Operations*

FORECAST PERIOD	TOTAL ANNUAL OPERATIONS *	LOCAL OPERATIONS (based + transient)		ITINERANT OPERATIONS (based + transient)	
		#	%	#	%
2005	16,033	8,494	49.3%	8,121	50.7%
2010	18,589	9,688	52.1%	8,901	47.9%
2015	21,184	10,889	51.4%	10,295	48.6%
2025	26,425	13,449	50.9 %	12,976	49.1%
Avg. Annual Growth	2.5%	2.3%		2.4%	

Source: Campbell and Paris, P.C. 2003

* Using Baseline Forecast, which does not include the 750 event operations

The 750 operations per year that are associated with University event traffic, discussed in Sections 2.2.3 & 2.4.3, are all considered Transient – Itinerant operations. Adding these event operations to Figure 2-22, Local vs. Itinerant Operations, provides a total of 8,871 itinerant operations in 2005 increasing to 13,726 in 2025.

2.4.8 Summary of Forecast

A summary of the activity forecasts for the various operational components at Virginia Tech-Montgomery Executive Airport over the twenty year planning horizon (2005-2025) are presented in **Figure 2-24**.

FIGURE 2-24: *Summary of Forecast*

FORECAST PERIOD	BASED YEAR 2005	Base Year +5	Base Year +10	Base Year +20	Average Annual Growth Rate
Baseline Operations	16,033	18,589	21,184	26,425	2.5%
Itinerant	8,121	8,901	10,295	12,976	2.4%
Local	8,494	9,688	10,889	13,449	2.3%
Event Operations	750	750	750	750	0%
Baseline + Event Operations	16,783	19,339	21,934	27,175	2.4%
Based Aircraft	36	41	44	49	0.7%
SE	26	26	27	31	0.9%
ME	3	3	3	3	0.0%
Turbo-Prop	3	3	4	4	1.4%
Jet	2	3	4	5	4.7%
Helicopter	0	1	1	2	
Other	2	3	3	4	3.0%