

6. COMMERCIAL AIRPORT FORECASTS

I. Overview

The VATSP Update will help the Commonwealth ensure that adequate facilities are in place to serve Virginia's aviation needs in the future. This forecast of airline activity projects the demand that will be placed upon Virginia's commercial aviation infrastructure over the planning period.

This chapter describes the development of activity forecasts for each of Virginia's nine airports that currently receive commercial service. Airports with some history of scheduled service but not served at the present, such as Danville, are not included in this analysis and it is assumed that they will receive no service over the forecast period.

Forecasts of commercial passenger enplanements were developed for each airport using data provided by individual airports, FAA historical data, and FAA nationwide activity projections. Preliminary forecasts were developed using alternative methodologies, with the most suitable then selected as the preferred forecast. Supplemental analysis beyond this preferred methodology was performed, especially where major changes in service implying changed assumptions about traffic growth are anticipated.

A derivative forecast of aircraft operations was then produced from the passenger enplanements projections. Enplanements per operation at each Virginia commercial service airport were forecast in view of historical trends at the airport, as well as nation-wide trends. Forecast enplanements were divided by enplanements per operation to yield a forecast of commercial aircraft operations.

II. Enplanements

This forecast considers passenger demand to be the major determinant of commercial aviation activity at Virginia airports. From passenger enplanements come derivative forecasts such as aircraft operations. Because it is the forecast driver, analytical emphasis is placed on forecasting future passenger enplanements.

CAF - Table 1

Historic Growth Rates Between 1990 and 2000 Virginia, Virginia non-DC Metro, and US Enplanements			
	<i>Virginia Enplanements</i>	<i>VA Non-DC Metro (Not DCA, IAD)</i>	<i>US Enplanements</i>
Year			
1990	15,931,355	3,012,516	495,399,518
1995	16,995,980	3,155,639	582,042,553
2000	21,577,626	3,730,621	706,106,262
Avg Ann Growth			
1990-1995	1.3%	0.9%	3.3%
1995-2000	4.9%	3.4%	3.9%
1990-2000	3.1%	2.2%	3.6%

Source: FAA Terminal Area Forecast

As shown in Table 1, passenger traffic grew more slowly over the past decade in Virginia than in the nation as a whole. Virginia’s total enplanement figures are dominated by enplanements at Reagan National and Dulles International airports, both of which serve the Washington DC metropolitan area. National’s underperformance weighed down the Virginia enplanement total before 1995, while extremely rapid growth at Dulles buoyed the Commonwealth’s total in the years since.

Excluding the Washington-area airports, other Virginia airports grew extremely slowly in the first half of the last decade, hurt by the recession of the early 1990’s. Traffic expanded at a more rapid pace in the latter half, though failing to reach the national average rate.

Preliminary Forecasts

Three different forecast methodologies were identified and each was applied to the individual Virginia airports. Of the three resulting forecasts, one was selected as the most appropriate and became the preferred commercial enplanement forecast for the VATSP.

Linear Regression

Regression analysis was used to determine the slope of the straight line that best fit historical enplanement data between 1985 and the present. According to this linear trend, enplanements are assumed to grow by a constant amount each year and follow the trend set in the past.

Logarithmic Regression

This methodology is similar to the linear trend analysis above. Instead of assuming a linear trend and growth by a constant number of enplanements each year, however, this method assumes that enplanements will increase by a constant annual percentage. Regression analysis was used to find the exponential trend that best fit the historical data, which was assumed to hold constant over the forecast period.

Relative Growth

The relative growth methodology casts enplanement growth at Virginia commercial service airports in the context of national enplanement growth. The rate of increase at each of the airports of the VATSP between 1985 and 2000 was compared to the expansion of enplanements nationwide over the same period, and the ratio of these growth rates calculated. These ratios were assumed to remain constant for the immediate future, and applied to the FAA's forecast of US enplanement growth to produce enplanement forecasts for each airport. Later in the forecast period, growth rates at the airports were gradually tapered back toward the FAA forecast national rate.

Preferred Forecast Methodology

The relative growth analysis described above was adopted as the basic methodology of the preferred forecast. Unlike the linear and logarithmic trend methods, the relative growth model is able to accommodate more than just historical trends at individual airports in formulating most-likely future scenarios. It is based on the FAA's national enplanement forecast, and thus reflects factors expected by the FAA to have an impact on air travel growth in the nation as a whole. Relative growth analysis subsumes the future macroeconomic, technological, and aviation system capacity assumptions in the FAA forecast.

In the first step of the basic methodology, the growth rate of each airport was compared with growth in national enplanements. In most cases, the period over which growth was measured was 1985 to the present, though growth since 1990 was used in instances where trends occurring between 1985 and 1990 were the result of dynamics considered to have little relevance for projecting future activity.

A ratio between the national and individual airports' rate of growth in enplanements was determined for each Virginia facility. For airports growing slower than the nation, the ratio was less than one. Airports growing faster than the rest of the nation had ratios greater than one.

The forecast of future traffic growth at Virginia airports was based on the FAA's national enplanements projections through 2015, obtained from its Terminal Area Forecast system. In the short-term, the ratios of growth between enplanements at Virginia airports and the national total were assumed to remain the same. The historical growth ratios were applied to the national forecast to yield growth rate forecasts for individual Virginia airports. For example, Charlottesville was found to have grown .96 times as fast as the nation in the historical period. In 2002, the FAA projects that national enplanements will increase by 4.3%. According to the basic relative growth methodology, Charlottesville will grow $4.3\% * .96 = 4.1\%$ in 2002 (though further adjustments to the forecast growth rate, described later, were subsequently made).

With time, it is assumed that growth rates diverging much above or below the national trend will track closer to the US average. Over the forecast period, the growth rates of Virginia airports have been tapered gradually toward the national forecast rate.

While the relative growth analysis was used to produce the basic forecasts for the airports, special conventions or additional analyses were adopted or performed for the airports below:

Reagan National (DCA) and Dulles International (IAD):

The VATSP forecast has adopted the forecast recently performed for Dulles in its Master Plan document. Enplanements at slot-controlled Reagan National Airport have fluctuated about a constant level over the historical period. As of this forecast's writing, it is uncertain whether National Airport will be permitted to resume serving the same level of traffic as before September 11, 2001. This forecast assumes that it will reach that level, at which enplanements will remain constant over the forecast period.

Norfolk International Airport (ORF):

Southwest Airlines began serving Norfolk in October of 2001 with twelve daily departures, though experience elsewhere suggests that its frequencies will grow rapidly. The initiation of Southwest service often has a transformative effect on an airport. The carrier's low fares and high frequency on short-haul routes attract many travelers who would otherwise drive to their destinations or use alternate airports. Due to its low cost structure, Southwest can also place a major market emphasis on transporting low-yielding discretionary travelers to leisure destinations such as Florida and Las Vegas. Airport traffic invariably grows rapidly in the years immediately following the entry of Southwest into a market.

To estimate how rapidly Norfolk will grow with the introduction of Southwest service, the experience of other airports that Southwest already serves was reviewed. The magnitude of Southwest's impact on an individual airport was found to depend on several factors. Among them were the absolute size of traffic flows before Southwest's arrival, the airport's proximity to other major airports, and initial fare levels.

Among airports of a size comparable to Norfolk, the effect of Southwest service on individual origin-and-destination markets within the carrier's route system was examined. The analysis demonstrated that in markets where the new Southwest service lowered fares, traffic jumped 125-150 percent between the year before and year after the commencement of service. In the following year, traffic grew 50-75 percent on the individual routes, then 12-25 percent, and then leveled off as the market matured.

These growth factors were applied to Norfolk origin-and-destination markets within Southwest's route system, on which fare benchmarking analysis indicated that Southwest's fares were likely to be lower than those currently offered. In aggregate terms, this analysis showed the airports' enplanements nearly doubling within five years, before leveling off and thereafter resuming a normal growth rate. Several examples were found of airports already served by Southwest and of comparable size to Norfolk (between half and double its traffic) where a similar growth pattern occurred, an external validation of the forecast methodology.

Passenger Traffic and the Inception of Southwest Service

	<u>Airport</u>	<u>Passenger Enplanements</u>		<u>Percent Increase</u>	
		<i>Year Prior</i>	<i>Five Years Later</i>		
CAF - Table 2	Memphis, TN	2,172,981	3,899,912	79.5%	
	Sacramento, CA	1,737,782	3,321,408	91.1%	
	Columbus, OH	1,578,673	3,239,160	105.2%	
	Reno, NV	1,411,912	2,526,136	78.9%	
	Burbank, CA	1,319,753	2,436,402	84.6%	
	Louisville, KY	918,284	1,698,118	84.9%	
	Boise, ID	752,046	1,332,837	77.2%	
	<i>SH&E Forecast:</i>				
	Norfolk, VA	1,516,361	2,812,276	85.4%	
	Richmond, VA	1,216,713	2,290,735	88.3%	

Source: FAA Terminal Area Forecast , SH&E Forecast

A leveling-off period follows the rapid growth. It represents the maturation of the market as Southwest stops expanding, holds capacity constant and allows growing demand to push up yields for a few years. This pattern has been observed at other Southwest airports, where fares are lower when the carrier first enters, and climb somewhat after the initial years of rapid expansion.

Following this brief level-off period, traffic is assumed to grow at the normal rate predicted by the basic relative growth methodology.

Richmond International Airport (RIC):

Southwest Airlines has declared its intention to serve Richmond in the future. A date for the launch of service or list of routes to be flown has not yet been fixed. This forecast assumes that Southwest will enter Richmond late in 2003.

While much is yet to be determined about Southwest service at Richmond, the forecast anticipates that in aggregate terms growth at Richmond will resemble growth at Norfolk. For the purposes of this forecast, the growth rates predicted for Norfolk in the years following the low-fare carrier's market entry have also been applied at Richmond, though commencing later with Southwest's projected market entry in 2003.

Newport News/Williamsburg (PHF):

When Southwest first enters into a new market, traffic at nearby facilities may decline as passengers are drawn away. However, there have also been many instances of airports where traffic and service appears to have been unaffected by Southwest's entry into a market nearby. The possibility was examined that Newport News would be adversely impacted by the entry of Southwest at Norfolk and Richmond, only twenty-three and fifty-two miles away respectively.

Certain factors suggest that Newport News' passenger traffic may not be diverted to Norfolk and Richmond. Fare benchmarking analysis shows that Newport News is already a deeply discounted airport, where fares are priced nearly twenty-five percent below level expected on routes of similar distance and density, due to the presence of low-fare carrier AirTran. Passengers originating in Newport News' natural catchment area and currently flying out of PHF are already paying low fares, so are unlikely to be diverted by low-fare service at ORF and RIC.

Secondly, the analysis shows that Newport News' most important origin-and-destination market by far is Atlanta, which Southwest does not serve. These Atlanta-bound passengers in particular will continue to fly from Newport News.

It is possible that PHF may lose traffic as passengers flying AirTran through Atlanta to connecting destinations such as Orlando and Jacksonville choose to fly Southwest, which offers direct flights. In addition, some passengers currently originating in Norfolk or Richmond's natural market areas but flying out of Newport News for its lower fares may stop driving there once low-fare service is available at ORF and RIC. The forecast aims to err on the side of caution in predicting traffic diversion from Newport News, however. In the forecast, Newport News' growth rate has been slowed somewhat during the years of Southwest expansion at Norfolk and Richmond.

Additional Forecast Adjustment

The events of September 11th and the drop in passenger traffic and downsizing by airlines necessitate a downward revision in passenger traffic forecasts. The incident lacks precedent, thus it is difficult to predict its medium and long-term effects. The forecast assumes that the full effect of the attack and its aftermath will cost the industry two years of growth. With this adjustment, the basic traffic levels initially forecast for 2001 become the 2003 forecast, 2002's projections are pushed back to 2004, and so forth.

As Tables 3 and 4 show the final result of the study team’s passenger enplanement forecast and predicted growth rates:

CAF - Table 3

Virginia Commercial Airport Enplanements

Airport Name	Historic Enplanements				SH&E Forecast		
	1985	1990	1995	2000	2005	2015	2020
Charlottesville	95,832	132,768	140,936	165,416	177,896	240,615	274,910
Washington National	7,261,209	7,806,515	7,692,554	7,875,373	7,875,373	7,875,373	7,875,373
Washington Dulles*	2,503,375	5,112,324	6,147,787	9,971,632	14,454,200	22,927,800	27,745,900
Lynchburg	67,089	91,575	91,975	81,010	84,001	105,110	119,094
Norfolk	1,626,844	1,345,173	1,337,509	1,516,361	2,812,276	3,362,508	3,823,698
New port New s	61,400	149,599	181,148	229,381	243,350	336,107	384,880
Richmond	766,744	937,054	1,068,023	1,351,925	1,957,635	2,679,171	3,062,572
Roanoke	308,493	345,088	327,845	365,503	382,758	489,099	555,414
Shenandoah	12,690	11,259	8,203	21,025	23,251	33,391	38,398
Total:	12,703,676	15,931,355	16,995,980	21,577,626	28,010,741	38,049,174	43,880,238

**SH&E adopted HNTB forecast*

Source: SH&E forecast except where noted

CAF - Table 4

Virginia Commercial Enplanements Growth

Airport Name	Average Annual Growth			SH&E Forecast		
	1985-1990	1990-1995	1995-2000	2000-2005	2005-2015	2015-2020
Charlottesville	6.7%	1.2%	3.3%	1.5%	3.1%	2.7%
Washington National	1.5%	-0.3%	0.5%	0.0%	0.0%	0.0%
Washington Dulles*	15.4%	3.8%	10.2%	7.7%	4.7%	3.9%
Lynchburg	6.4%	0.1%	-2.5%	0.7%	2.3%	2.5%
Norfolk	-3.7%	-0.1%	2.5%	13.1%	1.8%	2.6%
New port New s	19.5%	3.9%	4.8%	1.2%	3.3%	2.7%
Richmond	4.1%	2.7%	4.8%	7.7%	3.2%	2.7%
Roanoke	2.3%	-1.0%	2.2%	0.9%	2.5%	2.6%
Shenandoah	-2.4%	-6.1%	20.7%	2.0%	3.7%	2.8%
Total:	4.6%	1.3%	4.9%	5.4%	3.1%	2.9%

**SH&E adopted HNTB forecast*

Source: SH&E forecast except where noted

III. Commercial Aircraft Operations

The projection of commercial aircraft operations at Virginia airports represents a derivative forecast; it is based on forecast passenger enplanements as derived in the previous section. A forecast of average enplanements per aircraft operation was applied to projected enplanements to arrive at future aircraft operations.

The basic methodology used to project enplanements per operation was much like that used to forecast enplaning passengers. The difference between historical growth in enplanements per operation at individual airports and in the nation as a whole was evaluated. The resulting historical ratio between the airport and national growth rates was then applied to the FAA-forecast national increase in enplanements per operation in order to forecast growth in enplanements per operation at individual facilities.

As with passenger enplanements, growth rates in enplanements per operation at individual airports were tapered to the national rate over time. Annual forecast aircraft operations were then determined by dividing passenger enplanements by enplanements per operation. Operations forecasts were checked against the FAA's Terminal Area Forecasts. All forecasts were submitted to Commercial Airport operators for review.

Following are instances where analysis varied from this basic methodology:

Reagan National (DCA) and Dulles International (IAD):

The VATSP relied on Dulles' Master Plan document for operations figures. As with passenger enplanements, forecast operations were held constant at Reagan National Airport due to capacity limitations.

Norfolk International Airport (ORF) and Richmond International Airport (RIC):

Exceptional growth in passenger enplanements is projected at ORF and RIC, resulting from the launch of Southwest service. Southwest flies only Boeing 737 aircraft, a pillar of its low-cost operating strategy. These mainline jets will significantly raise the average aircraft size and thus enplanements per operation at those airports. The forecast compensated for this one-time rapid increase in aircraft size at Norfolk and Richmond by projecting probable changes in the fleet mix, and by review of average aircraft size at other Southwest-dominated facilities.

The following Tables, 5,6 and 7 present the study team’s forecast of commercial aircraft operations, predicted growth rates at Virginia airports and total airport operations:

CAF - Table 5

Virginia Commercial Aircraft Operations

Airport Name	Historic Operations				SH&E Forecast		
	1985	1990	1995	2000	2005	2015	2020
Charlottesville	20,356	16,803	19,828	22,103	24,298	31,030	34,077
Washington National	243,438	252,201	250,632	247,980	247,980	247,980	247,980
Washington Dulles*	88,709	178,635	251,365	389,314	524,770	700,840	797,800
Lynchburg	20,639	13,664	16,907	13,133	12,137	13,199	14,222
Norfolk	58,368	63,497	59,639	74,271	100,136	111,151	121,095
Newport News	10,953	26,841	22,208	21,047	17,662	20,958	22,789
Richmond	73,441	61,805	64,799	81,762	84,145	102,629	112,109
Roanoke	41,665	38,192	37,686	40,382	37,495	42,789	46,371
Shenandoah	1,500	4,167	2,553	1,619	1,599	2,000	2,188
Total:	559,069	655,805	725,617	891,611	1,050,223	1,272,578	1,398,631

**SH&E adopted HNTB forecast*

Source: SH&E forecast except where noted

CAF - Table 6

Virginia Commercial Operations Growth

Airport Name	Average Annual Growth			SH&E Forecast		
	1985-1990	1990-1995	1995-2000	2000-2005	2005-2015	2015-2020
Charlottesville	-3.8%	3.4%	2.2%	1.9%	2.5%	1.9%
Washington National	0.7%	-0.1%	-0.2%	0.0%	0.0%	0.0%
Washington Dulles*	15.0%	7.1%	9.1%	6.2%	2.9%	2.6%
Lynchburg	-7.9%	4.4%	-4.9%	-1.6%	0.8%	1.5%
Norfolk	1.7%	-1.2%	4.5%	6.2%	1.0%	1.7%
Newport News	19.6%	-3.7%	-1.1%	-3.4%	1.7%	1.7%
Richmond	-3.4%	1.0%	4.8%	0.6%	2.0%	1.8%
Roanoke	-1.7%	-0.3%	1.4%	-1.5%	1.3%	1.6%
Shenandoah	22.7%	-9.3%	-8.7%	-0.2%	2.3%	1.8%
Total:	3.2%	2.0%	4.2%	3.3%	1.9%	1.9%

**SH&E adopted HNTB forecast*

Source: SH&E forecast except where noted

CAF - Table 7

Total Operations at Virginia Commercial Airports

Airport Name	Ops Type	Historic Operations				SH&E Forecast		
		1985	1990	1995	2000	2005	2015	2020
Charlottesville	Commercial	20,356	16,803	19,828	22,103	24,298	31,030	34,077
	GA	39,789	42,962	72,594	56,898	66,056	85,981	96,815
	<i>Total</i>	<i>60,145</i>	<i>59,765</i>	<i>92,422</i>	<i>79,001</i>	<i>90,354</i>	<i>117,011</i>	<i>130,892</i>
Washington National	Commercial*	243,438	252,201	250,632	247,980	247,980	247,980	247,980
	GA	81,518	61,516	54,244	79,632	82,118	87,093	89,751
	<i>Total</i>	<i>324,956</i>	<i>313,717</i>	<i>304,876</i>	<i>327,612</i>	<i>330,098</i>	<i>335,073</i>	<i>337,731</i>
Washington Dulles	Commercial	88,709	178,635	251,365	389,314	524,770	700,840	797,800
	GA	115,972	63,562	56,773	67,173	69,607	74,458	76,941
	<i>Total</i>	<i>204,681</i>	<i>242,197</i>	<i>308,138</i>	<i>456,487</i>	<i>594,377</i>	<i>775,298</i>	<i>874,741</i>
Lynchburg	Commercial	20,639	13,664	16,907	13,133	12,137	13,199	14,222
	GA	56,980	58,391	41,689	44,574	50,942	64,779	72,292
	<i>Total</i>	<i>77,619</i>	<i>72,055</i>	<i>58,596</i>	<i>57,707</i>	<i>63,079</i>	<i>77,977</i>	<i>86,514</i>
Norfolk	Commercial	58,368	63,497	59,639	74,271	100,136	111,151	121,095
	GA	124,049	92,973	77,579	50,419	52,066	55,397	57,154
	<i>Total</i>	<i>182,417</i>	<i>156,470</i>	<i>137,218</i>	<i>124,690</i>	<i>152,202</i>	<i>166,548</i>	<i>178,249</i>
Newport News	Commercial	10,953	26,841	22,208	21,047	17,662	20,958	22,789
	GA	134,574	139,953	158,509	193,966	207,955	237,974	254,108
	<i>Total</i>	<i>145,527</i>	<i>166,794</i>	<i>180,717</i>	<i>215,013</i>	<i>225,617</i>	<i>258,933</i>	<i>276,897</i>
Richmond	Commercial	73,441	61,805	64,799	81,762	84,145	102,629	112,109
	GA	91,696	97,641	83,224	68,136	73,618	85,284	91,571
	<i>Total</i>	<i>165,137</i>	<i>159,446</i>	<i>148,023</i>	<i>149,898</i>	<i>157,764</i>	<i>187,913</i>	<i>203,679</i>
Roanoke	Commercial	41,665	38,192	37,686	40,382	37,495	42,789	46,371
	GA	105,582	90,775	76,401	67,585	74,597	89,752	97,950
	<i>Total</i>	<i>147,247</i>	<i>128,967</i>	<i>114,087</i>	<i>107,967</i>	<i>112,092</i>	<i>132,541</i>	<i>144,321</i>
Shenandoah	Commercial	1,500	4,167	2,553	1,619	1,599	2,000	2,188
	GA	22,450	26,306	14,204	19,027	21,221	26,119	28,780
	<i>Total</i>	<i>23,950</i>	<i>30,473</i>	<i>16,757</i>	<i>20,646</i>	<i>22,821</i>	<i>28,119</i>	<i>30,968</i>
VA Carrier Airports Total:		1,331,679	1,329,884	1,360,834	1,539,021	1,748,405	2,079,414	2,263,993

*SH&E adopted HNTB forecast

Source: SH&E forecast except where noted