Lynchburg Regional Airport
Airport Master Plan Update

FINAL


Existing ATCT Perspective

March 2010

Submitted by:
HNTB Corporation

HNTB

Lynchburg Regional Airport
Master Plan Update

March 2010

The preparation of this document was financed in part through an Airport Improvement Program (AIP) grant from the Federal Aviation Administration (FAA) as provided under the Federal Aviation Reauthorization act of 1996. The contents do not necessarily reflect the official views or policy of the FAA. Acceptance of this report by the FAA does not in any way constitue a commitment on the part of the United States to participate in any development depicted therein, nor does it indicate that the proposed development is environmentally acceptable in accordance with appropriate public laws. (FAA Order 5100.38 from the AIP handbook.)

To ensure that the interests of all stakeholders were considered, a public participation process was established. The two key elements of the process included meetings with the Lynchburg Regional Airport Commission and holding a public workshop. HNTB met with the Commission throughout the process to review technical work and to give progress reports. The nine commissioners are appointed by the Lynchburg City Council. The commission consists of city and county officials, local business owners, and general aviation users. Planners from the FAA and Virginia Department of Aviation also attended meetings when available. The public information workshop was held on June 8, 2009 toward the end of the process, to give the general public an opportunity to review and comment on the proposed development plan. Documentation of the public information workshop advertisements and sign-in sheet are contained in **Appendix F** of the document.

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HNTB Corporation

In association with:

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Prepared for:

Lynchburg Regional Airport

HNTB

Contents

Appendices

Chapter One
Inventory

The purpose of this technical memorandum is to document the airports physical facilities. The inventory is based on information obtained from the airport, interviews with tenants and onsite inspection. This information is based on conditions as they existed in October 2006. **Figure 1-1** depicts the existing airport facilities.

1.1 HISTORICAL BACKGROUND OF LYNCHBURG REGIONAL AIRPORT

Much of the site on which Lynchburg Regional Airport lies was formerly occupied by the City's Prison Farm, which was in operation from 1915 until 1945. The Prison farm initially focused on growing produce such as potatoes and corn and later established dairy farming. Prisoners were also "rented" out to other city departments for the maintenance of streets, parks, and the City Cemetery.

In 1929, the City Council and the Chamber of Commerce began efforts to establish an airport for the area, and a portion of the City Prison Farm was chosen as the site for the airfield. Work was commenced by the Virginia Department of Highways, and the Airport, named after Preston Glenn, a pilot in World War I, opened in April 24, 1931 with one runway (Runway 6-24).

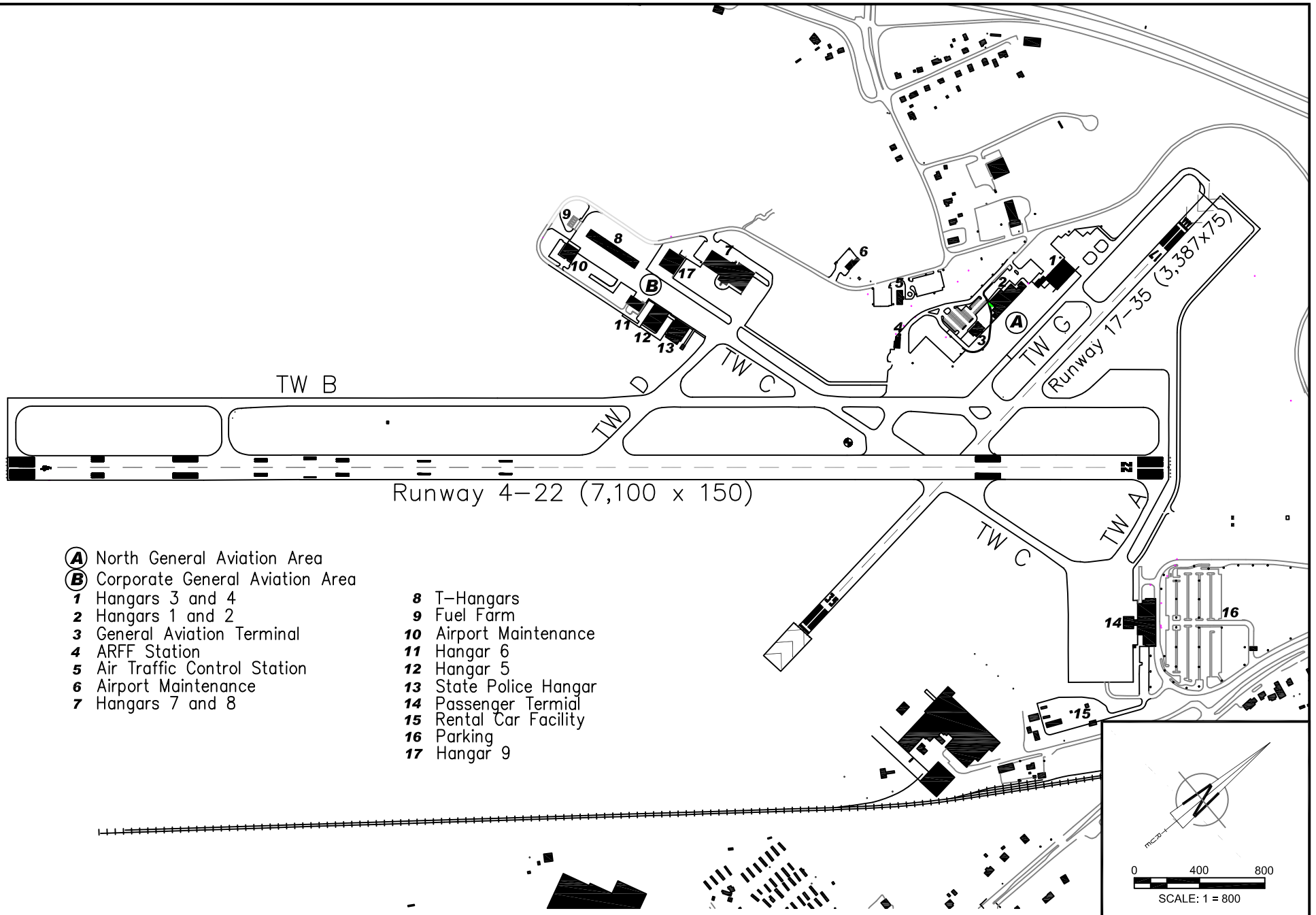
Initially, American Airlines began air mail and passenger service to the City; however, in 1937, American pulled out because Lynchburg, like many other small airports had inadequate facilities to handle their new fleet of aircraft. American returned to Lynchburg in 1942 after the U.S. Navy completed an extensive airport improvement program.

During World War II, the U.S. Navy designated Lynchburg as a ferry stop for new fighter aircraft on their way to Norfolk, VA. During this time the Navy paid for and built a control tower and improved the runways and lighting.

In 1948, Piedmont Airlines initiated service between Norfolk, Richmond, Lynchburg, Roanoke, Charleston, Huntington, and Cincinnati using DC-3 aircraft.

Major capital improvements were made to the Airport in the early 1960s, including the construction of a new terminal building, control tower, general aviation hangars and offices, improved taxiways, ramps, and runways (including the lengthening of Runway 3-21 to 5,800 feet).

Since that time, several corporate hangars have been constructed, along with an aircraft maintenance facility. In addition, construction was begun in 1989 for a 38,000 square foot airport terminal building to serve the growing demand of air service to the community.



P:_Projects\42464-lynchburg\CAD\LYH ALP\FIGURE1.dwg Layout2 Aug 12, 2009 - 9:54am

HNTB

2900 SOUTH QUINCY STREET,
SUITE 200
ARLINGTON, VIRGINIA 22206
PH (703) 824-5100
FAX (703) 671-6210

EXISTING AIRPORT LAYOUT

LYNCHBURG REGIONAL AIRPORT
LYNCHBURG, VIRGINIA

DATE:
Aug 12, 2009

FIGURE:
1-1

The Airport continues to grow and modernize in the 21st Century. A new GA terminal was built in 2002, in August 2007, Runway 4-22 was extended from 5,799 feet to a length of 7,100 feet, and in 2006 a t-hangar building and adjoining jet pod were constructed. Most recently, in October 2008, a new 13,200 square-foot corporate hangar opened.

1.1.1 Access

Primary ground access to the Airport is provided via US 29, just south of the US Route 460 interchange. This connects to Airport Drive which serves the commercial terminal and SR 648 which serves the general aviation side of the airport. US 460 provide secondary access to the general aviation area.

1.1.2 Parking

Parking for the commercial terminal is provided immediately adjacent the terminal building. The parking area is accessed from Airport Drive and includes 95 hourly, 313 daily and 70 employee spaces.

1.1.3 Terminal

The Air Carrier Terminal Building opened in February 1992. The terminal contains approximately 38,000 square feet of floor space on two levels. Approximately 29,300 square feet are on the main level which primarily supports airport administration, ticketing, hold rooms, bag claim, security, car rental, restrooms and public circulation and waiting area. The lover level is approximately 8,600 square feet and primarily supports airline offices, hold rooms, restrooms and circulation/public space. **Appendix A** contains a Technical Memorandum for the Inventory of the Passenger Terminal Conditions and Issues based on interviews and survey of existing conditions.

The terminal is supported by 16,000 square yards of apron that can support a wide range of aircraft sizes and types.

1.1.4 Airfield

The primary airfield elements include runways, taxiways and NAVAIDS. Each of these elements is described below.

Runways – The Airport is served by a primary runway, Runway 4-22 and a secondary crosswind runway, Runway 17-35. **Table 1-1** below lists the physical characteristics for each runway.

Table 1-1

Runway Characteristics

	Runway 4-22	Runway 17-35
Airport Reference Code	C-III	B-II
Length (ft.)	7,100 (1)	3,387
Width (ft.)	150	75
Pavement Type	asphalt	asphalt
Approaches	RWY 4 50:1	RWY 17 20:1
	RWY 22 34:1	RWY 35 20:1
Displacement	N/A	RWY 17 300'
		RWY 35 300'
Pavement Strength (lbs.)		
Single wheel	90,000	25,000
Double wheel	108,000	35,000
Double tandem	170,000	55,000
Effective Gradient (in %)	0.65	0.62
Runway End Elevation (MSL)	RWY 4 - 894'	RWY 17 - 918'
	RWY 22 - 938'	RWY 35 - 918'
Marking	Precision	Visual
Lighting	HIRL	MIRL
Runway Safety Area	500' x 8,800'	150' x 3,987'
Runway Object Free Area	800' x 8,800'	500' x 3,987'

Notes: (1) Includes runway extension.

Taxiways
The following is a summary of the taxiways that serve the Runway 4-22 and 17-35 system.

Taxiway A – connects the terminal apron to the Runway 22 threshold.

Taxiway B – a full length parallel taxiway that serves the primary runway, Runway 4-22.

Taxiway B1 – serves as an exit taxiway for Runway 4-22, located near the approach end of Runway 4.

Taxiway C – extends from the southwest corner of the terminal apron and extends to the south general aviation area.

Taxiway D – serves as an exit taxiway for Runway 4-22. It is located slightly south of the midpoint of the runway and extends to Taxiway C in the south general aviation area.

Taxiway E – serves as an exit taxiway for Runway 4-22. It is located in the proximity of the intersection of Taxiway C and the runway and extends to Taxiway B.

Taxiway G – is a partial parallel taxiway that serves Runway 17-35 and the north general aviation area. It extends from the Runway 17 end south to Taxiway B.

Taxiway H – serves as an exit taxiway for Runway 17-35. It connects to Taxiway G approximately 700 feet from Runway 17 threshold.

Taxiway J- serves an exit taxiway for Runway 17-35. It is located near the midpoint of the runway just north of the Runway 4-22 intersection and extends to Taxiway B and G intersection.

All taxiways are 50 feet in width and are provided with medium intensity lights.

NAVAIDS
The following summarizes the Airport's visual approach aids and electronic equipment that serves the precision and non-precision instrument approaches. The approach procedure charts for each published approach can be found in **Appendix B.**

Visual Approach Aids

- Runway 4 – Precision Approach Path Indicator (PAPI), Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR)
- Runway 22 – PAPI, Runway End Identifier Lights (REIL).
- Runway 17 – PAPI, REIL
- Runway 35 – PAPI, REIL

Electronic NAVAIDS

- Runway 4 – Localizer, Glide Slope Antenna
- Non-Directional Beacon, located off-airport
- VORTAC, located off-airport

Published Approaches

- Runway 4 – ILS, VOR and GPS
- Runway 22 – GPS, VOR/DME

1.1.5 General Aviation

There are two general aviation (GA) areas located on the west side of the airport. The North General Aviation area fronts Taxiway G and includes a GA terminal and a full-service Fixed Base Operator (FBO). The South GA area is served by Taxiway C and includes a full-service FBO, Corporate Hangars and a T-hangar complex. The facilities within these areas are summarized below. **Table 1-2** provides a summary of the GA facilities.

1.1.6 North General Aviation Area

GA Terminal

Building – This single-story building is 4,464 square feet and includes a lobby/atrium, conference room, pilot lounge, flight planning room, vending area, office, line service office and restrooms. The terminal is public use (except FBO offices) and operated by Virginia Aviation.

South Ramp – Approximately 3,200 square yards of transient apron is immediately adjacent the terminal building. A second larger apron area, referred to as the south ramp, is immediately south of the terminal building. This 10,000 square yard apron served the old terminal building which has since been removed.

FBO (Virginia Aviation is a full-service FBO providing aircraft maintenance, aircraft sales, fueling service, flight training, avionics, and aircraft rental/storage)

Hangars – There is approximately 31,600 square feet of hangar space that is used for maintenance and storage. The hangars associated with the North General Aviation Area include Hangars 1-4.

Office – There is approximately 4,798 feet of office space that is utilized for public use, administration, training and maintenance support.

Aircraft Apron/Tie-down – The aprons serving the FBO include transient parking, based aircraft tie-down and hangar apron. Approximately 11,000 square yards of apron is associated with the facilities.

1.1.7 Corporate General Aviation Area

T-Hangars – T-hangars were added to the Corporate GA Area in the summer of 2006 and are located at the west end of Taxiway C. The building includes 12 nested units and one jet pod unit located on the east side. A singe taxilane provides access to each side of the T-hangars.

FBO (Falwell-Aviation is a full-service FBO providing aircraft charter service, maintenance, flight training and aircraft storage, and retail fuel services).

Hangars – Three hangars, Hangar #7, Hangar #8, and Hangar #9, totaling approximately 41,000 square feet are located at the FBO. Hangar #8 is the larger of the two hangars with 15,800 square feet of floor area. This hangar supports Falwell-Aviation's aircraft maintenance business. Hangar #7 is a 12,200 square-foot hangar that is used exclusively for aircraft storage, and Hangar #9 is a 13,200 square-foot hangar used for aircraft storage.

Office – A two-story office pod separates the two hangars. This area provided over 15,000 square feet of space that is used for administration, training and maintenance support.

Apron – Approximately 10,300 square yards of apron support the hangar facilities.

Corporate Hangars – Hangars #5, #6 and the State Police Hangar occupy the South General Aviation Area on the south side of Taxiway C. Hangar #5 is leased by Virginia Aviation and has 12,000 square feet of hangar floor space and 2,400 square feet of office space. Hangar #6, which is leased to Virginia Aviation, is 6,000 square feet. The State Police Hangar is 10,000 square feet with a 2,200 square-foot office attached to the back of the hangar.

Table 1-2
Summary of General Aviation Facilities

Facility	Hangar Bay (SF)	Office (SF)	Apron (SY)
Terminal		598	3,200
Hangar 1	10,000	1,600	3,425
Hangar 2	5,600	-	3,425
Hangar 3	6,000	1,800	-
Hangar 4	10,000	-	-
Hangar 5	12,000	2,400	-
Hangar 6	6,000	-	-
Hangar 7	12,200	15,000 (a)	5,150
Hangar 8	15,800	-	5,150
Hangar 9	13,200	-	-
South Ramp	-	-	10,000
North Ramp (GA Tie-down)	-	-	4,170
Total	**100,800**	**23,598**	**34,520**
T-hangars	13		

Note: (a) office pod located between Hangars 7 and 8.

1.1.8 Airport Support

Airport support includes Airport Maintenance Facilities, Airport Rescue and Fire Fighting, Air Traffic Control Tower, and the Airport Fuel Farm. These facilities are described below.

Airport Maintenance Facilities – Airport maintenance facilities are located in two areas. The primary facility is located in the Corporate Aviation Area. This 6,700 square-foot facility was constructed in 2001 primarily to house the Airport's snow removal equipment. The second airport maintenance facility is located just west of the ATCT on the north side of Airport Road. This 3,600 square-foot facility is used for storage of field maintenance equipment. A vehicle/equipment list can be found in **Appendix C.**

Airport Rescue and Fire Fighting Facility (ARFF) – The ARFF facility is located south of the General Aviation Terminal. This 2,000 square foot facility includes two vehicle bays, an all purpose room, restroom, and equipment storage. The ARFF equipment includes one Oshkosh TB1500 response truck.

Air Traffic Control Tower (ATCT) – The ATCT is located on the south side of airport road between the north and south GA areas. The tower cab is situated on a three-story building. Much of this aging facility is currently unoccupied.

Fuel Farm – The airports fuel farm is located in the Corporate Aviation Area on the west side of the T-Hangars. This above ground facility includes 2-15,000 gallon Jet A tanks and 1-15,000 gallon 100LL tank. The fuel farm is currently leased by Virginia Aviation & Falwell Aviation.

1.1.9 Rental Car

The rental car facility is located south of the passenger terminal. This one and one-half acre site supports their ready/return car wash, fueling, and storage functions. They also control 61 spaces adjacent the south end of the passenger terminal building.

Chapter Two
Forecasts

2.1 INTRODUCTION

This chapter contains the aviation activity Master Plan, Virginia Air Transportation System Plan, and TAF forecasts for Lynchburg Regional Airport (LYH). The forecasts presented are used to assess future planning needs for both airside and landside development. The forecast plays a critical piece in these future developments. Without the forecast, facility sizes and the sectors of the airport that are going to need the most development would be more difficult to assess. For this reason, all aspects of the airport operations are examined. These include passenger movement, cargo tonnage, and aircraft operations. The forecasts presented in this working paper assume that airfield and terminal facilities will be available to accommodate any increase in demand that may occur during the forecast period. For this reason, all forecasts are considered unconstrained.

The chapter focuses first on socioeconomic data and projections, followed by historical activity at the airport. Finally, the future years forecast for airport activity will be presented. The forecast years presented as chosen in the scope are 2011, 2016, and 2026. In section 1.2 (socioeconomic data and projections) the Lynchburg primary and secondary service areas will be defined. Then, historical and projected population, income, and employment will be explained. The subsequent section 1.3 discusses historical aviation trends and activity at LYH. Section 1.4 will address the assumptions that the forecast requires. Section 1.5 describes passenger forecasts for enplanements, operations, and fleet mix. In addition section 1.5 also addresses peaking activity for passenger enplanements and operations. Section 1.6 addresses present and future cargo activity, and also, air taxi, GA and military activity. Section 1.7 compares a summary of the base case LYH projections to the Terminal Area Forecast (TAF). These forecasts will provide guidance into future planning and improvement throughout the master plan period.

The assumptions presented are based on inputs from Lynchburg Regional Airport Air Traffic Reports, The Lynchburg Small Community Air Service Development Program proposal, Commonwealth of Virginia Records, United States Department of Transportation (USDOT) data, relevant literature, and professional experience. Due to the low amount of air traffic at LYH in relation to other larger airports, LYH operations are more sensitive to changes in assumptions presented. For instance, the addition of a single carrier to the airport would effect operations at the airport much more than at an airport of larger size. Taking this into consideration, forecasting is an inexact science. Since the projections presented are based on factors such as the performance of the local and national economy and the airline business environment, a significant difference from their projected values would affect the forecasts. Changes in

technology or air travel would affect the final years of the forecast traffic levels the most, as uncertainty becomes a larger factor.

2.2 SOCIOECONOMIC PROJECTIONS

A strong local and national economy, coupled with airfare levels, proves to be the most significant factor in determining passenger demand. Any forecast that takes into account the passenger demand and activity should take into consideration the local economic trends and projections.

The most important factor when analyzing socioeconomic factors is properly defining the catchment area. An area that is too small will not take into account a portion of the population and economic activity that will generate demand at an airport. An area too large will subsequently take into account a portion of the population and economy that have more of an impact on a different airport's demand.

For LYH, two catchment areas were defined. The primary service area is the MSA for Lynchburg, which consists of the counties Amherst, Appomattox, Bedford, and Campbell, as well as the cities of Lynchburg and Bedford. The secondary service area includes all of the primary service area as well as the counties of Prince Edward, Charlotte, Halifax, and Pittsylvania. This area was expanded to account for potential local travelers for whom LYH is the closest commercial service airport. Counties that had interstate roadway access to other airports were excluded from the secondary catchment area. Even though these counties are closer to LYH, the fact that the interstate connects them to another airport causes the competing airport to appear closer. Both service areas were analyzed further to help determine the passenger forecast. These service areas are shown in **Figure 2-1**.

Data for socioeconomic activity is available on a county and incorporated city basis as opposed to zip code. Woods and Poole Economics, Inc, a nationally recognized provider of economic data and projections, was the source of all population, income and employment projections and data with the exception of 2002 through 2004. Data for the period 2002-2004 were obtained from the Bureau of Economic Analysis. Due to the fact that Woods and Poole projections are based on 2002 data, adjustments had to be made in order to account for more recent time periods. This was accomplished by taking the Woods and Poole future year projections and multiplying them by the ratio of actual 2004 data to Woods and Poole 2004 projections.

Table 2-1 presents historical and projected population levels for the primary and secondary service areas. The population for the primary service area grew from 206,913 in 1990 to 233,876 in 2004. This represents a compounded annual growth rate of 0.9%. The secondary service area increased from 381,119 in 1990 to 411,067 in 2004. This represents a compounded annual growth rate of 0.5%. Both of these rates lagged the U.S. population's compounded annual growth rate during the same time period (1.2%).

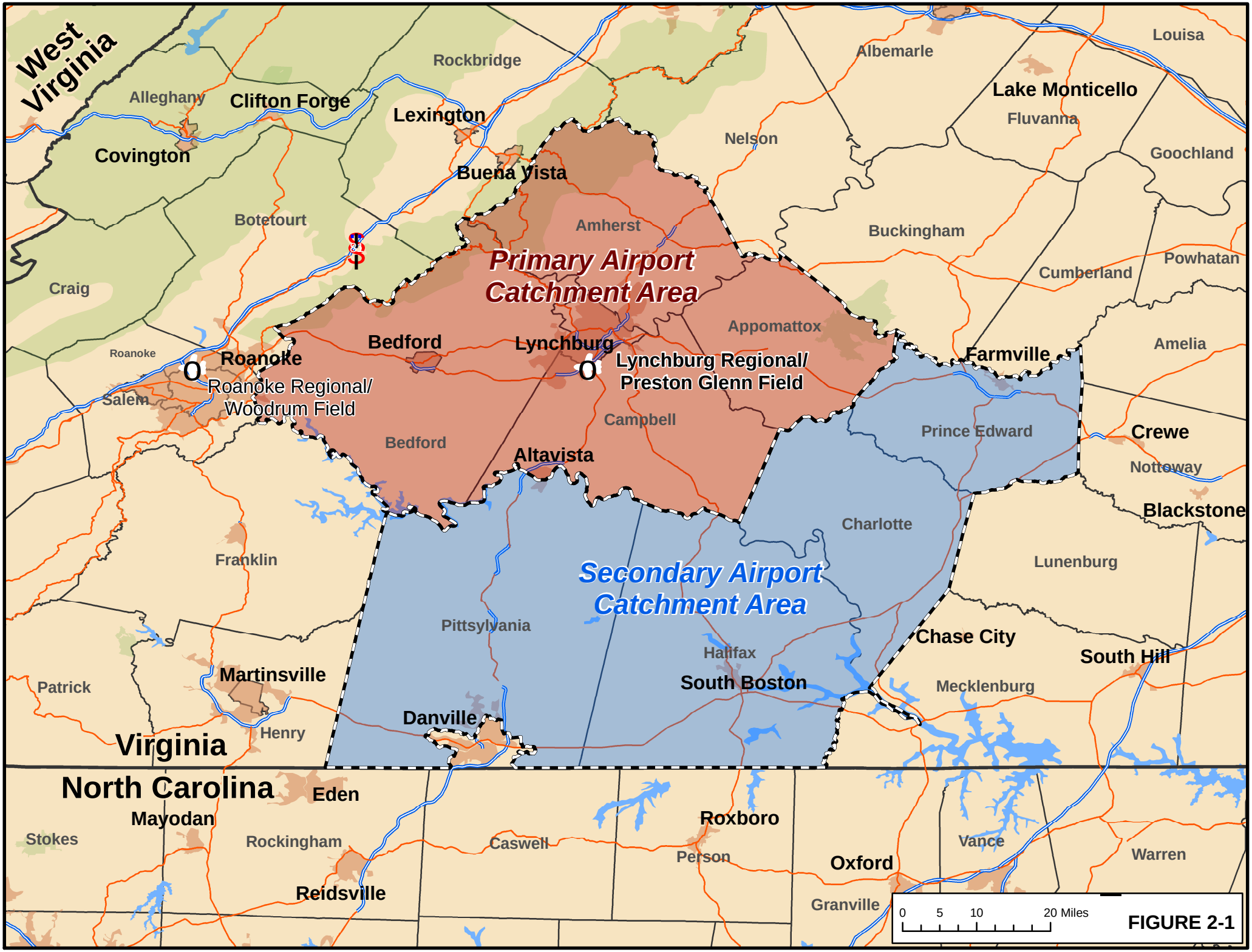

West Virginia
Alleghany
Clifton Forge
Rockbridge
Lexington
Albemarle
Louisa
Lake Monticello
Fluvanna
Nelson
Goochland
Covington
Buena Vista
Botetourt
Amherst
Buckingham
Powhatan
Cumberland
Craig
Primary Airport Catchment Area
Appomattox
Amelia
Roanoke
Bedford
Lynchburg
Farmville
Roanoke
Roanoke Regional/ Woodrum Field
Lynchburg Regional/ Preston Glenn Field
Salem
Campbell
Prince Edward
Crewe
Bedford
Altavista
Nottoway
Blackstone
Charlotte
Franklin
Secondary Airport Catchment Area
Lunenburg
Pittsylvania
Chase City
South Hill
Halifax
Martinsville
South Boston
Mecklenburg
Patrick
Danville
Henry
Virginia
North Carolina
Eden
Mayodan
Roxboro
Stokes
Rockingham
Caswell
Person
Vance
Warren
Oxford
Reidsville
Granville
0 5 10 20 Miles
FIGURE 2-1

Table 2-1

Historical and Projected Population

Year	Primary Service Area (1)	Primary & Secondary Catchment Area (2)	United States
		Historical	
1990	206,913	381,119	249,622,814
1991	208,971	384,147	252,980,941
1992	212,888	389,033	256,514,224
1993	214,890	392,411	259,918,588
1994	217,728	396,767	263,125,821
1995	219,612	399,223	266,278,393
1996	221,872	401,378	269,394,284
1997	224,156	403,619	272,646,925
1998	225,675	405,484	275,854,104
1999	227,337	407,339	279,040,168
2000	228,924	408,433	282,192,162
2001	229,278	407,969	285,102,075
2002	230,025	408,447	287,941,220
2003	232,065	409,742	290,788,976
2004	233,876	411,067	293,545,240
		Projected (3)	
2004	233,876	411,067	293,545,240
2011	247,240	425,207	314,066,344
2016	257,471	437,683	329,154,018
2026	279,534	461,663	362,849,363
		Average Annual Growth Rate	
1990-2004	0.9%	0.5%	1.2%
2004-2026	0.8%	0.5%	1.0%

(1) Includes Lynchburg City, Bedford City, and Amherst, Appomattox, Bedford, and Campbell Counties.
(2) Includes all cities and counties aforementioned in (1) plus Counties of Prince Edward, Charlotte, Halifax, and Pittsylvania.
(3) Projected to grow at Woods & Poole projected growth rates from 2004 base.

Sources: United States Department of Commerce, Bureau of Economic Analysis, Woods and Poole, CEDDS 2005 and HNTB analysis.

Table 2-1 also contains projections for future years 2011, 2016, and 2026. Woods and Poole projects the population to increase in the primary service area from 233,876 in 2004 to 257,471 in 2016 and then to 279,534 in 2026. This represents an annual increase of 0.8% for the primary service area. The secondary service area is projected to increase over the same time period at a 0.5% annual rate. The secondary service area population is projected to increase from 411,067 in 2004 to 425,207 in 2011, 437,683 in 2016 and 461,663 in 2026. The United States population is projected to increase faster than either the primary or secondary service area at a 1.0% compounded annual rate.

Table 2-2 describes the total employment for the area. The primary service area increased in employment from 116,033 in 1990 to 131,744 in 2004. This represents an annual percentage rate increase of 0.9%. The secondary service area increased from 201,445 in 1990 to 221,449 in 2004. This represents a 0.7% increase per year. The United States increased at a 1.4% annual rate during the same time period.

The employment projections for the primary service (Table 2-2) area show an increase to 141,961 in 2011, 149,324 in 2016, and 164,212 in 2026. Overall the primary service area is projected to increase at an annual rate of 1.0%. The secondary service area is projected to increase at an annual rate of 0.8%. The employment in the secondary service area is projected to increase to 235,451 in 2011, 245,863 in 2016, and 265,549 in 2026. Over the same period the United States is predicted to increase at a 1.3% annual rate.

Table 2-3 presents historical data for income and future projections in 2005 prices. The income for the primary service area increased from $4,784,908,000 in 1990 to $6,672,112,000 in 2004. This represented a 2.4% annual increase. The secondary service area income increased at a 2.1% annual rate from $8,173,957,000 in 1990 to $10,929,036,000 in 2004. The United States increased at a 2.9% annual rate during the same time period.

The projections in Table 2-3 for the primary service area income predict it to increase at an annual rate of 1.9% to $7,575,826,000 in 2011, $8,303,886,000 in 2016, and finally to $10,003,353,000 in 2026. The projections for the secondary service area are projected to increase at an annual rate of 1.6% for the forecast period. Income in this service area is projected to increase to $12,205,588,000 in 2011, $13,256,361,000 in 2016, and $15,587,444,000 in 2026. The United States is projected to increase at a faster annual rate of 2.1% during the forecast period.

While population and income both present valuable information about the socioeconomic makeup of an area, per capita income reveals relative income with more accuracy. For instance, an area can have a very large income, but also have a very large population, so the wealth of the average household will be lower than that of an area with a smaller population and equal income. **Table 2-4** displays the per capita income in 2005 prices for both the primary and secondary service areas and the United States. The per capita income for the primary service increased from $23,125 in 1990 to $28,528 in 2004. This represents an annual increase of 1.5%.

Table 2-2

Historical and Projected Employment

Year	Primary Service Area (1)	Primary & Secondary Catchment Area (2)	United States
		Historical	
1990	116,033	201,445	139,380,900
1991	114,957	198,759	138,605,800
1992	115,071	199,743	139,162,100
1993	118,038	204,582	141,779,400
1994	120,885	207,827	145,223,600
1995	122,964	212,017	148,982,800
1996	124,538	213,482	152,150,200
1997	125,864	215,980	155,608,200
1998	126,046	216,173	159,628,200
1999	129,659	220,886	162,955,300
2000	131,514	223,973	166,758,800
2001	130,181	220,273	167,014,700
2002	129,381	219,950	166,633,100
2003	129,599	219,413	167,488,500
2004	131,744	221,449	170,091,500
		Projected (3)	
2004	131,744	221,449	170,091,500
2011	141,961	235,451	187,415,274
2016	149,324	245,863	199,348,976
2026	164,212	265,549	224,825,823
		Average Annual Growth Rate	
1990-2004	0.9%	0.7%	1.4%
2004-2026	1.0%	0.8%	1.3%

(1) Includes Lynchburg City, Bedford City, and Amherst, Appomattox, Bedford, and Campbell Counties.

(2) Includes all cities and counties aforementioned in (1) plus Counties of Prince Edward, Charlotte, Halifax, and Pittsylvania.

(3) Projected to grow at Woods & Poole projected growth rates from 2004 base.

Sources: United States Department of Commerce, Bureau of Economic Analysis, Woods and Poole, CEDDS 2005 and HNTB analysis.

Table 2-3

Historical and Projected Income (000's of 2005 dollars)

Year	Primary Service Area (1)	Primary & Secondary Catchment Area (2)	United States
		Historical	
1990	$ 4,784,908	$ 8,173,957	$ 6,716,422,579
1991	$ 4,758,665	$ 8,118,494	$ 6,717,618,502
1992	$ 4,919,537	$ 8,411,955	$ 6,980,289,226
1993	$ 5,067,852	$ 8,590,210	$ 7,076,788,709
1994	$ 5,208,783	$ 8,795,132	$ 7,286,743,456
1995	$ 5,325,601	$ 8,978,115	$ 7,520,845,457
1996	$ 5,470,186	$ 9,151,869	$ 7,822,836,476
1997	$ 5,637,544	$ 9,439,788	$ 8,161,821,925
1998	$ 5,921,120	$ 9,850,100	$ 8,666,252,350
1999	$ 6,139,579	$ 10,140,866	$ 8,981,154,922
2000	$ 6,343,380	$ 10,468,685	$ 9,495,383,111
2001	$ 6,428,556	$ 10,568,215	$ 9,597,356,947
2002	$ 6,437,508	$ 10,649,013	$ 9,601,057,346
2003	$ 6,460,171	$ 10,670,847	$ 9,702,429,148
2004	$ 6,672,112	$ 10,929,036	$ 9,999,518,802
		Projected (3)	
2004	$ 6,672,112	$ 10,929,036	$ 9,999,518,802
2011	$ 7,575,826	$ 12,205,588	$ 11,522,756,730
2016	$ 8,303,886	$ 13,256,361	$ 12,732,500,624
2026	$ 10,003,353	$ 15,587,444	$ 15,667,549,815
		Average Annual Growth Rate	
1980-2004	2.4%	2.1%	2.9%
2004-2026	1.9%	1.6%	2.1%

(1) Includes Lynchburg City, Bedford City, and Amherst, Appomattox, Bedford, and Campbell Counties.

(2) Includes all cities and counties aforementioned in (1) plus Counties of Prince Edward, Charlotte, Halifax, and Pittsylvania.

(3) Projected to grow at Woods & Poole projected growth rates from 2004 base.

Sources: United States Department of Commerce, Bureau of Economic Analysis, Woods and Poole, CEDDS 2005 and HNTB analysis.

Table 2-4

Historical and Projected Per Capita Income (2005 dollars)

Year	Pirmary Service Area	Secondary Service Area (2)	United States (3)
		Historical	
1990	$23,125	$21,447	$26,906
1991	$22,772	$21,134	$26,554
1992	$23,109	$21,623	$27,212
1993	$23,583	$21,891	$27,227
1994	$23,923	$22,167	$27,693
1995	$24,250	$22,489	$28,244
1996	$24,655	$22,801	$29,039
1997	$25,150	$23,388	$29,935
1998	$26,237	$24,292	$31,416
1999	$27,007	$24,895	$32,186
2000	$27,710	$25,631	$33,649
2001	$28,038	$25,904	$33,663
2002	$27,986	$26,072	$33,344
2003	$27,838	$26,043	$33,366
2004	$28,528	$26,587	$34,065
		Projected (3)	
2004	28,528	26,587	34,065
2011	30,642	28,705	36,689
2016	32,252	30,288	38,683
2026	35,786	33,764	43,179
		Average Annual Growth Rate	
1980-2004	1.5%	1.5%	1.7%
2004-2026	1.0%	1.1%	1.1%

(1) Includes Lynchburg City, Bedford City, and Amherst, Appomattox, Bedford, and Campbell Counties.

(2) Includes all cities and counties aforementioned in (1) plus Counties of Prince Edward, Charlotte, Halifax, and Pittsylvania.

(3) Projected to grow at Woods & Poole projected growth rates from 2004 base.

Sources: United States Department of Commerce, Bureau of Economic Analysis, Woods and Poole, CEDDS 2005 and HNTB analysis.

The secondary service area increased from $21,447 in 1990 to $26,587 in 2004. This represents an annual increase of 1.5%. During the same time span the United States increased at a 1.7% annual rate.

The future projections for the primary service area in Table 2-4 predict per capita income to increase at a 1.0% annual rate from $28,528 in 2004 to $30,642 in 2011, $32,252 in 2016 and $35,786 in 2026. The secondary service area is projected to increase at an annual rate of 1.1%. The per capita income should increase to $28,705 in 2011, $30,288 in 2016 and $33,764 in 2026. The United States is projected to increase during the same time period at an annual rate of 1.1%.

Overall, in the Lynchburg primary and secondary service area, passenger growth determinants during the forecast period such as income should grow at rate slower than that of the rest of the United States. Per capita income should increase at a rate similar to that of the rest of the United States.

2.3 HISTORICAL AVIATION ACTIVITY AND CURRENT TRENDS

This section describes the historical aviation activity and notable trends at LYH. It includes all passenger and airline service, cargo, total aircraft operations, and the peaking activity.

2.3.1 Passenger Activity

Table 2-5 displays passenger activity at LYH. Total passengers peaked in 1994 when 196,361 passengers passed through the airport. After 1996, annual passenger levels fell slightly, then remained constant until 2000, when another decrease began. This was most likely attributable to an economic downturn that began in the airline industry at that time. The 2001 terrorist attacks exacerbated the decline in passenger demand at the airport, leading to the pullout of United Airlines at LYH. In January 2002, United Express ended their non-stop service from LYH to Washington Dulles International Airport (IAD).

Each year since 2003, the number of passengers traveling through the airport has increased. Between 2003 and 2004, the number increased by more than 20,000 passengers, to 120,976. The number increased again to 134,028 in 2005. LYH has benefited from the growth in activity nationally that normally is associated with a growing economy.

Table 2-5 also presents the historical originations for LYH. Originations are passengers that begin and end the air portion of their travel at LYH. Historically, originations have represented a very large amount of the total enplanements at LYH. This factor is due to the small number of connections at the airport.

2.3.2 Air Service

In 2005 Lynchburg had scheduled non stop flights to two destinations - Hartsfield-Jackson Atlanta International (ATL) and Charlotte-Douglas International Airport (CLT). Atlantic

Table 2-5

Historic Scheduled Passenger Enplanements

Year	Domestic O&D Passengers (1)	Domestic Originations (2)	Total Passengers (3)	Domestic Enplanements (3)	TAF (4)	Ratio of Domestic Originations to Enplanements
1990	167,380	83,990	182,839	91,420	90,813	91.87%
1991	159,270	79,470	175,818	87,909	94,277	90.40%
1992	160,000	78,780	185,793	92,897	87,814	84.80%
1993	157,000	78,470	184,574	92,287	84,784	85.03%
1994	136,820	67,800	196,361	98,181	88,926	69.06%
1995	153,860	77,110	182,988	91,494	86,675	84.28%
1996	148,220	74,490	178,505	89,253	82,645	83.46%
1997	191,280	78,360	183,378	91,689	82,402	85.46%
1998	155,530	77,640	182,448	91,224	87,815	85.11%
1999	157,860	79,620	176,438	88,219	84,179	90.25%
2000	149,740	75,180	161,277	80,639	81,886	93.23%
2001	119,010	58,650	127,590	63,795	71,330	91.94%
2002	94,850	47,420	100,274	50,137	51,901	94.58%
2003	88,160	43,580	95,932	47,966	45,895	90.86%
2004	111,350	55,550	120,976	60,488	51,493	91.84%
2005	121,830	60,640	134,028	64,328	65,504	90.49%

(1) From USDOT Origin-Destination Survey
(2) USDOT Origin-Destination Survey for historical.
(3) From Airport and T-100 data
(4) TAF Data by Fiscal Year

Sources: As noted and HNTB analysis.

Southeast Airlines (ASA) operated the ATL nonstop flights as Delta Connection, while Piedmont operated the CLT flights as US Airways Express. In 2005 there were 1,016 departures to ATL and 1,958 departures to CLT (see **Table 2-6**). Table 2-6 also depicts originating passengers, fares, and yields for the top ten destinations according to originations from Lynchburg. The top market (according to originations) from Lynchburg that does not have nonstop service is Orlando. The average one-way fare from LYH to MCO in 2005 stood at $140.56. The average yield to MCO was $0.20 per passenger mile. The largest yield of any airport on the list was CLT. In 2005 flights to CLT had a yield of $0.65 per passenger mile. Yield represents the revenue per seat mile in cents. The average real yield for LYH in 2005 was 20.17 cents.

Table 2-7 reveals the historical airfares with airline fees and taxes included (true fare). This table presents the actual price that travelers originating at LYH paid for a ticket historically as opposed to the fare price, which represents just the amount charged and received by the airline. The average true fare peaked in 2000 at $276.38. By 2005 the average true fare had decreased to $209.90.

Table 2-6

Distribution of Passengers by Destination: 2005

Destination	Distance	Aircraft Departures	On-Board Passengers	Originating Passengers	Average Fare (1)	Average Yield (2)
Wm B Hartsfield GA	389	1,016	28,082	6,380	145.95	37.27
Charlotte	175	1,958	36,246	2,610	114.25	64.66
Orlando Intl FL	625	0	0	2,350	140.56	20.01
Dallas/Ft Wor Int TX	1054	0	0	1,700	240.44	21.50
O'Hare Intl IL	564	0	0	1,560	204.64	24.90
Tampa Intl FL	673	0	0	1,450	159.20	21.66
Denver Intl CO	1385	0	0	1,300	218.45	13.92
Sky Harbor Intl AZ	1862	0	0	1,280	220.42	11.20
Fort Laud Intl FL	777	0	0	1,270	146.96	16.76
McCarran Intl NV	1986	0	0	1,240	183.73	8.61

(1) Prices in 2005 dollars. Does not include fees and taxes.

(2) Cost per passenger mile in 2005 cents. Does not include fees and taxes.

Sources: USDOT Origin-Destination Survey as compiled by Data Base Products, Inc. and HNTB analysis.

Table 2-7

Historical Average Domestic Fares and Yields including Airline Fees and Taxes

					Additional Taxes and Fees								
Year	Nominal Fare (1)	Nominal Yield (2)	Average Distance (3)	Average Segments (4)	Excise Tax (5) (% of Fare)	Segment Tax (6) (per Enplanement)	Security Surcharge (7) (per Enplanement)	Passenger Facility Charge (per Enplanement) LYH (8)	Passenger Facility Charge (per Enplanement) General (9)	Nominal Fare w/ Fees (10)	Nominal Yield w/ Fees (11)	Real Fare w/ Fees (12)	Real Yield w/ Fees (13)
1990	151.320	21.470	705	1.806	8.2%	$ -	$ -	$ -	$ -	163.68	23.22	220.10	31.23
1991	159.600	22.760	701	1.776	10.0%	$ -	$ -	$ -	$ -	175.56	25.04	227.81	32.49
1992	162.920	23.000	708	1.835	10.0%	$ -	$ -	$ -	$ 0.25	179.42	25.33	226.30	31.95
1993	189.580	26.570	714	1.829	10.0%	$ -	$ -	$ -	$ 1.17	209.51	29.36	258.28	36.20
1994	189.780	22.330	850	2.015	10.0%	$ -	$ -	$ -	$ 3.00	211.80	24.92	255.73	30.09
1995	188.190	23.470	802	1.846	10.0%	$ -	$ -	$ 1.50	$ 3.00	211.05	26.32	249.47	31.11
1996	211.920	24.450	867	1.906	3.5%	$ -	$ -	$ 1.50	$ 3.00	223.49	25.79	258.61	29.84
1997	197.420	26.310	750	1.730	7.9%	$ 0.25	$ -	$ -	$ 3.00	215.72	28.75	245.47	32.71
1998	215.230	24.660	873	1.896	8.8%	$ 1.25	$ -	$ -	$ 3.00	239.12	27.40	269.69	30.90
1999	216.650	25.160	861	1.850	7.9%	$ 2.06	$ -	$ -	$ 3.00	240.08	27.88	266.33	30.93
2000	229.960	26.040	883	1.840	7.5%	$ 2.50	$ -	$ 1.00	$ 3.00	255.33	28.91	276.38	31.30
2001	208.500	22.810	914	1.825	7.5%	$ 2.75	$ -	$ 3.00	$ 3.67	235.18	25.73	249.35	27.28
2002	198.070	22.560	878	1.793	7.5%	$ 3.00	$ 2.29	$ 1.75	$ 3.90	227.26	25.88	237.58	27.06
2003	207.160	20.900	991	1.908	7.5%	$ 3.00	$ 1.67	$ 4.50	$ 3.90	239.64	24.18	245.83	24.80
2004	194.340	18.860	1030	1.959	7.5%	$ 3.10	$ 2.50	$ 4.50	$ 3.90	228.13	22.14	228.13	22.14
2005	181.900	17.480	1041	1.959	7.5%	$ 3.10	$ 2.50	$ 4.50	$ 3.90	214.75	20.64	209.90	20.17

(1) Nominal fares from DataBase Products.
(2) Nominal yields from DataBase Products.
(3) Average trip distance DataBase Products.
(4) Average segments per trip from DataBase Products thereafter.
(5) Historical passenger ticket tax data from Air Transport Association. Values prorated when changes or expirations occurred within calendar year.
(6) Historical data on segment portion of passenger ticket tax from Air Transport Association. Values prorated when changes or expirations occurred within calendar year.
(7) Historical security charge data from Air Transport Association. Values prorated when changes or expirations occurred within calendar year.
(8) Federal Aviation Administration. Values prorated when changes occurred within calendar year.
(9) Federal Aviation Administration. Estimated average of all airports.
(10) Nominal fares with taxes and fees included.
(11) Nominal yields with taxes and fees included.
(12) Average fares with taxes and fees included converted to 2004 prices.
(13) Average yields with taxes and fees included converted to 2004 prices.
(14) Gross Domestic Product Implicit Price Deflator for Consumer Expenditures from U.S. Bureau of Economic Analysis.

Sources: As noted, Air Transport Association web site and HNTB analysis.

Table 2-8 presents the fleet mix and the number of commercial passenger departures per year for each aircraft type from 1996 through 2005. As shown, the dominant aircraft has been the Dash-8 (DHC-8) since 1996. In 2003 the 40 seat Canadair Regional Jet (CRJ) began regular service at LYH with Delta Connection (ASA) service to ATL. The CRJ and the DHC-8 were the only aircraft that served the airport in the year 2005. Turbo props made up 66% of the departures for the year 2005. Departures peaked in 2003 when they reached 3,963. Since 2003 departures have declined. There were 3,090 departures in 2005. Much of this has to do with the introduction of more regional jets to the airport. These regional jets can accommodate more passengers and therefore, need fewer operations.

2.3.3 Critical Aircraft

The current fleet mix presented in Table 2-8 also reveals that the critical aircraft for the airport in terms of operations is the 40 seat Canadair Regional Jet.

The critical aircraft for the airport is determined using a combination of aircraft with at least 500 annual operations each. The CRJ-200 is a C-II aircraft and is critical in terms of it's Aircraft Approach Category, which is a Category C. The DH-8 is an A-III aircraft and is critical in terms of its Airplane Design Group (wingspan), which is categorized as a Group III. With both of these aircraft having well over 500 annual operations, their combined design criteria require the Airport Reference Code to be a C-III.

Table 2-9 displays the scheduled seat departures per aircraft for the 1996-2005 period. There were 123,210 total seat departures in 2005, with Dash-8s accounting for 79,273 of the total and CRJs accounting for 43,937 (up substantially from 29,897 in 2003).

2.3.4 Peaking Activity

Table 2-10 depicts the monthly distribution of activity at LYH. These data are used to determine the time periods of peak activity at LYH.

- The peak month for enplaned passengers in 2005 was May, when 11,919 passengers boarded flights at LYH.

- The peak month for cargo was April, when seven (7) tons of cargo moved through LYH. Due to the fact that a very small amount of cargo moves through LYH, a single operation can effect the peak month significantly. This is the case for the month of April. A single CV-580 operation with 3 tons of cargo made April the peak month in 2005.

- Passenger carrier operations peaked in the month of October at 525. However, because October has 31 days, the average daily operations in this month (16.9) is less than it is in September or November (17.0). Therefore, these months were considered in determining

Table 2-8

Historical Scheduled Passenger Aircraft Departures by Aircraft Type

Equipment Type (1)	Average Seats	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Turboprop Aircraft											
BCH 1900 Beech	19	0	0	0	0	0	0	1324	1596	537	0
DHC-8-100 DeHavilland	37	3,281	3,013	2,298	2,307	1,797	15	163	0	1,188	1,695
DHC-8-300 DeHavilland	50	0	0	0	0	0	0	0	0	116	331
DO-328 Dornier 328 Turbo	32	0	0	0	0	0	0	0	0	337	0
EMB-120 Brasilia	30	1,092	1,433	1,272	1,361	1,081	1,089	1,080	368	0	0
SF-340 Saab-Fairchild	31	0	0	0	0	0	1,386	1,701	1,275	354	0
Jetstream 31	18	1,191	1,368	2,987	2,864	3,705	3,883	269	0	0	0
Jetstream 41	29	380	351	161	0	0	70	0	0	0	0
Shorts 360	36	853	393	0	0	0	0	0	0	0	0
Subtotal		6,797	6,558	6,718	6,532	6,583	6,443	4,537	3,239	2,532	2,026
Regional Jets											
RJ-200/ER Canadair	41	0	0	0	0	0	0	0	724	1,079	1,064
Subtotal		-	-	-	-	-	-	-	724	1,079	1,064
Total		6,797	6,558	6,718	6,532	6,583	6,443	4,537	3,963	3,611	3,090
Distribution											
Turboprops		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	81.7%	70.1%	65.6%
Regional Jets		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	18.3%	29.9%	34.4%

(1) Aircraft with at least 30 operations per year

Sources: From OAG as compiled by Back Aviation and HNTB analysis.

Table 2-9

Historical Scheduled Seat Departures by Aircraft Type

Equipment Type (1)	Average Seats	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Turboprop Aircraft											
BCH 1900 Beech	19	0	0	0	0	0	0	25,156	30,324	10,203	0
DHC-8-100 DeHavilland	37	121,412	111,495	85,037	85,370	66,497	555	6,032	0	43,961	62,723
DHC-8-300 DeHavilland	50	0	0	0	0	0	0	0	0	5,800	16,550
DO-328 Dornier 328 Turbo	32	0	0	0	0	0	0	0	0	10,784	0
EMB-120 Brasilia	30	32,760	42,990	38,160	40,830	32,430	32,670	32,400	11,040	0	0
SF-340 Saab-Fairchild	31	0	0	0	0	0	42,557	52,229	39,149	10,870	0
Jetstream 31	18	21,438	24,624	53,766	51,552	66,690	69,894	4,842	0	0	0
Jetstream 41	29	11,020	10,179	4,669	0	0	2,030	0	0	0	0
Shorts 360	36	30,708	14,148	0	0	0	0	0	0	0	0
Subtotal		217,338	203,436	181,632	177,752	165,617	147,706	120,659	80,513	81,618	79,273
Regional Jets											
RJ-200/ER Canadair	41	0	0	0	0	0	0	0	29,897	44,556	43,937
Subtotal		-	-	-	-	-	-	-	29,897	44,556	43,937
Total		217,338	203,436	181,632	177,752	165,617	147,706	120,659	110,410	126,174	123,210
Distribution											
Turboprops		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	72.9%	64.7%	64.3%
Regional Jets		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	27.1%	35.3%	35.7%

(1) Aircraft with at least 30 operations per year

Sources: From OAG as compiled by Back Aviation and HNTB analysis.

Table 2-10

Monthly Distribution of Activity: 2005

Month	Enplaned Passengers (1)	Total Cargo (tons) (2)	Aircraft Operations		
			Pax Carrier	Air Taxi	GA
January	9,712	1.0	491	113	2,756
February	9,585	3.0	447	86	4,460
March	11,701	3.0	501	112	3,670
April	11,242	7.0	487	84	5,406
May	11,919	4.0	510	107	4,732
June	11,480	1.0	497	118	3,485
July	10,894	1.0	495	89	2,643
August	10,640	3.0	508	113	3,064
September	9,704	4.0	511	103	5,388
October	11,065	2.0	525	74	5,769
November	10,471	1.0	511	131	4,606
December	10,288	1.0	506	93	2,895
Total	128,701	31.0	5,989	1,223	48,874
Peak	11,919	7.0	525	131	5,769
Peak Month Percent	9.3%	22.6%	8.8%	10.7%	11.8%
Peak Month	May	April	October	November	October

(1) Sept averaged more operations per day, so it is used for subsequent passenger peaking analysis.
(2) Monthly numbers not available for Ameriflight

Sources: T-100 data, Air Traffic Reports, and ATADS Tower Counts.

the peak for average daily operations. Of these two, November was selected as the peak month because it had more enplaned passengers per day.

- For air taxi operations, the peak month was November, with 131 operations.
- The peak month for General Aviation was October, with 5,679 operations.

These peaking characteristics were used to develop projected peaking activity, which is discussed later in this chapter.

Table 2-11 presents equipment and seat arrivals and departures per hour for an average weekday in May 2006. May was chosen since it was the peak month for passenger enplanements in 2005. Data from 2006 was used because it was the most recent data available. Table 2-11 reveals that the peak hour for departures occurs between 11:00-11:59 am. The peak hour for arrivals occurs between 10:00-10:59 am. During the peak hour LYH sees 90 seat departures and 90 seat arrivals.

Table 2-12 presents the hourly distribution for enplanements and deplanements for an average weekday in May 2006. As aforementioned, data from 2006 was used because it is the most recent information. The table assumes a 95 percent load factor for all flights during the peak hour. This assumption is consistent with peak hour load factors at other airports because load factors tend to be near capacity during the peak hour. For off peak hours load factors were based on annual load factors per equipment type. The peak number of passenger enplanements was 86 during the peak hour. The number of passenger deplanements was 86 during the peak hour as well.

2.4 ASSUMPTIONS

This section describes the general forecast assumptions that were applied in this forecast. More detailed assumptions specific to a particular activity category are described in the sections pertaining to those categories. The major assumptions are described below.

2.4.1 Unconstrained Forecasts

The activity forecasts contained herein are physically unconstrained. For the purposes of this study, "physically unconstrained" means that there are sufficient airfield, terminal, and landside facilities at LYH to accommodate all aviation activity dictated by demand. Except as noted, it is assumed that destination airports will be developed sufficiently to accommodate demand from the Lynchburg area.

2.4.2 Regulatory Assumptions

No return to airline regulation, as existed prior to 1979, is assumed. This means that airlines will increase service and change fares as market conditions dictate, not as regulations mandate. There will be no nighttime restrictions on aircraft operations.

2.4.3 Service Area

This forecast assumes that the ground transportation network will not change sufficiently over the forecast period to affect the travel times between other airports and LYH.

Table 2-11

Scheduled Passenger Aircraft Arrivals and Departures by Hour
Weekday in May 2006

Hour	Aircraft Departures	Seat Departures	Aircraft Arrivals	Seat Arrivals
0000-0559				
0600-0659	2	77		
0700-0759	1	50		
0800-0859				
0900-0959				
1000-1059			2	90
1100-1159	2	90		
1200-1259				
1300-1359			1	37
1400-1459	1	37		
1500-1559			1	40
1600-1659	1	40	1	50
1700-1759	1	50		
1800-1859				
1900-1959			1	50
2000-2059				
2100-2159				
2200-2259			1	40
2300-2359			1	37
Total	8	344	8	344
Peak	2	2	2	2
Peak Time	1100-1159	1100-1159	1000-1059	1000-1059

Sources: Official Airline Guide as compiled by BACK Aviation Solutions and HNTB analysis.

Table 2-12

Peak Hour Enplanements

Hour	Scheduled Enplanements (1)	Scheduled Deplanements	LYH Load Factor (2)	Scheduled Seat Departures (4)	Scheduled Seat Arrivals	Total Passengers	Total Seats
0000-0559	0	0				0	0
0600-0659	45	0	0.59	77		45	77
0700-0759	17	0	0.34	50		17	50
0800-0859	0	0				0	0
0900-0959	0	0				0	0
1000-1059	0	86	0.95		90	86	90
1100-1159	86	0	0.95	90		86	90
1200-1259	0	0				0	0
1300-1359	0	19	0.51		37	19	37
1400-1459	19	0	0.51	37		19	37
1500-1559	0	26	0.66		40	26	40
1600-1659	26	33	0.66	40	50	59	90
1700-1759	17	0	0.34	50		17	50
1800-1859	0	0				0	0
1900-1959	0	17	0.34		50	17	50
2000-2059	0	0				0	0
2100-2159	0	0				0	0
2200-2259	0	26	0.66		40	26	40
2300-2359	0	21	0.56		37	21	37
Total	210	228	0.64	344	344	438	688
Peak	86	86	1	90	90	86	90
Peak Hour	1100-1159	1000-1059		1100-1159	1000-1059		

(1) Seat departures multiplied by 95% load factor for peak and historical load factor by aircraft type for non peak

(2) Load Factor assumed to be 95% for Peak Hour estimates and historical load factor by aircraft type for non peak

Sources: Official Airline Guide as compiled by BACK Aviation Solutions and HNTB analysis.

2.4.4 Other Regional Airports

CLT and IAD are assumed to continue as major airline hubs, and RDU is assumed to continue as a focus city for low-fare carriers. GSO and RIC are assumed to obtain more limited low fare service, while CHO and ROA are assumed to continue to have limited regional carrier service to hub airports.

2.4.5 Economic Assumptions

The forecasts assume no major economic downturn, such as occurred during the recession of the early 1990s. The local and national economies will periodically increase and decrease the pace of growth in accordance with business cycles. However, it is assumed that, over the forecast period, the high-growth and low-growth periods will offset each other so that the adjusted economic forecasts described will be realized.

2.4.6 Future Security Environment

Security issues related to air travel have changed and will continue to change as new procedures and technology are incorporated to improve airport security. Events that may affect traveler confidence in airport security or air travel security cannot be predicted. It is assumed that there will be no terrorist attacks during the forecast period that will affect confidence in the aviation system to the same extent as 9/11. It is also assumed that the Transportation Security Administration (TSA) will remain in charge of airport security, and associated security costs and requirements will continue through the forecast period.

2.4.7 Fuel Assumptions

In accordance with FAA forecasts, fuel costs are assumed to increase significantly (15 percent) in 2006, and then generally grow with inflation. Also, no major increases in fuel taxes are assumed.

A major increase in fuel taxes would cause the general aviation operations to fall below the forecast levels, since general aviation operations have independent. The increase in fuel taxes would also allow commercial airlines to transfer their extra costs to customers. The increased ticket prices would cause the operations in this forecast to fall below the forecast levels.

2.4.8 Environmental Factors

No major changes in the physical environment are assumed. It is assumed that global climate changes will not be sufficient enough to force restrictions on the burning of hydrocarbons or major fuel tax increases within the forecast period.

2.4.9 National Airspace System

It is assumed that the FAA will successfully implement any required changes and improvements for the national airspace system to accommodate the unconstrained forecast of aviation demand.

2.4.10 Airline Consolidation

It is assumed that factors such as government regulations and labor union resistance will prevent any additional major airline consolidation. Although some minor airline consolidation could continue to occur, no attempt is made to predict the individual airlines that would be affected.

2.4.11 Adequate Runway System

It is assumed that the runway will be lengthened to 7100 ft., so that 50 seat Regional Jets can operate at the airport. The largest aircraft that can operate at the airport with the current runway configuration is the 40 seat RJ.

2.4.12 No New Hubs

This forecast assumes that the existing hubs for all airlines will remain the same for the entire forecast period. Current hubs, like CLT, will remain so for the duration of the forecast and airports that are currently not operating as hubs will not become hubs according to this assumption.

2.4.13 Community Service

It is assumed that LYH will be the only airport servicing the community. Also, it is assumed that the community will continue to utilize service from Lynchburg to their final destinations.

2.5 PASSENGER FORECASTS

This section describes the scheduled and non scheduled passenger forecasts for LYH. The section includes data sources, explanation of assumptions, and methodology used in determining the originations forecast. Also included are the projections for total enplanements, total passengers, load factor, seat departures, fleet mix, and peak activity.

2.5.1 Methodology, Assumptions, and Data Sources

The following is the process used in determining the domestic passenger forecast:

- Determine drivers of passenger activity in the Lynchburg service area
- Project future domestic passenger originations at LYH using regression analysis

- Estimate future ratio of enplanements to originations
- Project future enplanements
- Develop Origination Thresholds to determine whether or not service to a new hub is feasible
- Devise market by market forecasts based on origination thresholds and projected originations
- Adjust each market by market forecast to take into account passengers currently leaked to other airports due to lack of service at LYH. These passengers would use LYH, but do not because of more difficulty in traveling.
- Project load factor for aircraft that serve the airport
- Project seat departures using the enplanement and load factor forecasts
- Based on seat departures estimate the way that the airlines would accommodate the passenger demand at the airport in terms of aircraft type and frequency of service

The methodology will be described in more detail below. Data sources used in this analysis were:

- Socioeconomic information (population, employment, real income) was obtained from the Bureau of Economic Analysis, Woods & Poole, and local sources.
- Lynchburg Regional Airport Air Traffic Reports were used to determine charter air traffic
- USDOT Origin-Destination Passenger Survey data were used to obtain yield and fare information
- Official Airline Guide (OAG) information on scheduled operations was used to determine existing scheduled service by aircraft type
- JP Fleet Airline-Fleets International and other industry publications were used to identify information on airline fleet orders
- FAA Aerospace Forecast, Fiscal Years 2006-2017 was used for future load factors and future fares

2.5.2 Forecast Equation

This forecast used regression analysis to determine what factors historically have had the greatest influence on originating passengers at LYH. Regression analysis is a statistical method that

generates an equation to define the historical relationship between selected independent variables, such as population, income, or yield, and a dependent variable, such as originations. Assuming that the relationship that has existed in the past between the variables will continue into the future, the equation can then be used to forecast future activity.

To develop the forecast model for this working paper, several variables were tested to determine their correlation with originating passengers. Variables that were considered included average airfare, primary service area income, secondary service area income, the number of hubs that Lynchburg served, fares at competing airports (RDU, ROA, RIC, CHA, and IAD), and instrument variables. The instrument variables, or dummy variables, adjust the equation for the effect of an outside force during part of the study period. For instance, the effect of the 9/11 terrorist attacks was an outside force that effected the correlation between these variables. In order to correct for this effect, a 9/11 dummy variable was introduced. The model was tested in both linear and logarithmic formulations.

The model that showed the most significant correlation with passenger originations, from both a theoretical and statistical standpoint, was a logarithmic formulation. The equation defined originations as a function of the primary service area income, average fare at LYH, and dummy variables representing the continuing effects of the 9/11 attacks and the negative effect produced by the departure of United Express from the airport in Jan 2002. The regression equation took the form:

Originations= (10^3.017151) x LYH AVG FARE^-1.19054 x PRIMARY SVC INC^0.676585 x D2001
Where:
Originations= annual originating passengers at LYH
LYH AVG FARE= average fare for passengers traveling from LYH in 2005 dollars
PRIMARY SVC INC= income in thousands of 2005 dollars
D2001= Dummy variable for the 9/11 impacts (the variable equals 0.0 prior to 2001 and equals 10^-0.18038 in 2001 and all subsequent years)
R^2 = .950
F-statistic=47.85
Durbin-Watson = 2.787
T-Statistics:
Intercept = 2.19
LYH AVG FARE= -3.13
PRIMARY SVC INC= 2.29
D2001= -5.42
Standard Error= .02359

The model's projections were then compared with preliminary numbers for 2005. The results showed a partial recovery from the 9/11 impacts in 2005. This effect was the difference between the forecast result for 2005 and the actual number. The difference between the predicted number

and the actual 2005 originations number differed by roughly 9 percent. Taking into account the upswing in 2005, future year forecasts were adjusted upwards by 9 percent. Since the equation was formulated logarithmically, all variables are elasticities. The dummy variable decreases the final result for any input year by 18 percent. With the adjustment for 2005 the results for future years were then increased by 9 percent, so the net effect is a reduction of roughly nine percent.

The variables affecting originations in the model were the average historical fare for LYH (Table 2-14) and the total real income for the Lynchburg primary service area (Table 2-3). The model predicts that every that for every 1.19 percent decrease in LYH fare a 1.0 percent increase in originations will result. At the same time a 0.68 percent increase in primary service area income will result in a 1.0 percent increase in originations.

2.5.3 Projected Fares

Since the forecasting equation depicts the originations as a function of LYH fares and primary service income, projections for these variables are necessary, in order to predict future originations. Income projections are provided in Section 2. Projections of future fares are discussed in this section.

Tables 2-13 and 2-14 show fare history at the Lynchburg airport and predictions for future fares from the FAA, respectively. Table 2-15 depicts a decrease in average fares from the peak in 1996 at $251.64 to $190.35 in 2005. Table 2-15 details FAA forecasted fares for mainline and regional air carriers in the future. A weighted average of these forecasts was then used to predict the future fare. Table 2-14 projections use the growth rates predicted by the FAA applied to LYH fare history to predict future fares. LYH fares are higher than the national average, but are forecast to decrease slightly throughout the forecast period. The average fare in 2005 was $190.35 and is forecast to decrease to $183.56 in 2026. Lack of competition at the airport could contribute to significant fare increase at times. However, fares have shown great variability in the past and will likely continue to do so in the future. The FAA Forecasts are considered to be the best gauge of long term fare trends but significant year-to-year deviation should be expected.

Table 2-13

FAA Predicted Fares

	Mainline				Regional				Total	Weighted	Lynchburg
Year	FAA Yield	FAA Dist	Fare	Enp	FAA Yield	FAA Dist	Fare	Enp	Enp	Fare	Fare Multiplier (1)
2005	11.31	981.2	110.97	523.1	22.75	437.0	99.42	146.7	669.8	108.44	
2006										108.27	
2007										108.11	
2008										107.94	
2009										107.77	
2010	10.96	1001.7	109.79	577.7	19.55	514.8	100.64	181.2	758.9	107.60	0.9923
2011										107.37	0.9901
2012										107.13	0.9879
2013										106.90	0.9858
2014										106.66	0.9836
2015	10.48	1033.1	108.27	665.3	17.87	564.9	100.95	223.1	888.4	106.43	0.9814
2016										106.31	0.9803
2017										106.18	0.9792
2018										106.06	0.9780
2019	10.28	1048.4	107.78	701.1	17.48	577.3	100.91	241.4	942.5	106.02	0.9776
2020										105.40	0.9719
2021										105.60	0.9738
2022										105.40	0.9719
2023										105.19	0.9700
2024										104.99	0.9681
2025										104.37	0.9624
2026										104.57	0.9643

(1) predicted weighted fare divided by current fare

Source: FAA Aerospace Forecast Fiscal Years 2006-2017

Table 2-14

Lynchburg Fares

Year	Average Fare	Average Fare w/ Fees	Multiplier (1)
1990	208.60	220.10	
1991	213.07	227.81	
1992	214.53	226.30	
1993	240.57	258.28	
1994	235.20	255.73	
1995	227.62	249.47	
1996	251.64	258.61	
1997	232.48	245.47	
1998	248.11	269.69	
1999	249.11	266.33	
2000	260.64	276.38	
2001	230.04	249.35	
2002	210.45	237.58	
2003	216.87	245.83	
2004	198.21	228.13	
2005	190.35	209.90	
2011	188.46		0.990
2016	186.60		0.980
2026	183.56		0.964

Average Annual Growth Rate	
(2005-2026)	-0.17%

From US DOT Originations and Destinations Survey
(1) from Table 13

Sources: As noted and HNTB analysis.

2.5.4 Domestic Passenger O & D Forecast

Table 2-15 details the forecast of the total passengers using the aforementioned regression equation. Total O&D passengers are forecast to increase from 121,830 in 2005 to 164,436 in 2026. This represents a compounded annual growth rate of 1.44 percent.

2.5.5 Projected Passenger Enplanements

Table 2-15 also details the historical and projected values for total O & D passengers, total originations, total passengers, and domestic enplanements. Enplanements were projected by using an average annual ratio over the five year period beginning in 2000 and ending in 2005 of enplanements to originations. Due to the fact that few people connect at LYH, the originations represent a large part of the total enplanements and this trend should continue into the future. The table details that scheduled passenger enplanements are projected to increase from 64,328 in 2005 to 88,612 in 2026.

2.5.6 Predicting Future Service Thresholds

Because growth in passenger levels at LYH will be closely tied to the Airport's ability to maintain and enhance its service to airline hubs, it was critical to evaluate the possibility that a new hub(s) could be added during the planning period. This evaluation was performed by evaluating thresholds to all hub markets within the range of LYH. The threshold for service to a market is the minimum number of originating passenger traffic required to commence non stop service between two markets. Six hub airports were chosen – Washington Dulles International (IAD), Philadelphia International (PHL), Memphis International Airport (MEM), Detroit Metropolitan Wayne County Airport (DTW), Newark International Airport (EWR), and Chicago O'Hare International Airport (ORD). In order to determine thresholds for future service, total O&D passengers were evaluated for the largest markets without nonstop service to the comparison hubs. This number was then compared to the smallest market with nonstop service. The estimated threshold was then determined by averaging the two passenger levels together. By comparing the average threshold to the forecast for LYH total O&D passengers, the year that nonstop service could start can be determined. **Table 2-16** presents these comparisons. As shown, the threshold for service is currently met for PHL and will be met for DTW in 2026.

The threshold calculated for IAD may be high. The two largest markets without non stop service, Newport News (PHF) and Atlantic City (ACY) are both dominated by low fare carriers, AirTran and Spirit, respectively. This may discourage United from offering service to these points. The third largest market without nonstop service to IAD is Elmira, NY with approximately 77,000 originations. If Elmira were substituted for PHF, the IAD threshold would be lower than for any other potential new hub.

Table 2-15

Forecast Of Scheduled Passenger Enplanements Not Including Passengers Who Use Other Airports (Leaked Passengers)

Year	Domestic O&D Passengers (1)	Domestic Originations (2)	Total Passengers (3)	Domestic Enplanements (3)	Ratio of Originations to Enplanements
1990	167,380	83,990	182,839	91,420	91.87%
1991	159,270	79,470	175,818	87,909	90.40%
1992	160,000	78,780	185,793	92,897	84.80%
1993	157,000	78,470	184,574	92,287	85.03%
1994	136,820	67,800	196,361	98,181	69.06%
1995	153,860	77,110	182,988	91,494	84.28%
1996	148,220	74,490	178,505	89,253	83.46%
1997	191,280	78,360	183,378	91,689	85.46%
1998	155,530	77,640	182,448	91,224	85.11%
1999	157,860	79,620	176,438	88,219	90.25%
2000	149,740	75,180	161,277	80,639	93.23%
2001	119,010	58,650	127,590	63,795	91.94%
2002	94,850	47,420	100,274	50,137	94.58%
2003	88,160	43,580	95,932	47,966	90.86%
2004	111,350	55,550	120,976	60,488	91.84%
2005	121,830	60,640	128,656	64,328	94.27%
2011	132,034	66,017	142,302	71,151	92.78%
2016	142,163	71,081	153,219	76,609	92.78%
2026	164,436	82,218	177,224	88,612	92.78%
Average Annual Growth Rate					
(2005-2026)	1.44%	1.46%	1.54%	1.54%	

(1) From USDOT Origin-Destination Survey forecast years are originations multiplied by 2
Future years predicted using regression equation
(2) USDOT Origin-Destination Survey for historical.
(3) From Airport and T-100 data

Sources: As noted and HNTB analysis.

Table 2-16

Passenger Origination Thresholds to Potential Hubs

Hub	Distance to LYH	Distance Band	Smallest Market with Nonstop Service		Largest Market w/o Nonstop Service		Average	Year in Which LYH would reach Average Threshold (a)
			Threshold Calculations (Including outliers)					
IAD	147	50-250	BLF	2,053	PHF	491,060	246,557	(b)
PHL	276	175-375	ITH	74,270	ACK	144,900	109,585	**Current**
MEM	621	520-720	RST	121,610	SAV	964,930	543,270	none
DTW	403	300-500	MQT	58,750	PIA	228,630	143,690	2026
EWR	356	250-450	PLB	15,500	CAK	669,500	342,500	none
ORD	562	460-660	LNK	179,070	CHO	179,650	179,360	none

(a) Assuming base case forecast.
(b) Please see discussion in text

Source: USDOT Origin & Destination Database and T-100 Data

Using this analysis it was decided that service to the PHL market should commence by the first forecast year with two to three turbo prop operations per day. This would be consistent with markets like Ithaca, NY that service PHL. Ithaca has a similar number of enplanements and services multiple US Airways hubs.

Due to the fact that there had previously been service to IAD by United Express and the IAD threshold analysis may be skewed, the forecast takes into account that service to IAD could commence during the forecast period. Since the service to four hubs for an airport with 80,000 enplanements would be unlikely, service to either IAD or PHL but not both should commence during the forecast period. For the aforementioned reason, future tables refer to the new service destination as "unspecified northern hub".

2.5.7 Forecast of Total O&D Passengers on a Market By Market Basis

Table 2-17 uses the forecast for total passengers to form a breakout by market. Current percentages to the markets of CLT and ATL and future projections for the unspecified northern hub (either IAD or PHL) and DTW are used to formulate the market by market forecast. The market share for the unspecified northern hub and DTW were estimated by using the percentage of O&D traffic to different regions of the country. Each airport was assigned a geographical region based on location. For instance all traffic to the northeast was considered to go through the unspecified northern hub. In reality a passenger may find a cheaper fare through ATL to the northeast, but, the additional trip length would be a disincentive, so this was not considered for this forecast. The table predicts that total enplanements to the unspecified northern hub will increase to 10,787 by 2011 and 13,292 by 2026.

Although the threshold for passengers will have been met by 2026 it is unlikely that service will commence to DTW due the fact that very few, if any, airports with 80,000 annual enplanements service four airport hubs.

2.5.8 Leaked Passenger Forecast

The addition of service to new hubs in the future will give LYH the opportunity to capture passengers in the region that were utilizing service at other airports to reach their destination. For instance, passengers traveling to the northeast who were utilizing service at RIC to avoid connecting in CLT or ATL, could switch to LYH if service to PHL or IAD were introduced.

To determine the amount of passenger traffic that would be gained through additional service, leakage rates were determined to both northern and southern markets. Leaked passengers, as previously mentioned, are passengers from the LYH market who utilize other airports. Since LYH only has non-stop service to southern markets, it was assumed that with the introduction of service to northern hubs, leakage rates to northern destinations would approach the leakage rates to southern destinations. First, leakage rates were determined (**Table 2-18**) for both northern and southern markets based on information in the Lynchburg Small Community Air Service

Table 2-17

Forecast Of Total Enplanements Per Market Not Including Passengers Who Used Other Markets (Leaked Passengers)

Year	Total Enplanements	ATL	CLT	Unspecified Northern Hub (b)
2005	64,328	28,082	36,246	0
2011	71,151	26,560	33,804	10,787
2016	76,609	30,644	34,474	11,491
2026	88,612	35,445	39,875	13,292

(a) Enplanements from table 15

(b) PHL or IAD most likely destinations for Northern Hub

Sources: As noted and HNTB analysis.

Table 2-18

Estimated Leaked Passengers by Market
Second and Third Quarter, CY 2005

Airport	Leaked	Booked	Percent Leaked	Northern/Southern Mkt.
MSP	9.6	12.4	77.42%	Northern
ORD	5.5	10.2	53.92%	Northern
BOS	1.7	6	28.33%	Northern
YYZ	0.5	2.1	23.81%	Northern
DTW	1.7	3.9	43.59%	Northern
PIT	0	1	0.00%	Northern
PHX	2.2	4.7	46.81%	Northern
EWR	1.2	3.9	30.77%	Northern
LGA	1.7	5	34.00%	Northern
PVD	0.1	1.9	5.26%	Northern
MCO	15.7	20.1	78.11%	Southern
DFW	2.9	7	41.43%	Southern
ATL	8.9	27.5	32.36%	Southern
CLT	0.4	5.2	7.69%	Southern
MSY	3.3	4.3	76.74%	Southern
LIT	0	1.1	0.00%	Southern
LAS	5.8	8.4	69.05%	Western
DEN	2.1	6.6	31.82%	Western
SFO	3.6	6.5	55.38%	Western
LAX	1.2	4.2	28.57%	Western
SAN	1.2	4.1	29.27%	Western
SEA	1.1	3.9	28.21%	Western
HNL	0.4	1.1	36.36%	Western
Southern	15.5	45.1	34.37%	
Northern	24.2	51.1	47.36%	
		Difference	12.99%	

Sources:
Adjusted SABRE MIDT 2Q05
USDOT 10% Coupon Sample 3Q05

Development Program proposal. For the purpose of this leakage rate determination, travel to MCO was excluded due the high leakage rate to that market. The reasoning for such a high leakage rate most likely has to do with low fare service from competing airport RDU.

Table 2-19 details fares in 2005 from LYH and surrounding airports to MCO. The table describes that fares to MCO from RDU are significantly lower than from LYH or any other airport in the area. This is due to Southwest Airlines direct service to MCO from RDU. Because this leakage is unique to this market, MCO was excluded from this determination.

Upon further analysis leakage rates were determined to be 13 percent higher to northern markets than to southern markets. **Table 2-20** takes into account this leakage rate adjustment and increases passenger traffic to and from the northern markets by 13 percent. Unspecified northern hub service increases from 10,787 enplanements in 2016 to 12,985 with the addition of leaked passengers.

Table 2-21 describes the forecast with leaked passengers. The adjusted forecast predicts that domestic O&D passengers will increase from 121,830 in 2005 to 168,711 in 2026. This increase represents an annual growth rate of 1.56 percent.

2.5.9 Projected Load Factor, Departures, and Seat Departures

Table 22 describes current and future annual load factor by aircraft type. The current load factors for each aircraft were projected to grow at the rate predicted in the FAA Aerospace Fiscal Forecast Years 2006-2017. The load factor for the DHC-8-100 and DHC-8-300 are presently very low at the airport and therefore are projected to increase at a faster rate in the near term forecast year as air carriers attempt to increase load factors. These aircraft should be retired by 2020 as increasing relaxation of legacy carrier scope clauses will allow their code-sharing regional partners to add regional jets. The projections show that the load factor for the RJ-200 should increase from 66.76 percent in 2005 to 71.73 percent in 2016. These projections are based on the FAA Aerospace Forecast 2006-2017.

As the DHC-8's are retired, their passengers will be accommodated by increasing regional jet service. If the current load factors on regional jets were held constant, or increased at the FAA projected rates, then operations will decrease by 2026 as DHC-8's are retired. Since a decrease in total operations is likely as this has been the historical trend at LYH, the load factor was adjusted on the RJ-200's to increase at the FAA projected rate.

The load factor has increased substantially over the last 25 years. This large increase has been projected to dampen during the forecast period by the FAA, but the FAA still predicts a mild increase in load factor throughout the forecast period. This increase occurs as airlines attempt to increase the profitability of each operation.

Table 2-19

2005 MCO Fares

Airport	Outbound Fare	Inbound Fare
LYH	$140.56	$144.83
RDU	$93.10	$93.23
RIC	$117.77	$119.18
ROA	$140.25	$143.26

Fares to and from Orlando

Sources: USDOT O&D Survey for Historical

Table 2-20

Forecast Of Enplanements Per Market (Including Passengers Who Leak to Other Airports)

Year	Total Enplanements	ATL	CLT	Unspecified Northern Hub (a)
2005	64,328	28,082	36,246	0
2011	72,553	26,560	33,804	12,189
2016	78,103	30,644	34,474	12,985
2026	90,340	35,445	39,875	15,020

(a) PHL or IAD most likely destinations for Northern Hub

Sources: As noted and HNTB analysis.

Table 2-21

Forecast Of Scheduled Passenger Enplanements (With Passengers Who Leaked to Other Markets)

Year	Domestic O&D Passengers (1)	Domestic Originations (2)	Total Passengers (3)	Total Passengers Without Leaked Passengers (4)	Domestic Enplan.	Ratio of Originations to Enplanements
1990	167,380	83,990	182,839		91,420	91.87%
1991	159,270	79,470	175,818		87,909	90.40%
1992	160,000	78,780	185,793		92,897	84.80%
1993	157,000	78,470	184,574		92,287	85.03%
1994	136,820	67,800	196,361		98,181	69.06%
1995	153,860	77,110	182,988		91,494	84.28%
1996	148,220	74,490	178,505		89,253	83.46%
1997	191,280	78,360	183,378		91,689	85.46%
1998	155,530	77,640	182,448		91,224	85.11%
1999	157,860	79,620	176,438		88,219	90.25%
2000	149,740	75,180	161,277		80,639	93.23%
2001	119,010	58,650	127,590		63,795	91.94%
2002	94,850	47,420	100,274		50,137	94.58%
2003	88,160	43,580	95,932		47,966	90.86%
2004	111,350	55,550	120,976		60,488	91.84%
2005	121,830	60,640	128,656	128,656	64,328	94.27%
2011	134,636	67,318	145,107	142,302	72,553	92.78%
2016	144,935	72,468	156,206	153,219	78,103	92.78%
2026	167,643	83,821	180,680	177,224	90,340	92.78%
Average Annual Growth Rate						
(2005-2026)	1.53%	1.55%	1.63%	1.54%	1.63%	

(1) From USDOT Origin-Destination Survey forecast years are originations multiplied by 2
Future years predicted using regression equation
(2) USDOT Origin-Destination Survey for historical.
(3) From Airport and T-100 data
(4) From Table 15

Sources: As noted and HNTB analysis.

Table 2-22

Forecast Scheduled Passenger Aircraft Load Factor by Aircraft Type

Equipment Type (1)	Average Seats	2005	2011	2016	2026
Projected Load Factor (2)		69.80%	73.60%	75.00%	77.02%
		Turboprop Aircraft			
DHC-8-100 DeHavilland	37	50.62%	53.38%	54.39%	N/A
DHC-8-300 DeHavilland	50	34.31%	66.76%	68.03%	N/A
		Regional Jets			
RJ-200/ER Canadair	41	66.76%	N/A	N/A	N/A
RJ-200/ER Canadair	50	66.76%	70.39%	71.73%	73.67%

(1) Aircraft with at least 30 operations per year

(2) Future year Load Factors predicted by FAA Aerospace Forecast Fiscal Years 2006-2017

Sources: From T-100 as compiled by Database Products and HNTB analysis.

Table 2-23 describes the number of seat departures based on the departures performed and aircraft type for each forecast year. This projection predicts the total seat departures to increase from 118,873 at the present to 124,290 in 2026.

Table 2-24 projects departures based on the enplanements forecast and the load factor projections. The forecast assumes that U.S. Airways Express carrier Piedmont will continue to use DHC-8's through 2016, although RJ's will make up a more significant portion of the air traffic after the current runway extension is completed. By 2026 the number of RJ-200 operations should increase to 2,486 as RJ's will service the airport exclusively.

2.5.10 Forecast Critical Aircraft

The forecast critical aircraft is the 50 seat Canadair Regional Jet. This is the largest aircraft projected to perform 500 annual operations at LYH under unconstrained conditions. Constraints like runway length are not taken into consideration when predicting the future critical aircraft.

2.5.11 Projected Peak Activity

Table 2-25 presents the forecasts for passengers and operations in terms of peak month, average day peak month, and peak hour. Based solely on average day during the peak month, May was the busiest month in 2005. On an average day during the peak month, enplanements are projected to increase at the same rate as total passenger enplanements.

Statistics for hourly historical peak hour load factor are unavailable. Airline load factors during peak hours are generally very high. For this forecast they were assumed to be 95 percent and applied to scheduled seat arrivals and seat departures. Similar to peak month activity, peak hour activity was assumed to increase at the same rate as annual activity. The table predicts peak hour total passengers to increase from 86 in 2005 to 116 in 2026.

2.5.12 Non-Scheduled Passenger Activity

Non-scheduled passenger activity at LYH represents a very small portion of total operations. Charter operations in the T-100 data are almost non-existent. The main charter carrier at the airport remains Falwell Aviation. They carry out most of their operations with Beech King Air and Cessna Citation aircrafts.

The runway extension under construction as of 2007 would open up the opportunity for a larger amount of charter activity at the airport. The newer runway would allow for larger aircraft to use the runway. This could increase charter activity because charter flights typically utilize larger aircraft due to the larger party size. Tour groups, for instance, use charter flights. Unfortunately the lack of good data makes using regression analysis impossible for predicting future activity. It

is predicted in this forecast that non scheduled passenger enplanements will increase at a rate similar to passenger air traffic over the forecast period.

Table 2-23

Forecast Scheduled Passenger Aircraft Seat Departures by Aircraft Type

Equipment Type (1)	Average Seats	2005	2011	2016	2026
Projected Load Factor (2)		69.80%	73.60%	75.00%	77.02%
	Turboprop Aircraft				
DHC-8-100 DeHavilland	37	61,169	19,242	19,242	0
DHC-8-300 DeHavilland	50	15,750	21,023	24,048	0
Subtotal		76,919	40,265	43,290	0
Regional Jets					
RJ-200/ER Canadair	41	41,955	0	0	0
RJ-200/ER Canadair	50	0	66,400	68,419	124,290
Subtotal		41,955	66,400	68,419	124,290
Total		118,873	106,666	111,709	124,290
Distribution					
Turboprops		64.7%	37.7%	38.8%	0.0%
Regional Jets		35.3%	62.3%	61.2%	100.0%

(1) Aircraft with at least 30 operations per year

(2) Future year Load Factors predicted by FAA Aerospace Forecast Fiscal Years 2006-2017

Sources: From T-100 as compiled by Database Products and HNTB analysis.

Table 2-24

Forecast Scheduled Passenger Aircraft Departures by Aircraft Type

Equipment Type (1)	Average Seats	2005	2011	2016	2026
Projected Load Factor (2)		69.80%	73.60%	75.00%	77.02%
	Turboprop Aircraft				
DHC-8-100 DeHavilland	37	1,653	520	520	0
DHC-8-300 DeHavilland	50	315	420	481	0
Subtotal		1,968	940	1,001	0
Regional Jets					
RJ-200/ER Canadair	41	1,016	0	0	0
RJ-200/ER Canadair	50	0	1,328	1,368	2,486
Subtotal		1,016	1,328	1,368	2,486
Total		2,984	2,268	2,369	2,486
Distribution					
Turboprops		66.0%	41.5%	42.2%	0.0%
Regional Jets		34.0%	58.5%	57.8%	100.0%

(1) Aircraft with at least 30 operations per year

(2) Future year Load Factors predicted by FAA Aerospace Forecast Fiscal Years 2006-2017

Sources: From T-100 as compiled by Database Products and HNTB analysis.

Table 2-25

Projected Peak Activity
Scheduled Passenger Carriers

	2005	2011	2016	2026
Passengers				
Annual Enplanements (1)	64,328	72,553	78,103	90,340
Peak Month Enplanements (2)	11,919	13,443	14,471	16,739
Average Day Peak Month Enplanements (3)	397	448	482	558
Peak Hour Enplanements (4)	86	97	104	121
Peak Hour Deplanements (4)	86	97	104	121
Peak Hour Passengers (4)	86	93	100	116
Operations				
Annual Operations (5)	5,989	4,537	4,739	4,972
Peak Month Operations (2)	511	387	404	424
Average Day Peak Month Operations (3)	17	13	13	14
Peak Hour Departures (6)	2	2	2	2
Peak Hour Arrivals (6)	2	2	2	2
Peak Hour Operations (6)	2	2	2	2

(1) Table 21
(2) Existing data from Table 12. May was selected because it accounts for the most average day peak month (ADPM) enplanements. Future peak month percentage assumed to remain constant.
(3) Peak month (May) divided by 31 days.
(4) Existing seat arrival and departure data from Table 11. Peak hour load factor assumed to be 95 percent. Peak hour levels assumed to increase at same rate as average day peak month enplanements.
(5) Table 24 departures multiplied by two
(6) Existing scheduled aircraft operations data from Table 12. Peak hour levels assumed to increase at same rate as average day peak month enplanements.

Sources: As noted and HNTB analysis.

2.6 AIR CARGO FORECASTS

This section predicts future cargo activity at LYH. The air cargo at LYH currently consists entirely of belly cargo operations, with the exception of Ameriflight weekday operations. Belly cargo is cargo that is carried in the belly of a scheduled passenger operation. At the current time, the only all cargo operations are performed by Ameriflight. This forecast attempts to analyze the probability that all cargo service will be increased during the study period.

Air cargo is different from passenger traffic because the service area is much more extensive. Passenger traffic will not travel the distances that cargo services are willing to travel. Freight forwarders will routinely truck freight 500 miles or more to an airport offering the best rates and service. In the case of LYH several larger airports lie within a 500 mile radius. IAD, RIC, and ROA are all larger and currently have all cargo service. It is very likely that this trend will continue and freight will be trucked to the Lynchburg service area.

Table 2-26 looks at airports with similar enplanements to that of LYH. Table 2-26 describes that SBY and MQT are the only airports that have significant cargo service. One hypothesis for this larger service would be their ability to handle larger aircraft that all cargo carriers are more likely to have. The scheduled runway extension then could give all cargo carriers more incentive to service the airport.

Table 2-27 looks at runway length at airports of similar enplanements to LYH. Table 2-27 reveals that SBY currently has a shorter runway than LYH and MQT has a runway that is significantly longer than LYH. This information coupled with the fact that very little cargo service currently exists at the airport, does not support an argument that all cargo service will increase dramatically during the forecast period.

Table 2-28 attempts to predict the future air cargo that will service LYH. Table 2-28 uses cargo tons per operation to predict future tonnage at LYH. The current tonnage per operation was predicted to grow at a 0.5% rate for the duration of the forecast period. The total yearly tonnage was then predicted by multiplying per op tonnage by the number of operations performed for each forecast year (Table 2-29). By 2026 the enplaned cargo at the airport will increase to 708 tons. US revenue ton miles projected by the FAA forecast are presented for the purpose of comparison.

Table 2-29 presents the estimated annual all cargo operations at LYH. Currently, one carrier, Ameriflight, conducts all cargo operations at the airport. Ameriflight performs one departure per weekday. Ameriflight uses an Embraer 120 to perform these all cargo operations. The forecast predicts that the number of departures will increase to every weekday and one Saturday departure by 2011. Finally, the forecast predicts four weekday operations by the final year of the forecast for a total of 520 departures.

Table 2-26

2005 Air Freight and Air Mail Tonnage At Similar Sized Airports

Airport	City	Total Annual Passengers	Air Freight and Express	Air Mail	Total Air Cargo
LYH (1)	Lynchburg, VA	128,701	31	-	31
SBY	Salisbury, MD	128,103	960	-	960
MQT	Marquette, MI	126,560	519	-	519
HVN	New Haven, CT	129,660	8	-	8
HHH	Hilton Head, SC	134,969	3	9	12
DHN	Dothan, AL	137,652	36	-	36

(1) Ameriflight does not report to T-100

Sources: US DOT T-100 Data

Table 2-27

2005 All Cargo Operations and Length of Longest Runway

Airport	City	Total All-Cargo Operations	Length of Longest Runway in Ft.
LYH (1)	Lynchburg, VA	0	5,799
SBY	Salisbury, MD	1,091	5,500
MQT	Marquette, MI	862	12,370
HVN	New Haven, CT	1	5,600
HHH	Hilton Head, SC	0	4,300
DHN	Dothan, AL	78	8,498

(1) Ameriflight does not report to T-100

Sources: US DOT T-100 Data and AirNav

Table 2-28

Projected Air Cargo Tonnage

Year	Domestic		
	US RTMs (millions) (1)	Projected Cargo Tonnage Per Op	LYH Enplaned Cargo Tonnage (2)
1990	n/a		
1991	n/a		
1992	n/a		
1993	10,374		
1994	11,323		
1995	12,416		
1996	12,782		
1997	13,454		
1998	13,828		
1999	13,975		
2000	14,699		
2001	13,934		
2002	12,967		
2003	14,270		
2004	16,341		
2005 (3)	16,080	1.23	351
2011	19,557	1.26	394
2016	22,712	1.30	404
2026	30,643	1.36	708
Average Annual Growth Rate			
2005-2026	3.1%		3.4%

(1) FAA forecast of domestic revenue ton miles. Data prior to 2003 does not include Airborne Express.
(2) Historical data from T-100 and
(3) Estimates Based on Preliminary 2006 numbers

Sources: FAA Aerospace Forecasts: Fiscal Years 2006-2017 and HNTB analysis.

Table 2-29

Projected Air Cargo Departures

	Domestic	
		LYH
Year	Equipment	All Cargo Departures
2005	Embraer 120	260
2011	Embraer 120	312
2016	Embraer 120	312
2026	Embraer 120	520
Average Annual Growth Rate		
2005-2026		3.4%

Sources: FAA Aerospace Forecasts: Fiscal Years 2006-2017 and HNTB analysis.

In the past, ABX Air has expressed interest in beginning service to the airport. If this service were to commence after the completion of the runway extension, then the all cargo tonnage would be higher than the forecast indicates.

2.7 AIR TAXI, GENERAL AVIATION, AND MILITARY ACTIVITY

This section discusses the forecasts of air taxi, including for hire operations, general aviation, and military activity.

2.7.1 Air Taxi and Other

The category of Air taxi takes into account operations by non-scheduled charter operators that haven't been included in the categories discussed thus far. GA and military will be discussed later in this section.

Air taxi operations are not separate from the airport statistics or OAG schedules and are only intermittently included in the USDOT statistics. The total number of air taxi operations for this forecast was derived by taking the total number of air carrier operations provided by the airport and subtracting this number from ATADS tower counts of air carrier and air taxi operations. The air taxi forecast was derived by growing the forecast at the growth rates listed in the FAA hours flown forecast and adjusting them according to the ratio of the LYH primary service income to the U.S. income. The reasoning in this adjustment lies in the fact that the Lynchburg primary service income is projected to grow slower than that of the United States. So this effect dampens any overly optimistic forecast that would result through the usage of only the FAA hours flown growth rates. The fleet mix was derived from a one week sample of flight data from Flight Explorer. The percentages for each category were then applied to the annual statistics. **Table 2-30** projects the air taxi annual operations to grow from 1,223 in 2005 to 1,628 in 2026.

The largest factor affecting air taxi operations at LYH and nationwide during the forecast period will be the introduction of very light jets. These are small 3-7 seat jets that will be in service by the first forecast year 2011. Very light jets will make a market available for those who cannot afford to charter a plane but do not want to put up with the inconvenience of commercial flight. If very light jets become very popular, then air taxi operations will see a dramatic increase above the forecast. At the same time, if very light jets prove to be a commercial failure, then air taxi operations should tend toward the forecast predictions.

Table 2-30

Air Taxi and Other Annual Operations Forecast

Year	2005 (1)	2011 (2)	2016 (2)	2026 (2)	Average Annual Increase
US Income (3)	$10,278,204	$11,522,757	$12,732,501	$15,667,550	2.1%
LYH Primary Catchment Area Income (3)	$6,898,041	$7,575,826	$8,303,886	$10,003,353	1.9%
Single Engine Reciprocating	41	43	45	50	1.0%
Multi-Engine Reciprocating	489	512	536	587	0.9%
Multi-Engine Turboprop	652	691	723	777	0.9%
Multi-Engine Turbo Jet	41	78	119	214	8.6%
Total	1,223	1,324	1,423	1,628	1.4%

(1) Table 33 for totals and Flight Explorer tracking data for fleet mix. Excludes charter and cargo.
(2) Assumed to increase at FAA projected rate for hours flown in each category and then adjusted for income growth in catchment area relative to income growth inU.S.
(3) Table 3

Sources: FAA Aerospace Forecasts: Fiscal Years 2006-2017, and HNTB analysis.

2.7.2 General Aviation

General aviation activity at LYH had been declining between 1990 and 2003. The decline has reversed recently in both itinerant operations and local operations. Both have increased in the past few years. The decrease in GA activity has occurred nationwide. The exact cause of this decrease in activity is unknown, but the costs and inconvenience of general aviation flying have been cited.

Table 2-31 presents the based aircraft forecast at LYH. Nearly all the aircraft based at LYH are single engine piston, but there are a few jets. The table predicts the GA base aircraft to increase at the FAA Aerospace Forecast 2006-2016 for GA base aircraft rates. The table describes base aircraft increasing to 145 in 2026 from 88 in 2006.

Table 2-32 reveals the historical and projected local and itinerant operations. Historically, the itinerant operations have decreased since 1990 from 34,555 to 25,400 in 2005. Local operations, on the other hand, were up and down until 2003 and then increased by more than 8,000 operations annually. Because of the differing trend in itinerant operations and the increase in the past few years in local operations, the two were forecast separately. The table uses the ratio of the FAA GA hours flown forecast to the itinerant GA operations at LYH in order to predict future itinerant operations at the airport. The table then uses the forecast ratio for student pilots to LYH local operations for the local GA operations forecast. Since local operations are mainly touch and goes by student pilots, the ratio of FAA predicted student pilot hours flown to LYH local operations was used to forecast this number for years 2016 and 2026.

Liberty University has a School of Aeronautics aviation program that operates at the airport. The flight school element was recently started and has grown to approximately 250 flight students. As the program develops, both the students and the aircraft operations will increase. According to current numbers each student performs approximately 95 operations per year. This flight school's projected operations were added to the forecast years in order to take into account the additional take off and landings that will be performed. These operations were added due to the fact that FAA projected forecasts do not take into account such a specific increase in operations. In order to avoid double counting the growth in operations produced by the flight school, the additional operations produced by the flight school were added to the 2005 local operations number to forecast the 2011 local operations. The table predicts the growth of the past two years to continue and predicts that operations are expected to reach 99,974 by 2026.

Table 2-33 provides a fleet mix for future activity GA at LYH. The fleet mix was formulated by taking the one week sample data from a week in November 2006 and applying the fleet mix percentages to the historical and forecast numbers for operations. The largest increase occurs in the operation of jets at the airport. Jet aircraft operations are forecast to increase to 25,907 by 2026, surpassing the operations single engine pistons.

Table 2-31

LYNCHBURG REGIONAL AIRPORT

General Aviation Based Aircraft Forecast

	2006	2011	2016	2026
Single Engine Reciprocating	69	80	91	108
Multi-Engine Reciprocating	8	8	8	8
Multi-Engine Turbo Prop	2	2	2	3
Multi-Engine Turbo Jet	7	9	13	21
Helicopter	2	2	3	5
Total	88	102	117	145

(a) Virginia Airport Annual Based Aircraft Survey Summary Report.
(b) Flight School expected to add 10-15 additional C-172 aircraft

Sources: HNTB Analysis and FAA Aerospace Forecasts 2006-2017

Table 2-32

LYNCHBURG REGIONAL AIRPORT

Forecast of General Aviation Operations

Year	FAA GA and Air Taxi Hours Flown (a)	Ratio of LYH Itinerant GA Operations to FAA Hours Flown (b)	LYH Itinerant GA Operations (c)	FAA Student Pilots (a)	Ratio of LYH Local GA Operations to FAA Hours Flown (d)	LYH Local GA Operations (e)(h)	New Liberty U. Flight School Operations (f)	Total LYH GA Operations (g)
1990	31,744	1.089	34,555	n/a	n/a	21,387		55,942
1991	31,123	1.009	31,400	n/a	n/a	19,457		50,857
1992	27,401	1.014	27,785	n/a	n/a	15,808		43,593
1993	25,286	1.119	28,301	103,583	0.193	19,992		48,293
1994	24,911	0.970	24,166	96,254	0.184	17,758		41,924
1995	26,612	0.859	22,868	101,279	0.170	17,168		40,036
1996	26,909	0.787	21,174	94,947	0.148	14,042		35,216
1997	27,713	0.814	22,572	96,101	0.173	16,652		39,224
1998	28,100	0.823	23,125	97,736	0.167	16,350		39,475
1999	31,230	0.724	22,596	99,184	0.157	15,574		38,170
2000	30,219	0.807	24,372	99,110	0.192	19,006		43,378
2001	27,017	0.909	24,549	94,420	0.176	16,602		41,151
2002	27,040	0.886	23,951	85,991	0.182	15,656		39,607
2003	27,049	0.824	22,279	87,296	0.173	15,132		37,411
2004	27,255	0.949	25,876	87,910	0.270	23,762		49,638
2005	28,293	0.898	25,400	87,213	0.269	23,474		48,874
2006							10,215	
2011	34,468	0.831	28,648	94,270	0.318	23,474	13,430	65,552
2016	40,012	0.779	31,187	104,082	0.365	38,000	13,430	82,617
2026	45,501	0.685	31,189	114,917	0.482	55,355	13,430	99,974

(a) FAA, FAA Aerospace Forecasts: Fiscal Years 1995-2006, 1998-2009, 2000-2011, and 2006-2017.

(b) Historical ratio of GA itinerant operations at LYH to US GA and Air Taxi Hours Flown. Assumed to continue to change at historical rates.

(c) Historial itinerant GA operations from FAA ATADS data base. Future GA operations estimated by multiplying FAA forecast of GA and Air Taxi hours flown by ratio of LYH itinerant GA operations to FAA hours flown.

(d) Historical ratio of GA local operations at LYH to US Student Pilots. Assumed to continue to change at historical rates.

(e) Historial local GA operations estimated by subtracting itinerant operations from total operations. Future local GA operations estimated by multiplying FAA forecast of Student Pilots by ratio of LYH local GA operations to FAA Student Pilots.

(f) Flight School numbers are from 2006

(g) Historical data from Table 13. Future estimates equal to sum of local and itinerant operations forecasts.

(h) 2005 number was carried forward to 2011 in order to avoid double counting the increase in operations produced by Liberty University Fight School growth.

Sources: As noted and HNTB analysis.

Table 2-33

LYNCHBURG REGIONAL AIRPORT

Forecast of General Aviation Operations by Type

Year	2005 (a)	2011 (b)	2016 (b)	2026 (b)	Average Annual Increase
Single Engine Reciprocating	34,142	43,127	51,446	56,173	2.5%
Multi-Engine Reciprocating	6,502	8,134	9,649	10,452	2.4%
Multi-Engine Turboprop	4,242	5,376	6,365	6,767	2.4%
Multi-Engine Turbo Jet	3,683	8,466	14,557	25,907	10.2%
Helicopter	305	449	600	675	4.1%
Total	48,874	65,552	82,617	99,974	3.6%

(a) Distribution based on Flight Explorer Estimate
(b) Assumed to increase at FAA projected rate for hours flown in each category and then adjusted on a prorated basis to total operations estimated in Table 32.

Sources: FAA Aerospace Forecasts: Fiscal Years 2006-2017, and HNTB analysis.

2.7.3 Military

Military operations are difficult to predict. They do not rely on any social or economic factors from the surrounding areas, but rather on political and institutional factors from the military and the government. The militaries are assumed in this forecast to remain constant at their 2003-2005 average throughout the forecast. The forecast in **Table 2-34** predicts 1,098 operations for the duration of the forecast.

2.8 SUMMARY OF PROJECTED ACTIVITY AND COMPARISON TO TAF FORECAST

Table 2-35 summarizes all operational activity at LYH. The table summarizes all operations and peak activity by category. Peak month operations come from FAA airport tower count (ATADS) data for air taxi and GA data. Average day peak month was formulated by dividing peak month operations by the number of days in the peak month. Finally, the peak hour was derived from flight explorer data for GA and Air Taxi. The percentage of daily operations that took place in the peak hour was then multiplied by average day peak month operations to ascertain peak hour operations. Total operations are expected to increase at a 3.1 percent annual rate.

Table 2-36 compares operations and enplanements from the Master Plan forecast to the Virginia Air Transportation System Plan Update (VATSP) and the Terminal Area Forecast. Comparison of the Master Plan and Terminal Area forecasts is inexact due to the fact that the TAF is forecast in fiscal years and this forecast is predicted in calendar years.

The operations forecast in this report predicts 12.3 percent more operations than the VATSP forecast in 2016. The largest factor in the higher forecast is the inclusion of operations for the new flight school. Without these operations the forecast would predict approximately 13,430 fewer operations and fall below the VATSP forecast. The TAF predicts 87,417 aircraft operations in 2026. The Master Plan Forecast predicts 107,613 operations. This difference can be attributed mostly to the aforementioned flight school activity.

The passenger enplanement forecast in this report predicts 6.44 percent more passengers than the TAF forecast in the year 2026. This number is consistent with the 10 percent difference in forecasts allowed by the FAA. The VATSP predicts far more enplanements than either the TAF or the Master Plan forecast. The VATSP from 2003 predicted enplanements for 2005 to be 84,001. This number fell 23.4 percent below the actual recorded enplanements in 2005. The robust growth predicted between 2003 and 2005 did not occur. This caused the future year enplanement levels to be much higher than the Master Plan or TAF predicted.

For the purposes of this report the airport requests the approval from the FAA of the enplanement and operations forecasts in the Master Plan.

Table 2-34

Forecast of Military Operations

Year	LYH Military Operations (a)	Local	Itinerant
1990	2,449	1,417	1,032
1991	1,972	1,164	808
1992	2,010	1,367	643
1993	2,391	1,469	922
1994	1,247	811	436
1995	1,653	884	769
1996	1,140	684	456
1997	1,139	663	476
1998	1,175	749	426
1999	1,329	689	640
2000	1,196	750	446
2001	1,394	912	482
2002	1,195	845	350
2003	1,192	784	408
2004	1,086	788	298
2005	1,015	659	356
2011	1,098		
2016	1,098		
2026	1,098		

(a) Historical data from ATADS. Future military operations assumed to remain constant at 2003-2005 average.

Table 2-35

Summary of Aircraft Operations and Total Passengers Forecasts

Year	Scheduled Passenger Carrier	Air Taxi	General Aviation	All Cargo	Total Operations	Total Passengers
			Annual			
2005	5,989	1,223	48,874	520	56,606	134,028
2011	4,537	1,324	65,552	624	72,037	145,107
2016	4,739	1,423	82,617	624	89,403	156,206
2026	4,972	1,628	99,974	1,040	107,613	180,680
			Average Annual Growth			
2005-2026	-0.9%	1.4%	3.5%	3.4%	3.1%	1.5%
			Peak Month			
2005	511	131	5,769	N/A	6,411	11,919
2011	387	142	7,738	N/A	8,267	12,978
2016	404	152	9,752	N/A	10,309	13,973
2026	424	174	11,801	N/A	12,399	16,285
			Average Day Peak Month			
2005	17	4	192	1	214	397
2011	17	5	258	1	280	433
2016	18	5	325	1	348	466
2026	20	6	393	2	419	543
			Peak Hour			
2005	4	1	21	N/A	26	178
2011	4	1	29	N/A	34	194
2016	4	1	36	N/A	41	209
2026	4	1	44	N/A	49	243

Sources: Flight Explorer, HNTB analysis.

Table 2-36

Comparison With TAF and VATSP Forecasts

Year (1)	Master Plan	TAF	Percent Difference	Master Plan	2003 VATSP Update	Percent Difference
			Passenger Enplanements			
2005	64,328	65,504	1.8%	64,328	84,001	23.4%
2011	72,553	68,425	-6.0%	72,553	*96,095*	24.5%
2015					105,110	
2016	78,103	73,672	-6.0%	78,103	*107,769*	27.5%
2020					119,094	
2026	90,340	85,414	-5.8%	90,340	*138,352*	34.7%
			Aircraft Operations			
2005	56,606	57,038	0.8%	56,606	63,079	10.3%
2011	72,037	70,645	-2.0%	72,037	71,636	-0.6%
2015					*77,977*	
2016	89,403	76,721	-16.5%	89,403	*79,614*	-12.3%
2020					86,514	
2026	107,613	87,417	-23.1%	107,613		

(a) VATSP operations and enplanements interpolated for 2011 and 2016 from growth rates
(b) 2026 TAF forecast number extrapolated by growing
the 2025 number at the 2024-2025 growth rate
(c) TAF numbers are based on fiscal years while HNTB numbers are calendar years.
This explains the differences in historical numbers

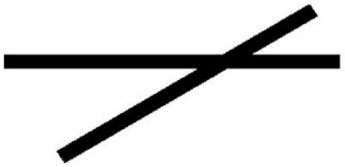
Sources: Tables 35, FAA Terminal Area Forecast, February 2006, 2003 Virginia Air Transportation System Plan (VATSP) Update, and HNTB analysis.

Chapter Three
Facility Requirements

The purpose of this technical memorandum is to document the airport's physical facilities. The inventory is based on information obtained from the airport, interviews with tenants and onsite inspection. This information is based on conditions as they existed in October 2006. **Figure 3-1** depicts the existing airport facilities.

Figure 3-1

Hourly Capacity and ASV for Long Range Planning

Runway Use Configuration	Mix Index	Hourly Capacity Ops/Hour		Annual Service Volume
	%(C+3D)	VFR	IFR	Ops/Year
	0 to 20	98	59	230,000
	21 to 50	77	57	200,000

Source: FAA Advisory Circular 150/5060 – 5, Airport Capacity and Delay

The purpose of this technical memorandum is to provide a summary of the facilities required to accommodate aviation demand at Lynchburg Regional Airport (LYH) over the 20-year planning period to the year 2026. Facility requirements were developed by taking the aviation demand forecasts presented in the Forecast of Aviation Demand and performing demand/capacity analyses on the various functional elements of the Airport. Table 3-1 provides a summary of aircraft operations and total passenger activity used in these analyses. Where appropriate separate facility requirements were developed for the horizon years 2011, 2016, and 2026. Analyses were performed for the following functional areas:

- Airfield
- Terminal
- Surface Transportation and Auto Parking
- Cargo
- General Aviation
- Support Facilities

Table 3-1

Summary of Aircraft Operations and Total Passengers Forecasts

Year	Scheduled Passenger Carrier	Air Taxi	General Aviation	All Cargo	Total Operations	Total Passengers
			Annual			
2005	5,989	1,223	48,874	520	56,606	134,028
2011	4,537	1,324	65,552	624	72,037	145,107
2016	4,739	1,423	82,617	624	89,403	156,206
2026	4,972	1,628	99,974	1,040	107,613	180,680
			Average Annual Growth			
2005-2026	-0.9%	1.4%	3.5%	3.4%	3.1%	1.5%
			Peak Month			
2005	511	131	5,769	N/A	6,411	11,919
2011	387	142	7,738	N/A	8,267	12,978
2016	404	152	9,752	N/A	10,309	13,973
2026	424	174	11,801	N/A	12,399	16,285
			Average Day Peak Month			
2005	17	4	192	1	214	397
2011	17	5	258	1	280	433
2016	18	5	325	1	348	466
2026	20	6	393	2	419	543
			Peak Hour			
2005	4	1	21	N/A	26	178
2011	4	1	29	N/A	34	194
2016	4	1	36	N/A	41	209
2026	4	1	44	N/A	49	243

Sources: Flight Explorer, HNTB analysis.

3.1 AIRFIELD REQUIREMENTS

This analysis addresses runway, taxiway and NAVAID improvements needed to accommodate future traffic levels.

3.1.1 Airfield Capacity and Delay

Airfield capacity is anticipated to be adequate through the planning horizon therefore the capacity of the existing airfield layout was calculated utilizing the methodology described in Chapter 2 of AC 150/5060-5, Airport Capacity and Delay.

Airfield capacity can be defined in several ways. The two most common measures of capacity are hourly capacity and annual service volume (ASV). Hourly capacity is defined as the maximum number of aircraft that can operate on the airfield in a 60-minute period. Annual service volume is a reasonable estimate of an airport's annual capacity. It accounts for differences in runway use, aircraft mix, weather conditions and other variables that would be accounted for over a year's time. Both of these values are determined by selecting a runway configuration contained in Chapter 2 that most closely represents the airfield configuration being evaluated and determining the aircraft mix index. The mix index is derived from the aircraft mix which is the relative percentage of operations conducted by each class of aircraft. The mix index is the percent of Class C aircraft plus 3 times the percent D aircraft and is expressed %(C+3D). The mix index for the base and future years is presented in **Table 3-2**. Figure 3-1 depicts the runway configuration, hourly capacity and ASV for long range planning.

Table 3-2

Existing and Future Mix Index

	2005	2011	2016	2026
Mix Index	16	19	22	26

Source: HNTB analysis.

Based on the mix index, the hourly capacity for the base year and 2011 is 98 operations for VFR and 59 operations for IFR. In forecast years 2016 and 2026 the mix index increases which results in a decrease of hourly operations to 77 operations in VFR and 57 operations in IFR.

As depicted in Figure 3-1, a mix index under 20 results in an ASV of 230,000 operations. For a mix index between 21 and 50 the ASV falls to 200,000 operations.

Total aircraft operations are expected to increase from 56,000 operations in the base year to 107,000 operations by 2026. Peak hour operations will increase from 26 operations in the base

year to 49 operations by 2026. A comparison of the airfield capacities to demand indicate that there is excess airfield capacity through the planning horizon and that no capacity improvements will be required.

3.1.2 Taxiway Requirements

Runway 4-22 is served by full length parallel Taxiway B and Runway 17-35 is served by partial parallel Taxiway G. The existing ALP shows a number of taxiway improvements including a future full length parallel Taxiway A on the east side of Runway 4-22, Taxiway G extension to the Runway 35 departure end, and a number of fillet widening throughout the airfield. There are no requirements that are driving these improvements. The fillet widening would help facilitate the movement of aircraft off of the primary runway helping to reduce runway occupancy times. The parallel taxiways would be 'nice to have' for some operational scenarios, but may be difficult to justify financially. It should be noted that the runway to taxiway separation for Taxiway G/Runway 17-35 is deficient at 230-feet. The separation requirement for this runway/taxiway is 240-feet for the B-II (small aircraft exclusively) design criteria for this runway. This condition will be addressed in Sections 4.2.3 and 4.4.3.

Additional taxiways may be required to provide access to future development areas, i.e. the south GA expansion area and the north side of the airfield where north GA development area will be constructed. These will be discussed and depicted in further detail in Chapter 4, Alternative Concepts and Recommended Plan.

3.1.3 NAVAID Requirements

The existing navigational and landing aid facilities are adequate to support current and forecasted levels of demand. An obstruction analysis for Runway 22 is being performed as part of the master plan effort. The analysis will determine opportunities to expand the existing GPS approach procedures in an effort to reduce existing minimums. The results of the analysis will be incorporated into the final Airport Layout Plan.

3.2 TERMINAL REQUIREMENTS

Facility requirements for the passenger terminal building were based on forecasts of peak hour activity (including originating and terminating passengers, baggage, and aircraft operations), application of industry standards, FAA planning guidelines (AC 150/5360-9 and 150/5360-13), and information gathered during the inventory process.

Based on the facility requirement analysis the terminal facility will have excess capacity through the planning horizon. Approximately 24,200 square feet will be required to accommodate demand by 2026. The existing terminal has 37,900 square feet of existing space available leaving a surplus of nearly 13,700 square feet. The program areas for each major terminal function for

each forecast year are presented in **Table 3-3**. Although the terminal has surplus space, some of the individual functional areas have become less efficient with new security requirements. The

Table 3-3

Lynchburg Passenger Terminal Building - Facility Requirements
(Square Feet)

	2011	2016	2026
MAIN LEVEL			
Airline Functions			
Ticket Counter	873	936	1,089
Ticket Counter Queuing	1,164	1,248	1,452
Airline Ticket Offices	1,164	1,248	1,452
Check Bag Screening	1,164	1,248	1,452
Departure Lounge/Waiting Area	4,918	5,273	6,135
Baggage Claim	1,164	1,248	1,452
Subtotal	10,447	11,201	13,032
Concessions Space			
Vending Machines/Food	177	190	221
Rental Car	51	54	59
Subtotal Concessions Space	51	54	59
Security Screening			
Security Checkpoint	900	900	900
Subtotal	900	900	900
Secure Public Area			
Hold Room	1,455	1,560	1,815
Circulation to Apron	437	468	545
Subtotal	1,892	2,028	2,360
Non-Secure Public Area			
Circulation - General	138	146	159
Restrooms	350	350	350
Subtotal	488	496	509
Non-Public Area			
Administrative Offices	1,164	1,248	1,452
TSA Office	200	200	200
Subtotal	1,364	1,448	1,652
Subtotal Main Level	15,141	16,127	18,512
Main Level Space	29,300	29,300	29,300
Surplus/(Deficit)	**14,159**	**13,173**	**10,788**
LOWER LEVEL			
Airline Offices	1,164	1,248	1,452
Hold Rooms	1,455	1,560	1,815
Restrooms	776	832	968
Circulation/public space	1,164	1,248	1,452
Subtotal Lower Level	4,559	4,888	5,687
Lower Level Space	**8,600**	**8,600**	**8,600**
Surplus/(Deficit)	**4,041**	**3,712**	**2,913**
Requirements	19,700	21,015	24,199
Existing Terminal Space	37,900	37,900	37,900
Surplus/(Deficit)	**18,200**	**16,885**	**13,701**

Source: HNTB analysis.
(1) Future planning requirements based on industry standard planning factors based on peak hour enplanements/deplanements and professional judgment. Security screening requirements are based on typical single TSA checkpoint design requirements.

inventory has identified several areas that require additional analysis to address these efficiency issues. The airport development concepts will identify improvements to the passenger terminal facility.

3.3 AIRPORT SURFACE TRANSPORTATION AND PARKING REQUIREMENTS

Landside and parking capacity is anticipated to be adequate through the planning period. The purpose of this analysis was to validate the adequacy of each of these components. Industry planning standards and existing and future passenger peaking characteristics airport were utilized to estimate the capacities for each component.

3.3.1 Access Roadway and Terminal Curb

The existing two lane airport access road has a capacity of approximately 900 vehicles per lane per hour. Based on the forecast these activity would never be realized through the planning period. The critical capacity in the access system would be the terminal curb. The terminal building is approximately 300 feet in length. There is an additional 50 feet of curb on each side of the terminal that could be utilized, providing 400 feet of curb length. Based on our analysis this would provide a balanced capacity of 172 vehicles per hour for the 300 foot curb length and 226 vehicles per hour for the 400 foot curb length. Based on peak hour passenger activity there would be a demand of approximately 59 vehicles in the peak hour for the base year and 81 vehicles in the peak hour by 2026. Terminal curb capacity can also be measured in acceptable levels of service. This is calculated by comparing the ratio of volume to capacity. A volume to capacity (v/c) ratio greater than 0.70 is considered to be unacceptable level of service. The v/c ratio is calculated to be 0.47 for a 300 foot curb length in the out year (2026). The analysis indicates the airport curb has sufficient capacity, and will provide an acceptable level of service through the planning period.

3.3.2 Parking

The existing parking includes 313 economy spaces and 95 close-in spaces. On an average busy day 120 economy spaces and 55 close-in spaces are occupied. Another 53 spaces are occupied the close-in lot on a daily bases for less than 30 minutes. Based on conversations with Airport staff, the parking demand remains fairly steady during the weekday through out the year. As a general rule of thumb parking requirements should be increased when demand reaches 90 percent capacity in the economy lot and 85 percent capacity in close-in lot. Based on the existing parking demand to capacity the economy lot is at approximately 38 percent capacity. The close-in lot can experience a capacity rate as high as 85 percent if fifty percent of the vehicles less than 30 minute dwell time are parking at the same time. Future requirements were calculated based on the growth in total passengers. Based on this assumption approximately 163 spaces would be required by 2026 for economy parking and 130 parking spaces would be required for close-in parking. Although the total number of combined economy and close-in spaces meets parking

requirements there will be a shortage of dedicated close-in parking spaces by 2026. The airport development concepts will determine how additional close-in parking will be accommodated.

3.4 AIR CARGO REQUIREMENTS

Air cargo is projected to double, from 700 annual tons to 1,400 annual tons, through the planning period. The number of all cargo flights is also expected to double, from 1 to 2, over the same time frame. The cargo tonnage is comprised of both belly cargo and all cargo operation. There are currently no facilities on the airport dedicated to cargo processing. Cargo facilities are typically planned based on a ratio of annual tonnage per square foot. Based on industry trends the utilization rates for cargo facilities typically range from one to three square feet per ton. One square foot per ton implies a high utilization rate. Facilities experiencing these rates are typically constrained and in need of expansion. Utilizing the higher utilization rate of three square feet per ton approximately 4,200 feet of cargo building will be required through the planning horizon. This is a relatively small cargo building requirement. There could be some efficiency in providing a larger facility. For planning purposes the airport development concepts will plan to accommodate a 5 to 10 thousand square-foot building. The land side area would be approximately double the building area. An apron area for two EMB-120 or equivalent aircraft should be planned for the airside. A brief analysis showed that two EMB-120, or a DC9 can be accommodated in this area with the ability to turn around while remaining clear of parked CRJ-900 at the gate. For a graphical depiction see figures 4-3 and 4-7.

3.5 GENERAL AVIATION REQUIREMENTS

General aviation is the largest segment of operations at the airport. As documented in the Forecast of Aviation Demand general aviation operations will double from 48,874 in 2005 to 99,974 in 2025. Turbojet aircraft is the fastest growing component within the general aviation fleet. **Table 3-4** provides a summary of forecast aircraft operations by aircraft type. **Table 3-5** provides a summary of forecast based aircraft.

Facility requirements were developed by comparing current and future requirements to existing facilities and utilizing standard planning factors and relationships, including those presented in the 2002 Virginia Air Transportation System Plan Update (VATSP). For buildings and aprons a high and low range of facility requirements were developed to determine how requirements for the various facilities would change with varying aircraft storage distribution assumptions. Separate general aviation facility requirements were developed for each forecast year for the major general aviation components including, hangar, office/shops and apron. Facility requirements for the GA terminal were developed for the planning horizon, 2026. Based on these requirements total acreages were derived using existing facility ratios that account for ancillary facilities such as auto parking and buffer zones.

3.6 GA TERMINAL

The existing GA terminal is approximately 4,500 square feet in size. GA terminals are typically sized to accommodate peak period activity, and most activity within a GA terminal focuses on serving transient aircraft operations. The current GA terminal provides approximately 194 square feet of building space per itinerant aircraft parking position. This includes space for critical functional areas, such as, passenger lounge, pilot lounge, conference rooms, flight planning, storage, mechanical, restrooms, administration etc. Recognizing that the current GA terminal provides a good level of service, and because the mix of transient parking positions is not expected to vary significantly through the planning horizon, this ratio was applied to the forecast 2026 transient aircraft parking position requirements to provide an estimate of future long-term GA terminal needs. Based on this analysis, the size of the GA terminal is forecast to increase from approximately 4,500 square feet in the base year to about 7,400 feet by 2026.

3.7 HANGAR REQUIREMENTS

- Conventional Hangars – There is approximately 62,000 square feet of conventional hangar space at the airport that is utilized strictly for the storage of aircraft. As suggested above, requirements can vary based on the distribution of aircraft utilizing these types of facilities. Based on the existing utilization rates approximately 122,000 square feet of conventional hangar is required by 2026. However, if a lower distribution of aircraft were assumed, such as those utilized in VATSP, only 92,000 square feet of hangar would be

Table 3-4

Forecast of General Aviation Operations by Type

Year	2005	2011	2016	2026
Single Engine Reciprocating	34,142	43,127	51,446	56,173
Multi-Engine Reciprocating	6,502	8,134	9,649	10,452
Multi-Engine Turboprop	4,224	5,376	6,365	6,767
Multi-Engine Turbo Jet	3,683	8,466	14,557	25,907
Helicopter	305	449	600	675
Total (c)	48,856	65,552	82,617	99,974

Sources: FAA Aerospace Forecasts: Fiscal Years 2006-2017, and HNTB analysis.

Table 3-5

Summary of Based Aircraft

Based Aircraft	2011	2016	2026
Single Engine Reciprocating	80	91	108
Multi-Engine Reciprocating	8	8	8
Turbo-prop	2	2	3
Multi-engine Turbo Jet	9	13	21
Helicopter	2	3	5
Total	101	117	145

Source: HNTB analysis.

required. The lower requirement would indicate that other facilities such as T-hangars or tie-downs would be utilized for aircraft storage.

- Maintenance Hangars – Aircraft maintenance is a large component of the general aviation business activity occurring at the airport. Approximately 42 percent of the hangar space (25,800 square feet) at the airport is dedicated for aircraft maintenance activities. Assuming that this percentage would remain constant, maintenance hangar requirements would nearly double through the planning period to 51,000 square feet based on the higher conventional hangar requirement.

- Office/Shops – There are typically offices, shops and support space associated with conventional and maintenance hangars. For example a maintenance hangar will often have various shops within the hangar complex supporting the maintenance activities. A conventional hangar may provide office space or pilot support space. Based on existing ratios, office and support areas represent 29 percent of the total hangar requirements. Based on these ratios these areas will nearly double from 23,600 to 46,700 through the planning period based on the higher conventional hangar requirement.

- T-Hangars – Construction of 12 T-hangar units and one jet pod was completed at the Airport in the summer of 2006. Similar to conventional hangar requirements, the forecast for T-hangars can vary based on the distribution of aircraft. The number of T-hangars ranges from 22 based on the low scenario to 63 based on the high scenario in the year 2026.

The range of hangar requirements is summarized in **Table 3-6.**

Table 3-6

Summary of Hangar Requirements

Existing Facilities	2011	2016	2026	
Conventional Storage Hangar (SF)	73,597	88,402	122,271	High Scenario
	50,002	61,820	91,159	Low Scenario
Maintenance Hangar (SF)	30,725	36,906	51,045	High Scenario
	14,726	18,207	26,848	Low Scenario
Office Support/Shops (SF)	28,105	36,906	46,693	High Scenario
	17,438	21,560	31,792	Low Scenario
T-Hangar Requirements (units)	48	54	63	High Scenario
	17	19	22	Low Scenario

Source: HNTB analysis.

3.8 APRON REQUIREMENTS

- Based Aircraft Apron – There is approximately 15,000 square yards of apron dedicated for aircraft based at the airport. Similar to hangar requirements, based aircraft apron requirements can vary based on the distribution of aircraft utilizing the airport facilities. Utilizing aircraft distribution rates that represent a high and low scenario based aircraft apron requirements would vary between 29,000 square yards and 33,600 square yards by the end of the planning horizon.

- Itinerant Aircraft Apron - Apron area requirements for transient aircraft parking were derived by multiplying the forecast busy day itinerant operations by aircraft space requirements. A high and low scenario was developed for itinerant apron. An assumption on the number of operations is consistent for each scenario. The variable between the two scenarios is the areas assigned for each type of aircraft. The high scenario utilized the VATSP assumptions while the low scenario represents planning assumptions developed by HNTB based on existing conditions, professional judgment and experience at similar GA airports.

- Hangar Circulation Apron – A certain amount of apron is required to provide circulation of aircraft into and out of a hangar facility. For planning purposes this area is calculated at 10 percent of the hangar requirements presented in square yards. Based on the high and low hangar requirements this area ranges from 11,800 square yards to 17,300 square yards by 2026.

- T-hangar Apron Circulation – Taxilanes are provided to support access to individual t-hangar units. This area required to support these taxilanes was calculated based on the existing ratio of apron area to individual T-hangar units. These requirements range from

14,300 to 40,800 square yards. This was calculated primarily to determine the total area required to support the t-hangar development.

The range of apron requirements is summarized in **Table 3-7.**

Table 3-7

Summary of Apron Area Requirements

Existing Facilities	2011	2016	2026	
Hangar Apron (SY)	10,432	12,531	17,332	High Scenario
	6,473	8,003	11,801	Low Scenario
Based Aircraft Apron (SY)	24,951	28,388	33,597	High Scenario
	21,392	24,358	28,865	Low Scenario
Itinerant Aircraft Apron	71,602	77,608	76,441	High Scenario
	37,149	40,265	39,659	Low Scenario
T-Hangar Circulation (SY)	30,630	34,693	40,842	High Scenario
	10,647	12,101	14,305	Low Scenario

Source: HNTB analysis.

3.8.1 Total Airside/Building Area

This is the sum of the building and apron areas but does not include the t-hangar component. This is utilized to calculate the landside requirements. Based on the requirements presented above this area ranges from 28 to 39 acres by 2026.

3.8.2 Landside Requirements

General aviation facility development includes a landside component comprised of access, parking and buffer areas. For planning purposes a planning factor of 50 percent of the total airside/building area was utilized. Based on this assumption 12 to 14 acres are required to accommodate these functional areas.

3.8.3 Total General Aviation Area

This is the total area required to accommodate all airside, building and landside general aviation facilities. Based on the analysis the total area ranges from 40 to 53 acres by 2026.

General Aviation Area requirements are summarized in **Table 3-8.**

Table 3-8

Summary of General Aviation Area Requirements

Existing Facilities	2011	2016	2026	
Total Airside/Building Area (AC)	30	34	39	High Scenario
	21	23	28	Low Scenario
Landside/Circulation/Buffer (SY)	11	13	14	High Scenario
	9	10	12	Low Scenario
Total General Aviation Area	41	47	53	High Scenario
	30	33	40	Low Scenario

Source: HNTB analysis.

3.9 SUPPORT FACILITY REQUIREMENTS

This analysis includes requirements for fueling facilities, Airport Maintenance, ARFF, and Air Traffic Control.

3.9.1 Airport Maintenance

Airport Maintenance facilities are located in two separate locations at the airport. The Corporate General Aviation area houses the largest facility at 6,700 square feet. A 3,600 square-foot facility is located just west of the ATCT. This second facility is antiquated and in poor condition. The landside location is also not continently located. For planning purposes it will be assumed that the maintenance requirements will double through the planning period. The Airport Development Concepts will evaluate co-locating all maintenance facilities.

3.9.2 ARFF

The existing ARFF meets current requirements; however, the Airport is relocating this facility in close proximity of the terminal and integrating this function with public safety. This would allow cross utilization of personnel which could potentially reduce the Airport's operating costs. The exact location of the facility will be determined in the airport development concepts.

3.9.3 Air Traffic Control Tower

The existing location of the ATCT is well situated to provide air traffic control duties. The building however is old and deteriorating. The Airport Development Concepts will identify and evaluate alternative locations, including the existing location, for a new tower.

3.9.4 Fueling Facilities

The existing fuel farm includes 30,000 gallons of Jet A and 15,000 gallons of 100LL. Over the past five years Jet A fuel consumption has average 1 million gallons per year and 100LL

consumption has averaged 113,000 gallons per year. To estimate future fuel requirements ratios of peak month fuel consumption to peak month departures were developed for several different operational categories including air carrier, general aviation and air taxi. These ratios were then applied to future average peak month departures to determine the monthly fuel consumption. A general planning assumption for fuel storage is a capability to maintain a five-to seven-day supply of fuel. Assuming a seven-day storage requirement for fuel facilities, Jet A would require some expansion through the planning period and 100LL fuel facilities would be adequate. **Table 3-9** presents the storage requirements for each fuel through the planning period.

Table 3-9

Fuel Storage Requirements

Year	Jet A	100LL
2011	28,000	4,000
2016	32,500	5,200
2026	37,500	6,300

Source: HNTB analysis.

Chapter Four
Alternative Concepts and Recommended Plan

4.1 INTRODUCTION

The purpose of this chapter is to describe the process used in preparing a recommended development plan for Lynchburg Regional Airport (LYH) that will meet the 20-year facility requirements (2006-2026). To meet deficiencies identified in the Facility Requirements chapter, alternatives and development strategies were developed and qualitatively analyzed considering relative cost, ease of implementation, adjacency issues, efficiency, and flexibility to meet changing market needs. Each functional element analyzed is listed below:

- Terminal
- Surface Transportation and Auto Parking
- Airfield
- Cargo
- General Aviation
- Support Facilities

The result of the analysis undertaken in this effort is a recommended development plan for LYH, which is described in Section 4.4.

4.2 OVERALL CONCEPT DEVELOPMENT APPROACH

The strategy for identifying and developing concepts was based on meeting requirements identified in Chapter 3, Facility Requirements. Using industry standard planning factors, general land area requirements were determined for long-term planning (i.e., out to 2026) and developed into schematic layouts.

Each functional area of the airport requiring facility development/improvement is discussed below.

4.2.1 Terminal

The existing terminal facility exceeds the anticipated facility requirements through the planning period. However, a terminal useful life analysis (See **Appendix A**) was done to assess the

condition of the existing terminal and to identify potential improvements. The following represents the key improvements considered in the analysis:

- Replace existing HVAC system in the mid-term planning period (approximately by 2012 according to typical HVAC useful life span of 20 years).

- In the short-term, as funds are available consider implementing key recommended Terminal Sustainability Ideas from Appendix A to reduce O&M costs of the terminal facility.

- Replace the existing escalators in the short-term planning period. The existing escalators are approaching 20 years old. Reliability of the escalators are going down and the annual maintenance costs are going up.

- Upgrade the Terminal Facility Security System. Like some of the other terminal systems mentioned, the security system is nearing 20 years old and is outdated and in need of replacement.

- Remodel and Update Terminal in the next five to ten years. Particular areas requiring an update are the ticket counters, holdroom carpet, and overall interior paint.

- Improve the bag screening operation as shown in the Terminal analysis. See **Figures 4** and **5** in Appendix A.

- Expand the connecting bridge at the passenger screening checkpoint to improve deplaning passenger circulation. This is not necessarily a demand driven project but one of functionality and aesthetics that would improve customer service. This project should be implemented as funding is available. See **Figure 3** in Appendix A for the Deplaning and Administration Area Expansion option.

- Expand bag claim in the long-term to accommodate narrowbody aircraft (e.g., Airbus A320, Boeing 737). See **Figure 6** in Appendix A for the Bag Claim Expansion option**.**

4.2.2 Surface Transportation and Auto parking

Terminal Parking

The facility requirements chapter identified a need for approximately 35 additional close-in (hourly) spaces within the planning period.

The existing economy lot has a surplus number of spaces that will not be required during the planning period; therefore the Master Plan recommends reallocating a block of 35 spaces from the next closest row of economy spaces to the north of the existing close-in spaces. Reallocating

these 35 spaces to better serve close-in parking will have no effect on accommodating economy parking demand in the planning period. It is, however, recommended that all parking requirements be reassessed as demand levels near the trigger point where additional close-in spaces are required. In the case that more close-in parking is required beyond what is anticipated in the facility requirements the whole row of economy parking can be reallocated as close-in spaces without needing to expand the northeast end of the economy lot. Also, the terminal parking lot pavement requires rehabilitation in the mid-term planning period.

See **Figure 4-1** for a graphical depiction of the parking space reallocation plan.

Terminal Access Roadway and Curb-Front

Based on the facility requirements analysis, the capacity of the existing facilities exceeds what is required. No capacity improvements to terminal access roadways and curb-front are necessary. However, most of Terminal Road will need rehabilitation within the planning period except for the terminal curb front, which was rehabilitated within the last three years. See **Figure 4-2**

Airport Roads and Parking Lots

A number of airport roads require rehabilitation in the short to mid-term planning period. These sections are shown in Figure 4-2. Also, several parking lots require rehabilitation within the planning period: the rental car ready return, the Virginia Aviation Maintenance Hangar lot, and the Falwell Aviation lot. See Figure 4-2.

4.2.3 Airfield

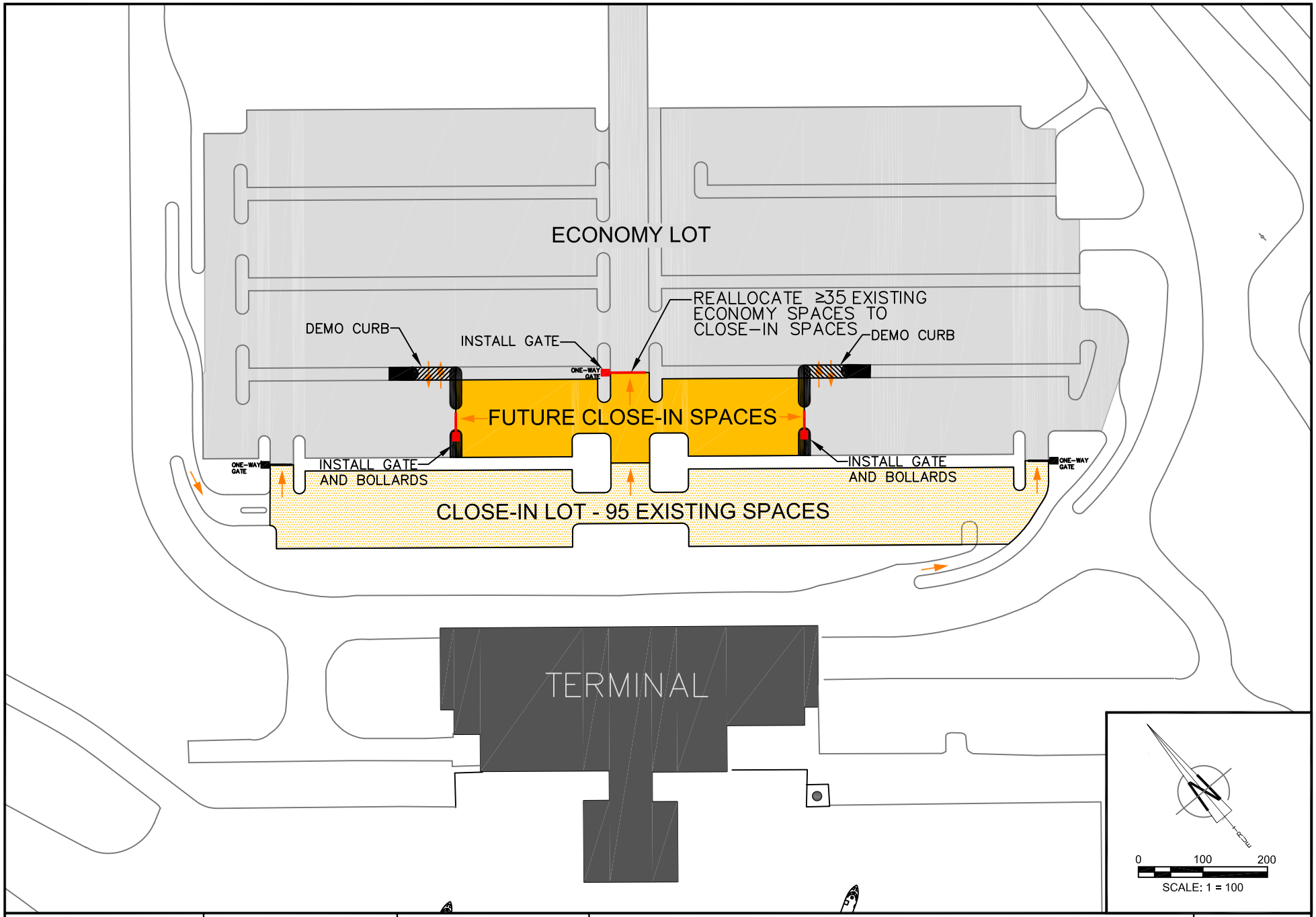
The existing airfield configuration (runways, taxiways, and NAVAIDs) meets airfield capacity requirements through the planning period. However, several airfield improvements are recommended and described below. All airfield improvements adhere to recommendations and guidelines from 5300-13 Change 12 *Airport Design*, dated January 3, 2008.

Runway 17 to Runway 22 Connector Taxiway

One of the proposed development areas at LYH is the north GA expansion area, located northeast of Runway 17, where a flight school is planned to be constructed. To access the site, an ADG-II taxiway should be constructed to provide efficient access from the ramp to either runway end. For more information on the north GA expansion area see Section 4.2.5, General Aviation Development.

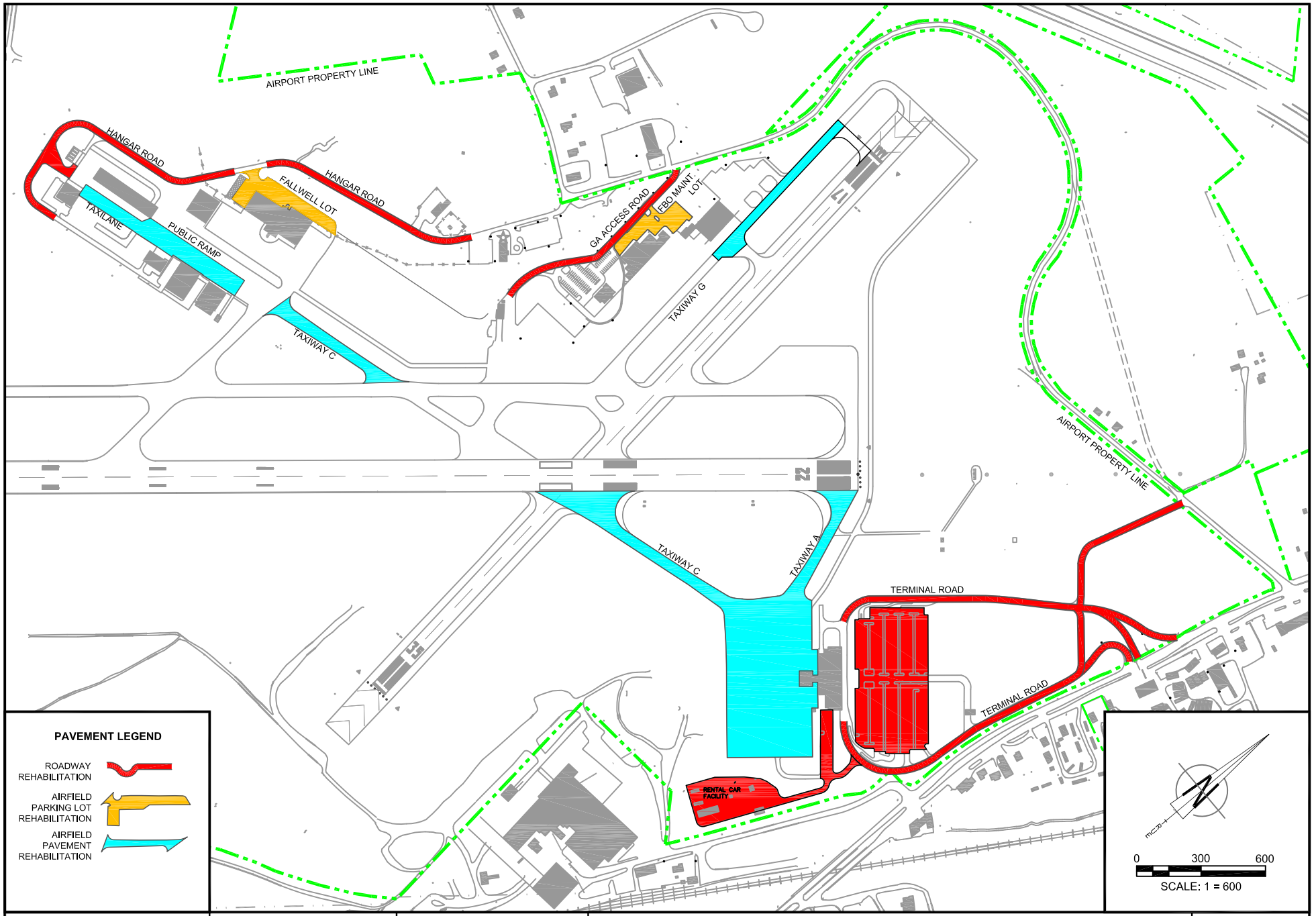
Runway 17-35 Parallel Taxiway G Separation Distance

The runway to taxiway separation for Runway 17-35 and Taxiway G is 230-feet, which is insufficient for a B-II runway. The runway to taxiway separation requirement for this taxiway is 240-feet for B-II (small aircraft exclusively) design criteria. Several options were considered to



P:_Projects\42464-lynchburg\REPORT\Figures\4-1 Parking Plan.dwg Layout1 Sep 30, 2008 - 12:45pm

	HNTB	2900 SOUTH QUINCY STREET, SUITE 200 ARLINGTON, VIRGINIA 22206 PH (703) 824-5100 FAX (703) 671-6210	PARKING SPACE REALLOCATION PLAN LYNCHBURG REGIONAL AIRPORT LYNCHBURG, VIRGINIA	DATE: Sep 30, 2008 FIGURE: 4-1



P:_Projects\42464-lynchburg\REPORT\Figures\4-2 Airport Roadway Rehabilitation.dwg Layout1 May 26, 2009 - 3:45pm

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ROADWAY/PAVEMENT REHABILITATION

LYNCHBURG REGIONAL AIRPORT
LYNCHBURG, VIRGINIA

DATE:
May 26, 2009

FIGURE:
4-2

solve the existing issue. To achieve full B-II design standards and provide a full 240 feet of separation would require relocating Hangar 1 (known by the airport as hangars 3 and 4), and shifting Taxiway G 10 feet. This would have to occur later in the implementation of the Airport's CIP due to funding and phasing constraints. Recognizing some of the issues at hand, the FAA and LYH management agreed to a more appropriate solution. This runway is very seldom utilized by any B-II aircraft and no reduction in the utility of LYH would be experienced by changing the design classification of Runway 17-35 to a B-I (small aircraft exclusively) runway. Only 150 feet of runway to taxiway separation is required for small aircraft exclusively (<12,500 pounds). The existing configuration would exceed this requirement.

Should the airport choose to change the reference code of this runway back to B-II this could be done once the hangars are reconstructed and relocated in Phase III of the CIP. Until then the airport will operate Runway 17-35 with a greater margin of safety over what is required.

Runway 17-35 Parallel Taxiway G Extension

Taxiway G is a partial parallel taxiway, which runs along the west side of 17-35 and north of the intersection of Runway 4-22. To avoid having to back-taxi on the runway it is desirable to extend the taxiway so it parallels the full length of the runway. At a minimum this taxiway should be built to meet full ADG-I design standards as discussed above. Alternately should airport management choose to bring the northeast portion of Taxiway G back to ADG-II compliance, then this taxiway extension should be built to match those requirements. This will have to be reassessed at the time of construction.

While extending the taxiway is a desirable improvement, activity levels through the planning horizon are below those needed to financially justify the project. It is recommended that land be preserved for the taxiway (up to B-II standards) until such time as it is financially feasible or to meet operational requirements. This project is shown as post-2026 development on the updated ALP and will not be included in the 20-year Capital Improvement Program (CIP). For a graphical depiction of the parallel taxiway see **Sheet 2** in the ALP set.

Runway 4-22 Parallel Taxiway

The existing airfield configuration requires scheduled commercial service flights (arriving on Runway 22 or departing from Runway 4) to make two runway crossings to access/exit the terminal to/from Taxiway B. This condition decreases airfield efficiency and increases controller workload.

To address this deficiency the Airport Master Plan Update recommends constructing a full-length ADG-III parallel taxiway on the east side of Runway 4-22. Although activity levels through the planning horizon will be below those needed to financially justify the project, it is recommended that land be preserved for the taxiway until such time as it is financially feasible. This project is shown as post-2026 development on the updated ALP and will not be included in

the 20-year Capital Improvement Program (CIP). For a graphical depiction of the parallel taxiway see **Sheet 2** in the ALP set.

Connector Taxiways C and E

Taxiways C and E connect Taxiway B with Runway 4-22 west of the intersection of Runways 4-22 and 17-35. These taxiway intersections have an unconventionally wide intersection with the runway and may be confusing to pilots. Following the FAA's Engineering Brief No. 75, (Incorporation of Runway Incursion Prevention into Taxiway and Apron Design) it is recommended that the fillets be narrowed to a standard taxiway width of 50 feet. This can be done in Phase I of the CIP, at a minimal cost during the rehabilitation of Taxiway G. Ultimately, however Taxiways C and E should be removed and consolidated into a single taxiway perpendicular to Taxiway B and Runway 4-22. This will simplify the intersection and introduce a "decision point" for pilots in an effort to reduce the likelihood of runway incursions and enhance safety. It is assumed that as much existing pavement will be preserved as possible to reduce costs. For a graphical depiction of the revised taxiway configuration see **Sheet 2** in the ALP set.

Connector Taxiway J

Taxiway J is a short connector taxiway northwest of the intersection of Runways 4-22 and 17-35 and like taxiways C and E above, it is an unconventional layout. It is recommended that this taxiway be removed during the rehabilitation of Taxiway G to simplify the intersections of the two runways and Taxiway B.

Taxilanes

To serve the proposed GA development areas in the midfield and south GA area expansion, new ADG-II and III stub taxilanes and parallel taxilanes will need to be constructed. The new taxilane parallel to Taxiway C in the midfield is laid out to meet separation criteria for full ADG-III separation. The south GA expansion will be built to accommodate full ADG-III aircraft.

NAVAIDs

In an ongoing effort, the Virginia Navaid Instrument Approach Procedures Study has identified a potential NAVAID improvement that could benefit approaches to Runway 22. The existing RNAV (GPS) approach has one-mile approach visibility minimums. Following recent updates to FAA TERPS Order *8260.3B* Change 20 (dated 12/07/07), the installation of an Medium Intensity Approach Lighting System (MALS) could potentially improve minimums from one-mile to 5/8-mile visibility. The Master Plan recommends this improvement to increase reliability and improve customer service. To realize the benefits of this improvement a larger RPZ off the end of Runway 22 will need to be protected for. The additional property encompassed by the larger RPZ will need to be under airport control, either through acquisition or avigation easement.

The Master Plan also recommends planning for the possibility of having non-precision instrument approaches to Runway 17-35. The correlating RPZs and easements that would be required are shown on the ALP.

Air Traffic Control Tower

As noted in the Facility Requirements chapter the existing ATCT building is at the end of its useful life and requires being reconstructed. The facility is not a conventional "tower" as most commonly seen, but is essentially a three-story building with the tower cab a top the structure.

There is excess unused space in the building, which would not be required in a newly constructed tower. Instead a conventional control tower with no base building should be constructed to specifically cater to the needs of a contract operated tower.

The tower has no existing or anticipated Line-of-Sight (LOS) obstructions to movement areas on the airfield. Also, the existing tower height meets FAA human performance metrics as stated in FAA Order 6480.4A; Object Discrimination and Line of Sight (LOS) Angle of Incidence (minimum.80 degree AOI), which are used to assess controller distance perception.

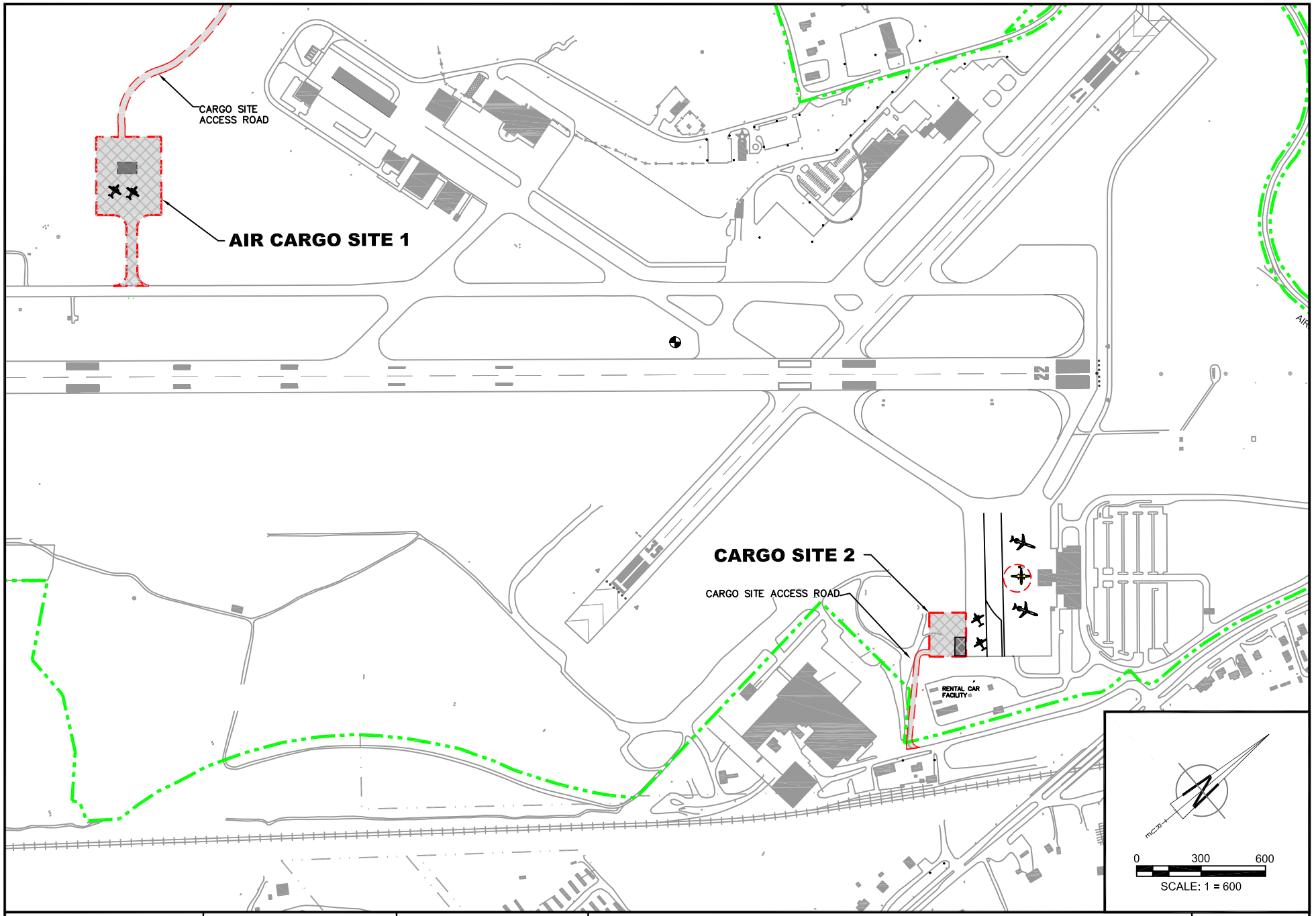
The existing site and tower height remain an ideal location to reconstruct the ATCT at Lynchburg Regional Airport. It should be noted that the FAA will require that a separate ATCT Siting Study be conducted to assess alternate tower sites, identify a preferred site, and to document all technical analyses (6480.4A, Chapter 9 Alternative Siting Process). Part of the tower siting process also requires that a Safety Risk Management Document (SRMD) be prepared to adhere to new FAA Safety Management System (SMS) initiatives.

4.2.4 Cargo

As identified in the facility requirements chapter, air cargo is projected to double at the LYH from 700 annual tons to 1400 annual tons, and will effectively increase the number of daily cargo flights from one to two. LYH does not currently have a dedicated cargo facility. With the forecast amount of cargo activity, the Master Plan recommends constructing a dedicated cargo facility. A utilization rate of 3 square feet per ton will be planned for. With that utilization rate a 4,200 square foot building will be required. Two sites were considered for a cargo facility. See **Figure 4-3**.

Site 1

This site lies just west of Runway 4-22 and Taxiway B on an undeveloped portion of airport property. This site was previously identified on the ALP as the preferred cargo development area. This area would ultimately be part of the city/county industrial park or "Air Commerce Park", which would extend from the cargo area to the south. This site has a considerable amount of available land which would easily accommodate a cargo facility. The site has its own access taxilane and is isolated from other airport operations, which is always a desirable characteristic



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POTENTIAL CARGO SITES

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FIGURE:
4-3

for a cargo operator. The downside to this location is that it requires a significant amount of site work and is a considerable distance (approximately 1 mile) from a major public road, utilities, and communications infrastructure.

Site 2
This site is located on the opposite side of the passenger terminal apron, which has excess capacity beyond what is needed for scheduled passenger service. The apron is capable of serving the forecast cargo aircraft, an Embraer 120, and could even accommodate a B737 while providing adequate clearance for aircraft parked at the terminal (includes set-back distance required for the potential future addition of Passenger Boarding Bridges).

The only drawback to sharing the terminal apron is that long-term expansion (not shown on ALP) of the terminal concourse to add more gates would conflict with a future cargo operation. However, based on the forecast, the capacity of the existing terminal does not require expansion within and beyond the planning horizon. Should terminal requirements increase prior to constructing a cargo facility, an apron extension may be required. This alternative will need to be reassessed prior to constructing the cargo facility.

Communications and utility infrastructure are easily accessible with all major utility connections serving the terminal facility. This site could also provide independent access from airport traffic to and from the airport access road. A 500 foot-long entrance road would be needed to connect Rangoon Road with the cargo facility. This could be routed behind the southwestern side of the rental car facility adjacent to the airport property line. This may impact a recently constructed drainage basin in the area, which may need to be modified to accommodate the access road. Additional analysis during the design process is required. See Figure 4-3.

Recommendation
Site 2 is the recommended site for air cargo. It would make use of underutilized apron capacity for a revenue generating operation. Its location across from the terminal facility would be very convenient for transferring belly cargo, whereas Site 2 is a mile away.

Site preparation costs for this site would be minimal, as the apron, airfield access and utilities infrastructure already exist, whereas Site 1 requires a significant amount of earthwork and infrastructure improvements to construct an equivalent cargo facility. Site 1 would be better reserved for future aviation development as part of the city/county industrial park or "Air Commerce Park."

4.2.5 General Aviation Development

General aviation is expected to experience the most significant growth at LYH in the 20-year planning horizon and could require an additional 23 to 36 acres, depending on the number and types of aircraft storage facilities (tie-downs, T-hangars, or conventional hangars) used. To

accommodate this demand four GA expansion areas are identified, and are shown in **Figure 4-4**. Each of these areas is described below.

Mid-Field GA Expansion Area
The mid-field GA expansion area is located between the GA terminal and Falwell Aviation and is about eight acres in size. While the northern and southern portions of this site are well graded, the central portion rises from 920 feet MSL to 970 feet MSL, requiring approximately $7.6 million in earthwork. The site will also require approximately 1,200 feet of access road to be constructed, which costs approximately $900,00. FAA Part 77 surfaces will require that structures be located as far west as possible, reducing the site's development flexibility. Additional analysis will be required during the design stage when building height and a specific grading plan of the site are determined. Once developed, further expansion at this location would be difficult.

All major utilities (force fed septic, fiber, electric, telephone) run along Airport Road and can easily be tied into for future development. There are also connections serving the existing GA terminal and ARFF station, which could serve facilities on the northern end of the expansion area.

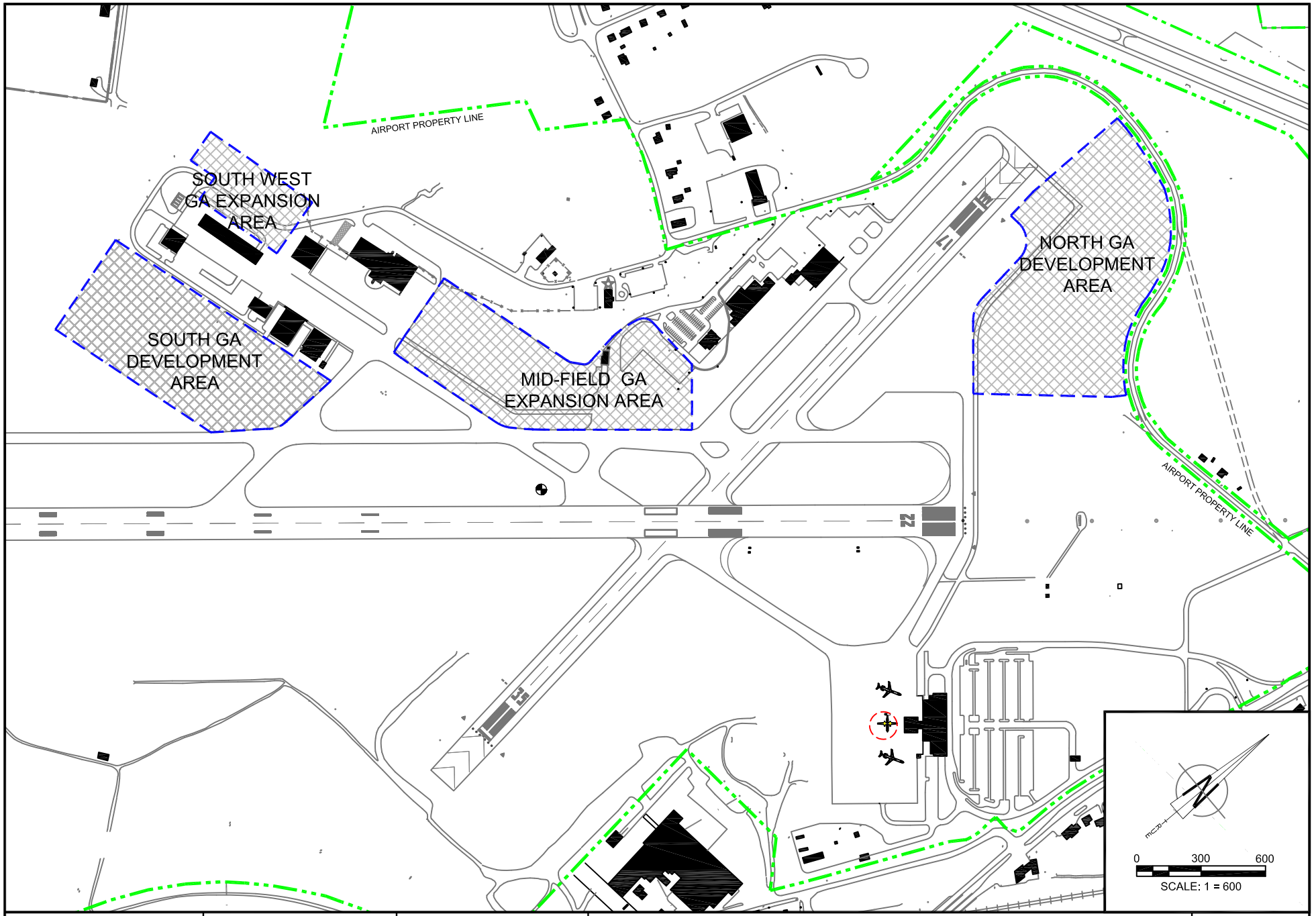
As shown in Figure 4-5 through 4-7, an extension of the nearby service road would be required for access to the site. Finally, the existing ARFF facility, located on this site would need to be relocated to the terminal area, as described in Section 4.3.1. The new facility is currently under design and planned for construction in FY 2009/2010.

South GA Development Area
The South GA Development area is located between Taxiway B and the South GA area, and is approximately 12 acres in size. This site can be expanded to the south. Advantages of this site are that landside access is already provided by Hangar Road, the site provides greater building development flexibility since it is farther from Runway 4-22, and would be less restricted by Part 77 clearance. Additional analysis may be required during the design stage when building height and a specific grading plan of the site are determined.

The site requires a significant amount of fill to raise the grade to match the elevation of the surrounding airfield, and the airport has already relocated fill from the recently completed runway extension project. Nevertheless, approximately $5.0 million of earthwork would be required to prepare this site for development.

All major utilities (force fed septic, electric, and telephone) run along Hangar Road and can easily be tied into for future development.

Southwest GA Expansion Areas
The southwest GA expansion area is located just west of the South GA area. This site was previously identified on the ALP as long-term T-hangar development area. The site is



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POTENTIAL DEVELOPMENT AREAS

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FIGURE:
4-4

approximately four acres in size and could be used to expand the existing T-Hangar development. The downside to this site is that in exchange for a moderate amount of developable area it requires a significant amount of earthwork and will require relocating/reconstructing approximately 1,750 feet of Hangar Road to go around the development area. Approximately $850,000 of earthwork would be required to prepare this site for development and $1.9 million would be needed to relocate/reconstruct Hangar Road.

All major utilities (force fed septic, electric, and telephone) run along the existing Hangar Road and can easily be tied into for future development.

North GA Development Area

The North GA expansion area adjacent to the end of Runway 17 is approximately 18 acres in size. The site will support general aviation activity and a flight school, which is currently under design. The preliminary layout of the development area can be seen in Figures 4-5 through 4-7 and Sheet 2 of the ALP set.

General Aviation Development Strategies

As previously noted in Chapter 3, Facility Requirements, two methods for determining GA aircraft storage requirements were identified. The first was based on general, industry standard planning factors. Using this approach, there is a greater need for tie-down storage and conventional hangar space. The second was based on assumptions found in the VATSP. Under this assumption, a greater need for T-hangar and itinerant tie-down storage was identified. Because these two methods resulted in different GA facility requirements, two distinct GA layouts needed to be prepared. Subsequently, the airport sponsor identified a third strategy designed to attract high-end business jet users. This resulted in a third layout, which shows a greater focus on providing conventional hangars and covered aircraft storage.

These three layouts represent different development strategies the airport could pursue. The selection of one over the other as a preferred development strategy is less dependent on the pros and cons of each layout and more dependent on future development policies, goals of the airport, and demand. Each resulting development strategy is described and qualitatively analyzed to identify the preferred development strategy of the Airport.

Strategy 1

The goal of this strategy is to develop LYH to meet the facility requirements using industry standard GA storage distribution as developed in the Airport Master Plan Update. Based on this planning assumption, there is a need for a significant increase in based and itinerant tie-down apron (approximately 43,500 square yards), nine additional T-hangar units, approximately 80,000 square feet of conventional hangar, and approximately 30,000 square feet of maintenance hangar. Also the GA terminal is shown to require approximately 2,900 square feet of additional space by the end of the planning horizon. Adequate space is available for an expansion of the

existing facility. See **Table 4-1** for a summary of the requirements and **Figure 4-5** for a graphical depiction of this strategy**.**

This strategy would initially be developed in the north GA expansion area, where a flight school and GA apron will be constructed. This area will be built to accommodate up to an ADG-II aircraft, but will primarily serve ADG-I aircraft.

Secondly the north portion of the mid-field GA area, where a large hangar could be constructed to serve a high-end corporate tenant would have convenient access to the GA terminal. This area is sized to accommodate up to ADG-III aircraft and has been laid out to keep parked aircraft tails clear of Part 77 surfaces. To meet the remaining hangar and aircraft maintenance requirements (depending on demand), an expansion of the south GA area could be developed between Taxiway B and the South GA area. This area is designed to accommodate up to ADG-III aircraft. The remaining available area on the west side of Runway 17-35 between the GA terminal and Falwell Aviation could be developed with based and transient tie-down apron that would be designed to accommodate ADG-I and II sized aircraft.

Table 4-1

Alternative 1 - (HNTB GA Storage Requirements)

Facilities		Existing	Required	Unit	Additional Needed
GA Terminal/FBO		4,464	7,352	SF	**2,888**
Based Tie-down		15,150	33,597	SY	**18,447**
Transient Tie-down Apron		15,000	39,659	SY	**24,659**
Based T-hangar (1)		13	22	Stalls	**9**
Based Conventional Hangar (2)					
	Storage	61,800	122,271	SF	**60,471**
	Office/Shop	12,500	32,891	SF	**20,391**
	Total	74,300	155,162	SF	**80,862**
	Apron		12,227	SY	**12,227**
Maintenance Hangar					
	Storage	25,800	51,615	SF	**25,815**
	Office/Shop	12,500	13,884	SF	**1,384**
	Total	38,300	65,499	SF	**27,199**
	Apron		5,162	SY	**5,162**

Source: HNTB Analysis

(1) One of the existing T-Hangar end-unit stalls is sized to accommodate a small jet.

(2) Excludes Hangar #9 (13,200 SF)

Strategy 2

The goal of this strategy is to develop LYH to meet facility requirements using a different distribution of aircraft storage types (conventional hangar, T-hangar, tie-down) as recommended in the VATSP, which focuses on providing less conventional hangars and more itinerant/ based tie-downs and T-hangars. Required are approximately 60,000 square yards of additional itinerant tie-down apron, 14,000 square yards of additional based tie-down apron, 50 additional T-hangar units, 40,000 square feet of conventional hangar, and approximately 30,000 square feet of maintenance hangar. Also the GA terminal is shown to require approximately 2,900 square feet of additional space by the end of the planning horizon.

This strategy would be developed in a similar sequence as outlined in Strategy 1. The North GA area would be developed first, followed by the south portion of the mid-field expansion area, the South GA expansion area, the remainder of the mid-field area, and finally the Southwest GA expansion area. Design criteria used in laying out each development area would be fundamentally the same, except that the north end of the mid-field development area would only accommodate up to ADG-II aircraft on the tie-down apron. See **Table 4-2** for a summary of the requirements and **Figure 4-6** for a graphical depiction of this strategy.

Table 4-2

Alternative 2 (VATSP GA Storage Requirements)

Facilities		Existing	Required	Unit	Additional Needed
GA Terminal/FBO		4,464	7,352	SF	**2,888**
Based Tie-down		15,150	28,865	SY	**13,715**
Itinerant Tie-down Apron		15,000	76,441	SY	**61,441**
Based T-hangar (1)		13	63	Stalls	**50**
Based Conventional Hangar (2)					
	Storage	61,800	91,159	SF	**29,359**
	Office/Shop	12,500	24,522	SF	**12,022**
	Total	74,300	115,681	SF	**41,381**
	Apron		9,116	SY	**9,116**
Maintenance Hangar					
	Storage	25,800	51,615	SF	**25,815**
	Office/Shop	12,500	13,884	SF	**1,384**
	Total	38,300	65,499		**27,199**
	Apron		5,162	SY	**5,162**

Source: HNTB Analysis

(1) One of the existing T-Hangar end-unit stalls is sized to accommodate a small jet.

(2) Excludes Hangar #9 (13,200 SF)

Strategy 3 – Ultimate Conventional Hangar Build-out

The goal of this strategy is to focus development at LYH to cater more to high-end business jet users than the previous alternatives. As such, this strategy is a combination of the development Strategies 1 and 2, but aims to position the airport for the most flexible development possible, while still meeting facility requirements. At the direction of the airport sponsor this strategy shows a build-out of the developable areas primarily with conventional hangars and covered aircraft storage. Approximately 100,000 square feet of additional conventional hangar (sized to accommodate up to a Gulfstream-V in some hangars) and 7 T-hangar units (ADG-I) are shown. Also the GA terminal is shown to require approximately 2,900 square feet of additional space by the end of the planning horizon (expanding to the south). This is especially important as accommodating high-end business jet users with the best customer service will be a priority in this strategy. Adequate space is available for an expansion of the existing facility.

In this development strategy the North GA area would be developed first, followed by the north and south portions mid-field expansion area, then the South GA expansion area, central mid-field area, and finally the Southwest GA expansion area. Design criteria used in laying out each development area would be fundamentally the same with the exception of the mid-field area, which is laid out to serve up ADG-II in the north and middle section of the development area and full ADG-III at the southern end of the mid-field development area.

For comparative purposes **Table 4-3** summarizes the additional facilities for each strategy. See **Figure 4-7** for a graphical depiction of this strategy.

Table 4-3

GA Requirement Summary

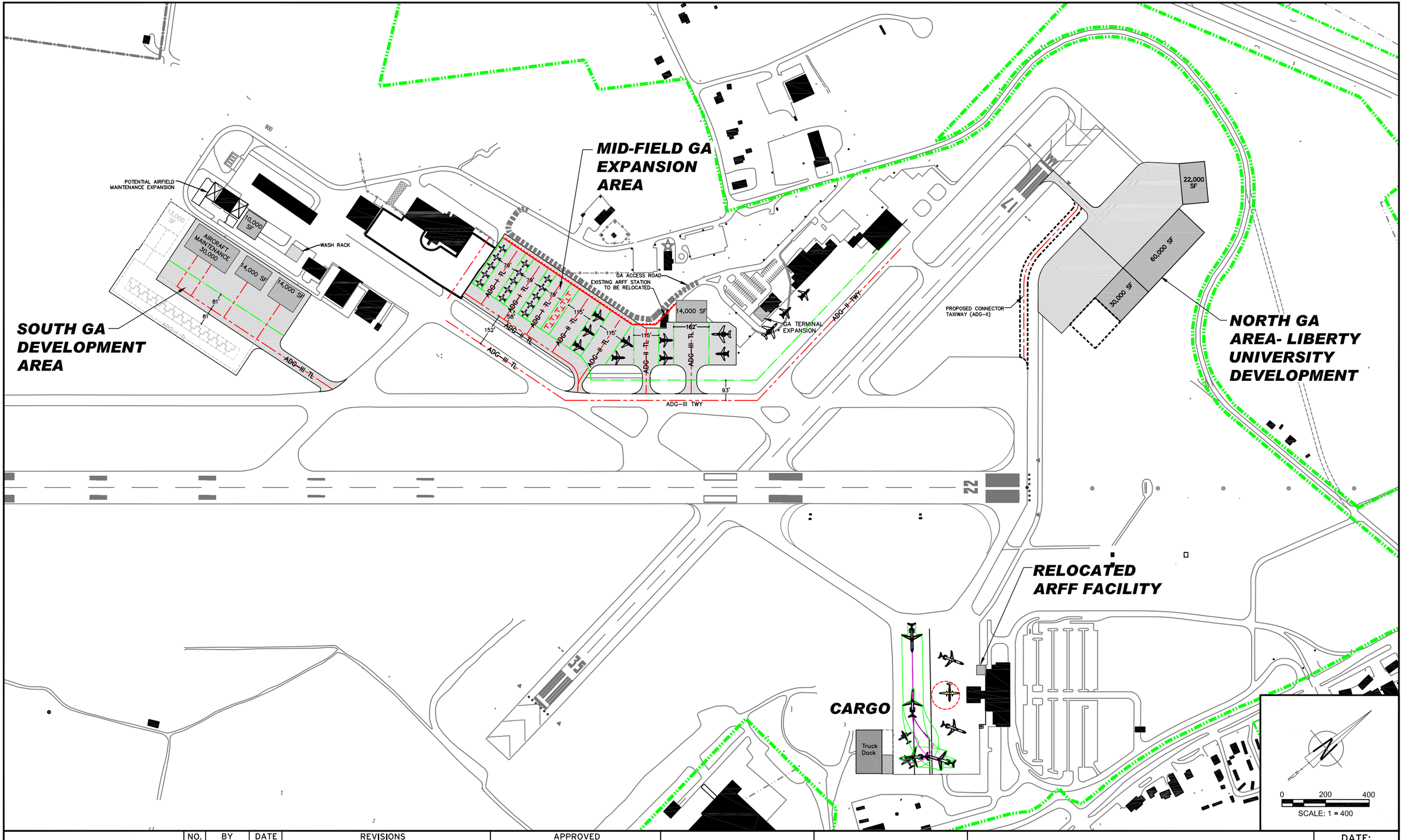
Facilities	Units	Existing	AMPU Requirements	% Increase	VATSP Requirements	% Increase	Alt 3 (3) Requirements	% Increase
GA Terminal/FBO	SF	4,464	7,352	65%	7,352	65%	7,352	65%
Based Tie-down	SY	15,150	33,597	122%	28,865	91%	40,483	167%
Transient Tie-down Apron	SY	15,000	39,659	164%	76,441	410%	40,000	167%
Based T-hangar (1)	Stalls	13	22	69%	63	385%	20 (3)	54%
Based Conventional Hangar (2)	SF	74,300	155,162	109%	115,681	56%	178,800	141%
Maintenance Hangar	SF	38,300	65,499	71%	65,499	71%	68,300	78%

Source: HNTB Analysis

(1) One of the existing T-Hangar end-unit stalls is sized to accommodate a small jet.

(2) Does not include Liberty University hangars or Hangar #9 (13,200 SF)

(3) Alt 3 Strategy meets or exceeds AMPU facility requirements, with the exception of two T-hangar stalls, which are made up for in additional Conventional Hangars provided beyond AMPU facility requirements.



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ALTERNATIVE 1

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FIGURE 4-5

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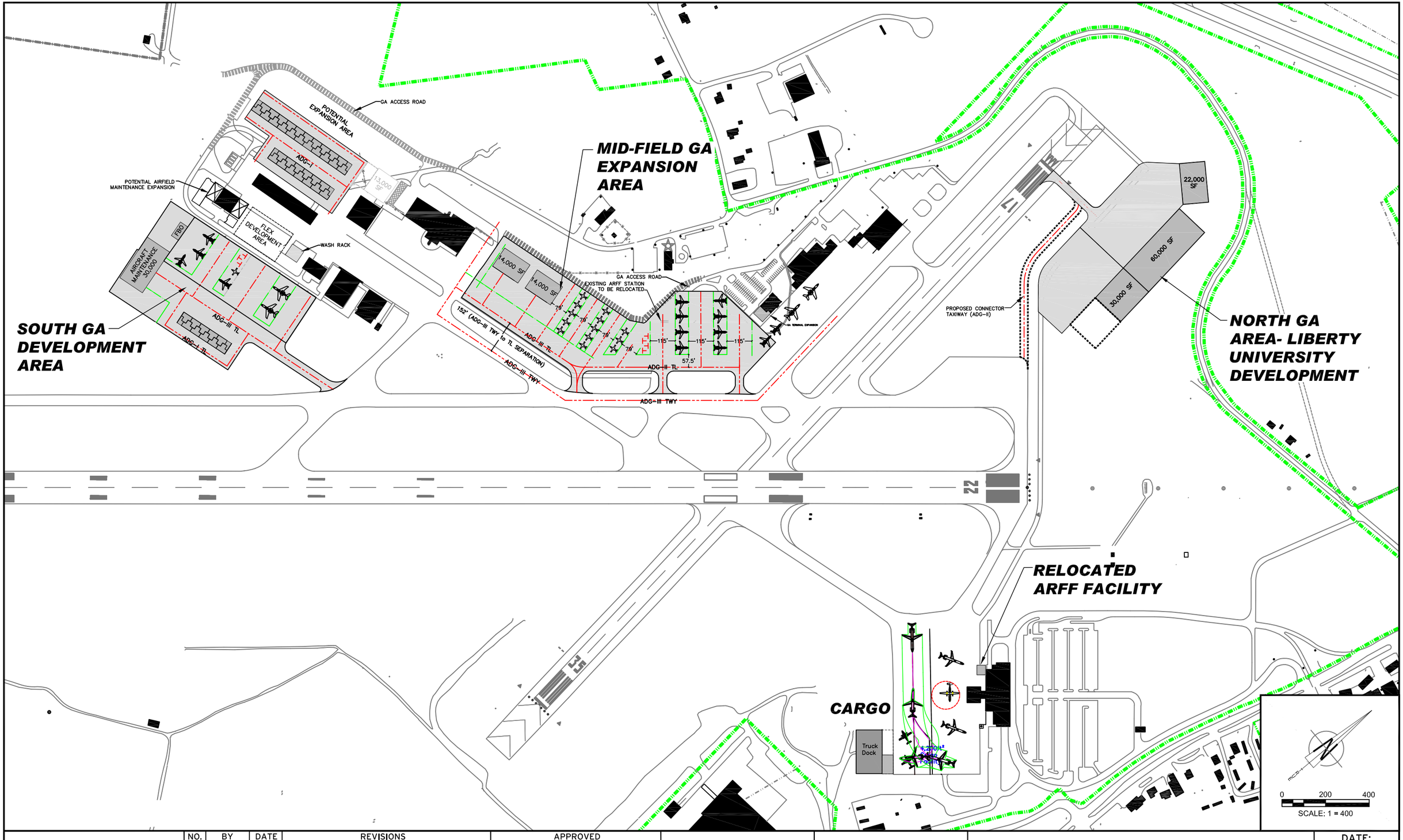

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ALTERNATIVE 2

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FIGURE
4-6

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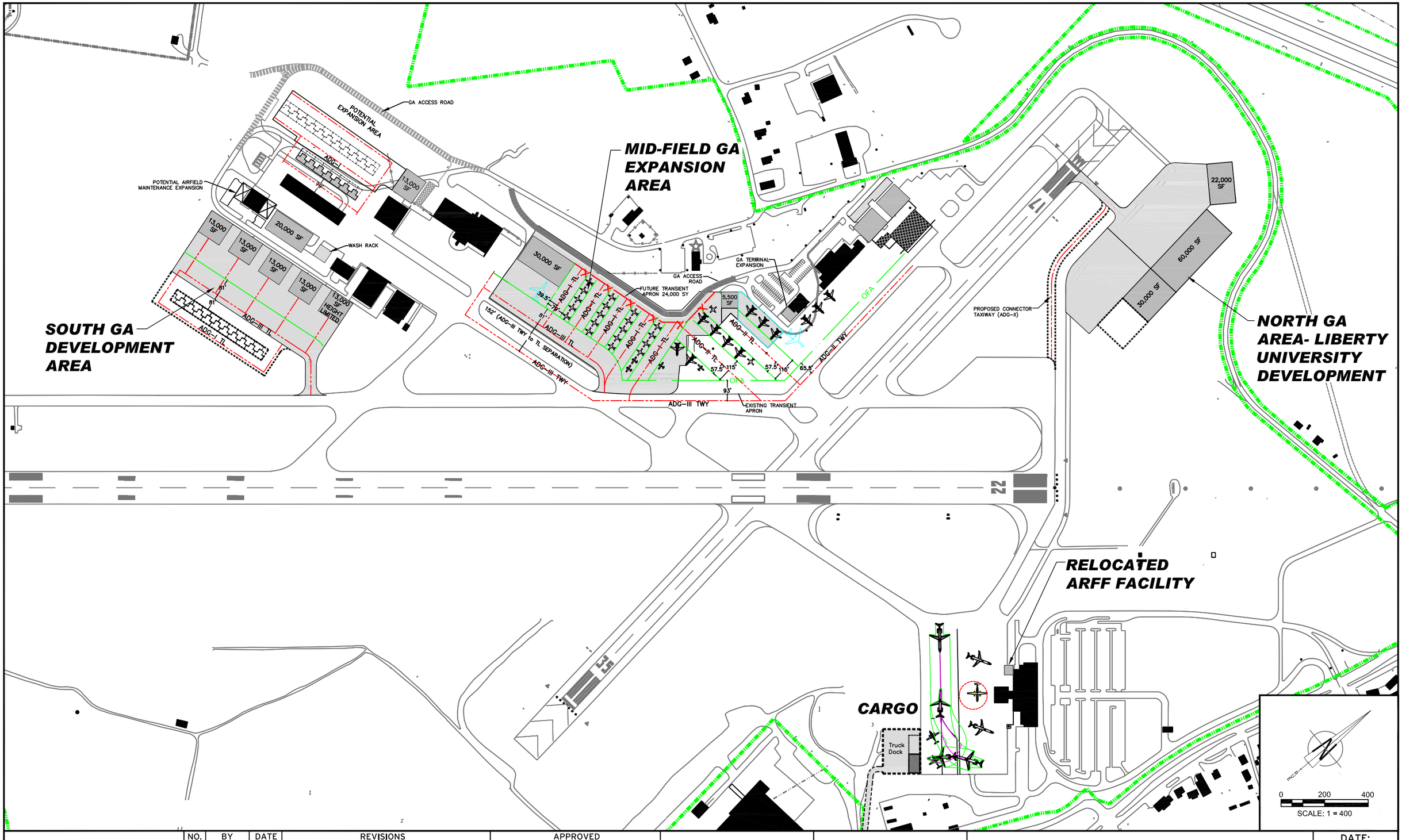

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ALTERNATIVE 3

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FIGURE
4-7

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Recommendation

The goal of the airport sponsor is to develop the airport to be as financially self-sustaining as possible. Doing this requires focus on developing revenue producing facilities. For LYH the primary development of facilities is to accommodate GA activity which is forecast to double within the planning period.

To meet the desires of the airport management, Strategy 3 is the preferred strategy. It meets the requirements set forth by the AMPU facility requirements yet provides additional conventional hangars in the mid-field area.

Should demand or the focus of the airport change, alternate facility placement can be easily adopted from the other strategies, e.g., an aircraft maintenance facility can easily be accommodated in the south GA area in place of two to three conventional hangars, and T-hangars or tie-downs can easily replace conventional hangars, etc. For additional discussion of this strategy and recommended phasing of development see Section 4.4.5 and Figure 4-9.

4.3 SUPPORT FACILITIES

4.3.1 ARFF

The existing ARFF facility is not conveniently located to serve operations in the vicinity of the terminal. ARFF staff often serve as public safety staff at airports of this size and a separate location requires duplicate staff. To reduce operating cost and increase operational support, the airport desires to collocate the ARFF building with the existing terminal. With that in mind, collocating the ARFF facility adjacent the terminal is the only viable alternative. The future relocated ARFF facility is currently under design and will be constructed in FY 2009/2010.

4.3.2 Fuel

To meet fuel storage requirements for 2026, approximately 10,000 gallons of additional Jet A capacity will be required. To meet facility requirements through 2026 the Master Plan recommends installing an additional fuel tank. This would likely be an additional 15,000 gallon tank, following suit with the existing 15,000 gallon tanks at LYH. This would meet facility requirements and add capacity for post-2026 activity levels. Also, the airport sponsor desires to install a self–serve station (100LL) in the future when feasible. The most cost effective location to install the station would be adjacent to the existing fuel farm, utilizing existing infrastructure. The system would simply feed off of the existing 100LL tank. Any alternate location in the vicinity would require an underground connection to the existing fuel farm and construction of a spill retention pad, which would increase the cost of the facility significantly.

4.3.3 Airport Maintenance

The two airport maintenance facilities (Buildings 16 and 14) are located in two separate locations at the Airport. It is desirable, for the sake of efficiency, to collocate airport maintenance facilities. At LYH the 3,600 square foot facility (Building 14) situated just west of the ATCT has reached the end of its useful life and is in need of significant repairs/replacement. Two options were therefore considered. See **Figure 4-8.**

Option 1
Expand the Snow/Maintenance Building (Building 16) to the east to accommodate maintenance equipment/operations from the Grounds Maintenance Building (Building 14). To meet long-term facility requirements expand the facility to the west. See Figure 4-8.

Option 2
Construct a new facility located closer to the passenger terminal that will accommodate existing maintenance operations and equipment and meet long-term facility requirements. See Figure 4-8.

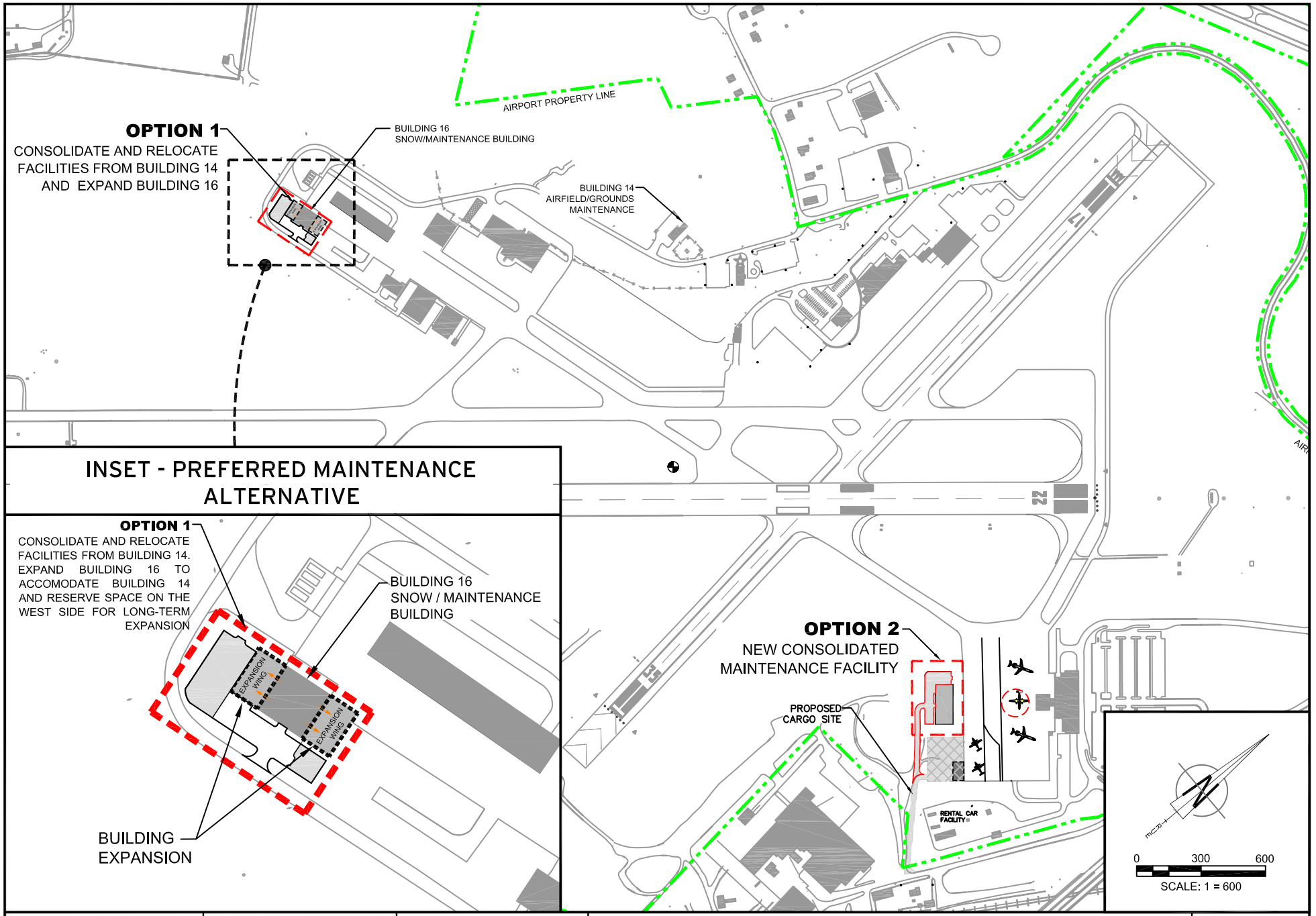

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FIGURE:
4-8

Recommendation

As shown in Figure 4-8, Option 1 is the recommended alternative. Sufficient land is available on the east side of Building 16 to accommodate the Grounds Maintenance Building and the west side of Building 16 to accommodate an expansion of the consolidated Snow and Grounds maintenance functions. There would be significant cost savings with this option as opposed to Option 2, which requires reconstruction and relocation of both facilities.

4.4 RECOMMENDED PLAN

Following the concept analysis described above, a recommended development plan was prepared and is summarized below by functional element. All recommended airport improvements/developments are shown in **Figure 4-9**.

4.4.1 Terminal

The existing terminal facility exceeds the anticipated facility requirements through the planning period. However a number of improvements have been identified. The Master Plan recommends the following improvements be made:

- Replace existing HVAC system in the short-term planning period (approximately 2012 according to typical HVAC useful life span of 20 years) or as soon as funds become available.

- In the short-term or as funds become available consider implementing key recommended Terminal Sustainability Ideas from Appendix A to reduce O&M costs of the terminal facility.

- Replace the existing escalators in the short-term planning period. The existing escalators are approaching 20 years old. Reliability of the escalators are going down and the annual maintenance costs are going up.

- Upgrade the Terminal Facility Security System. Like some of the other terminal systems mentioned, the security system is nearing 20 years old and is outdated and in need of replacement.

- Remodel and Update Terminal in the next five to ten years. Particular areas requiring an update are the ticket counters, holdroom carpet, and overall interior paint.

- Improve the bag screening operation as shown in the Terminal analysis. See Figures 4 and 5 in Appendix A.

PROPOSED T-HANGARS

PROPOSED HANGAR

MAINTENANCE EXPANSION

SOUTH GA DEVELOPMENT AREA

T-HANGAR DEVELOPMENT (ULT.)

T-HANGAR DEVELOPMENT (ULT.)

POTENTIAL EXPANSION AREA

ADG-I

20,000 SF

13,000 SF

13,000 SF

13,000 SF

13,000 SF

13,000 SF HEIGHT LIMITED

ADG-I, TL

WASH RACK

REHABILITATE RECONSTRUCT /HANGARS 5 AND 6

DEMO TWY D FILLET (SAFETY IMPROVEMENT)

TAXIWAY FILLET IMPROVEMENTS

PARALLEL TWY (ULT)

RECONSTRUCT ATCT

GA ACCESS ROAD

30,000 SF

ADG-III TL

ADG-III TWY

MID-FIELD GA DEVELOPMENT AREA

GA APRON EXPANSION

ADG-III TWY

DEMO TWY J (SAFETY IMPROVEMENT)

REHABILITATE/ RECONSTRUCT HANGARS 1 AND 2

REPLACE HANGAR #4

5,500 SF

OFA

OFA

OFA

GA TERMINAL EXPANSION

NORTH GA DEVELOPMENT

22,000 SF

60,000 SF

30,000 SF

NORTH GA EXPANSION

INSTALL MALS

22

5

TERMINAL SUSTAINABILITY AND MODERNIZATION IMPROVEMENTS

REALLOCATE "LONG-TERM" SPACES TO "CLOSE-IN" SPACES

RELOCATED ARFF FACILITY

PASSENGER BOARDING BRIDGES

PROPOSED CARGO FACILITY

RESERVED FOR FUT. DEV

EXPAND BAGGAGE CLAIM

LEGEND

PHASE 1 (2009-2013)

PHASE 2 (2014-2018)

PHASE 3 (2019-2026)

ULTIMATE (POST-2026)

0 100 200

SCALE: 1 = 200

NO.	BY	DATE	REVISIONS	APPROVED

HNTB

2900 SOUTH QUINCY STREET,
SUITE 200
ARLINGTON, VIRGINIA 22206
PH (703) 824-5100
FAX (703) 671-6210

RECOMMENDED PLAN

LYNCHBURG REGIONAL AIRPORT
LYNCHBURG, VIRGINIA

DATE: Mar 19, 2010

FIGURE 4-9

P:_Projects\42464-lynchburg\CAD\Chapter 4 Figures\LYH PHASING_REV3.dwg PREFERRED ALTERNATIVE Mar 19, 2010 - 10:16am

- Expand the connecting bridge at the passenger screening checkpoint to improve deplaning passenger circulation. See Figure 3 in Appendix A**.**

- As noted in Sheet 3 of the ALP set, there are a number of trees in the terminal area that need to be removed or topped to clear Part 77 transitional and approach surfaces. Also, there are two points on the terminal building that slightly penetrate the transitional surface. These points may be required by FAA to have obstruction lights.

4.4.2 Surface Transportation and Auto Parking

In general the capacity of existing surface transportation and auto parking facilities exceeds what is required for forecast activity levels; however, the Master Plan has identified a need for approximately 35 additional close-in parking spaces by 2026. Utilizing excess capacity in the economy lot, the Master Plan recommends reallocating spaces from the next closest row of economy spaces to the north of the existing hourly spaces. See Figure 4-1.

The Master Plan also recommends rehabilitating a number of airport roads and parking lots as shown in Figure 4-2.

4.4.3 Airfield

The existing airfield meets capacity and delay requirements; however, improvements to the airfield are required to provide access to planned development areas. Each recommended airfield improvement is described below.

Runway

- The Master Plan recommends changing the design classification of Runway 17-35 from B-II (small aircraft exclusively) to a B-I (small aircraft exclusively) runway.

Taxiways/Taxilanes/Apron/Service Roads

- The Master Plan Update recommends constructing a connector taxiway between the ends of Runway 17 (Phase I) and Runway 22(Ultimate) to provide access to the North GA development area. See Figure 4-9.

- The Master Plan recommends rehabilitating taxiway G and C and recommends removing/simplifying several intersections (taxiways C, E, and J) based on guidance from FAA engineering brief No. 75. Ultimately, in Phase III these taxiways should be consolidated into one conventional perpendicular taxiway (Twy E).

- In the terminal area the Master Plan recommends rehabilitating taxiway C, A, and the airline terminal apron. As shown in Figure 4-2.

- The Master Plan recommends rehabilitating the Public apron in front of Hangars 5, 6, the State Police Hangar, and a portion of the taxilane on the south side of the T-Hangars.

- The Master Plan recommends changing the design classification of Runway 17-35 from B-II (small aircraft exclusively) to a B-I (small aircraft exclusively) runway. Only 150 feet of runway to taxiway separation is required for small aircraft exclusively (<12,500 pounds). The existing configuration on Taxiway G has 230 feet of runway to taxiway separation and would exceed this requirement.

- In the long-term (post-2026) the Master Plan recommends reserving land required to construct a parallel taxiway (A) on the east side of Runway 4-22 and extending parallel taxiway G on the west side of 17-35.

- As demand requires, the Master Plan recommends constructing additional access taxilanes to serve the planned developments/GA expansion areas. See Figure 4-7.

- As funds become available the Master Plan recommends relocating the airside service road outside of the Runway 22 RSA (Ultimate).

- The aircraft hold apron for aircraft departing on Runway 4 was designed as part of the Runway 04 extension, but was not completed due to funding limitations. All design and site work has been completed. The Master Plan recommends completing the project as demand dictates or as funding becomes available. The project is currently planned as a long-term project (Phase III).

NAVAIDs

The Master Plan recommends improving approach minimums to Runway 22 by installing a Medium Intensity Approach Lighting System (MALS). This will increase airport reliability during inclement weather and improve customer service. With FAA approval and support this improvement will reduce approach minimums on the RNAV (GPS) approach from one mile visibility to 5/8 mile visibility.

The Master Plan also recommends planning for the possibility of having non-precision instrument approaches to Runway 17-35. The correlating RPZs and easements that would be required are shown on the ALP.

Air Traffic Control Tower

The Master Plan recommends replacing the existing control tower which has reached the end of its useful life. It is recommended that a conventional tower without a base building be constructed on the existing tower site.

4.4.4 Cargo

As cargo activity dictates, the Master Plan has identified the need for a dedicated cargo facility. Using a high (conservative) utilization rate of 3.0 square feet per ton a 4,200 square foot facility should be planned for opposite the terminal facility on the terminal apron. The landside component of the facility will likely be more than double the building area. See Figure 4-3.

4.4.5 General Aviation

As indicated in the facility requirements, GA will experience the most significant amount of growth through the planning period. The Master Plan recommends developing GA facilities as shown in Strategy 3, using the development phasing depicted in Figure 4-9 as described below.

Short-Term (Phase 1 – 2009 to 2013)

Short term development will occur primarily in the North GA Development area, which will be developed to accommodate a GA apron and flight school facility. Remaining development in Phase I will be a single sided row of small conventional/T-Hangars and a 20,000 SF hangar in the Southwest GA Expansion Area (adjacent Snow Equipment/Maintenance Building).

Mid-Term (Phase II – 2014 to 2018)

Mid-Term development will start in the North with the construction of Phase II of the North GA Development Area. Development should follow with the apron expansion in the north Mid-Field development area and earthwork for the southern portion of the Mid-Field development area.

Long-Term (Phase III – 2019 to 2026)

Lastly, long-term development should occur in the north central portion of the mid-field area. This site is in a prime location for transient aircraft apron, but is the most expensive portion of the mid-field to develop. Next, a large conventional hangar should be built in the South Mid-Field area. The South GA Development Area should follow the other developments as described. It should also be noted that a number of the existing aircraft hangars on the airfield will need to be replaced before the end of the planning period and are shown as being replaced in Figure 4-9. When replacing hangar 4, the hangar should be pushed back from Taxiway G to allow enough space to park aircraft out front clear of the Taxiway Object Free Area.

It is also expected that the existing GA Terminal will require some expansion to maintain the existing good level of service. Based on the facility requirements analysis, the size of the GA terminal is forecast to increase from approximately 4,500 square feet in the base year to about 7,400 feet by 2026.

4.4.6 Support Facilities

ARFF

The Master Plan recommends relocating the existing ARFF facility to be collocated with the existing passenger terminal.

Fuel

To meet fuel storage requirements for 2026, the Master Plan recommends installing an additional 15,000 gallon Jet A tank to the existing fuel farm site. The Master Plan also recommends reserving space adjacent to the fuel farm to accommodate a self-serve fueling station.

Airport Maintenance

Building 14 (3,600 square feet) has reached the end of its useful life. The Master Plan recommends expanding Building 16 and relocating equipment and facilities from Building 14 to Building 16 so that all of maintenance is collocated at one site. There is also sufficient land available to double the size of maintenance facilities to meet facility requirements. See Figure 4-8.

Wash Rack

The Master Plan recommends installing a wash rack to serve the general aviation community at LYH. By installing a wash rack with an isolated drainage system the airport can minimize deposition of harmful contaminants (fossil fuels and phosphates) into stormwater drainage systems.

4.5 ENVIRONMENTAL CONSIDERATIONS

This environmental review examines the recommended projects anticipated to take place before 2026. The review is being conducted in order to consider all environmental impact categories described in the Airport Environmental Handbook (FAA Order 5050.4B) and uses the Policies and Procedures for Considering Environmental Impacts (FAA Order 1050.1E) as guidance. For the purposes of the environmental review, the recommended projects have been grouped as follows:

- Developments within the Terminal Area
    - Relocated ARFF
    - Rehabilitation of Terminal Road and Parking Lot

  - New cargo facility

- Developments within the North GA Development Area
  - New GA Development Area
  - New Runway 17 to Runway 22 Connector Taxiway
- Developments within the South GA Expansion Area
  - Rehabilitated Hangar Road
  - Rehabilitated parking areas
  - New wash rack
  - New hangars
  - Expanded maintenance building
  - New 15,000 gallon fuel tank
- Development within the Mid-Field GA Expansion Area
  - Rehabilitation of mid-field access road
  - Rehabilitation of parking areas
  - New hangars and apron
- Airfield Improvements
  - New Medium Intensity Approach Lighting System (MALS)
  - Airfield pavement improvements
  - Taxiway E (simplify Twy C/E intersection)

For a summary of the projects and their recommended environmental documentation, see Section 4.5.1 below and Table 4-4. For a discussion of each of the environmental impact categories considered, see Section 4.5.2.

4.5.1 Recommended Environmental Documentation

The recommended airport projects were reviewed in order to identify the level of environmental documentation that may be required for implementation of the projects. Projects involving

Federal funding or approvals constitute Federal actions and therefore are subject to environmental review in accordance with the National Environmental Policy Act (NEPA). The NEPA review is conducted in accordance with FAA Order 1050.1E, *Environmental Impacts: Policies and Procedures,* and FAA Order 5050.4B, *National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions.* Order 1050.1E is used to determine the appropriate level of NEPA review for the proposed action.

Three levels of environmental review/documentation exist for actions requiring Federal funding or approval: categorical exclusion (CE), environmental assessment (EA, includes Short EA) or environmental impact statement (EIS). A CE is appropriate when the proposed airport project is included in the list of categorically excluded actions in Chapter 3 of FAA Order 1050.1E. This list includes those types of actions that the FAA has found to not normally require an EA or EIS except in the case of extraordinary circumstances. "Extraordinary circumstances" exist when the proposed project involves any of the circumstances listed in paragraphs 304a through 304k of FAA Order 1050.1E, and may have a significant effect. If the proposed airport project is not included in paragraphs 307 thru 312 of FAA Order 1050.1E, an EA or EIS must be prepared. If the proposed airport project is included in the list of categorically excluded actions and does not involve extraordinary circumstances, the project is exempted from environmental review. However, if the proposed airport project is included in the list of categorically excluded actions but would result in extraordinary circumstances, an EA or EIS must be prepared.

The decision of whether to prepare an EA or an EIS is based on the likelihood of significant impacts and the potential for mitigation of those significant impacts. An EA is prepared when the proposed action is not expected to result in significant impacts. An EA may also be prepared if there are significant impacts but mitigation can be incorporated into the proposed action such that the level of impact is reduced below the level of significance.

Table 4-4 shows the recommended level of environmental documentation for each of the proposed airport projects. The recommended level of environmental documentation is based on FAA Order 1050.1E and consideration of the potential for environmental impacts as discussed in the preceding sections.

Table 4-4
Recommended Environmental Documentation

Project Description	Location	Recommended Documentation (1)	Categorical Exclusion Reference (2)	Comments
Relocated ARFF	Terminal Area	CE	N/A	Relocation of the ARFF has been approved by the FAA as a Categorical Exclusion.
New Cargo Facility	Terminal Area	EA	N/A	The FAA Eastern Region Short EA format would likely be appropriate.
Flight School and Associated Taxiway	North GA Development Area	EA	N/A	The FAA Eastern Region Short EA format would likely be appropriate.
New Hangars, Apron and Taxilane	South GA Expansion Area	EA	N/A	The new hangers, apron and taxilane may qualify for a categorical exclusion as defined in Order 1050.1E paragraph 310h if it can be demonstrated that the new facilities do not "substantially expand" the existing facilities and that extraordinary circumstances do not exist. Additional study will be required to show that the new facilities would not involve extraordinary circumstances identified in FAA Order 1050.1E paragraphs 304a, 304b, 304c, 304h, 304j, and 304k.
Expand Maintenance Building	South GA Expansion Area	PCE	310h	The expansion of the maintenance building may qualify for a categorical exclusion as defined in Order 1050.1E paragraph 310h if it can be demonstrated that the proposed expansion does not "substantially expand" the existing facilities and that extraordinary circumstances do not exist. Given that the project is an expansion of an existing facility in an area likely to have been previously disturbed, it is unlikely the project would involve extraordinary circumstances.
Wash Rack	South GA Expansion Area	CE	310f	The wash rack has previously been approved by the FAA as a Categorical Exclusion.
New 15,000 Gallon Jet A Fuel Tank	South GA Expansion Area	EA	N/A	An EA is required; see FAA Order 1050.1E paragraph 401f. The FAA Eastern Region Short EA format would likely be appropriate.
New Hangars, Apron and Taxilane	Mid-Field GA Expansion	EA	N/A	The new hangers, apron and taxilane may qualify for a categorical exclusion as defined in Order 1050.1E paragraph 310h if it can be demonstrated that the new facilities do not "substantially expand" the existing facilities and that extraordinary circumstances do not exist. Additional study will be required to show that the new facilities would not involve extraordinary circumstances identified in FAA Order 1050.1E paragraphs 304a, 304b, 304c, 304h, 304j, and 304k.
New Intermediate Approach Lighting System (IALS)	Runway 22 End	PCE	309b	The new IALS may qualify for a categorical exclusion as defined in Order 1050.1E paragraph 309b if it can be demonstrated that extraordinary circumstances do not exist. Additional study will be required to show that the new facilities would not involve extraordinary circumstances identified in FAA Order 1050.1E paragraphs 304a, 304b, 304c, 304h, 304j, and 304k.
Reconstruct Air Traffic Control Tower	West of Mid-Field	EA	N/A	
Rehabilitate Terminal Rd. and Parking Lot	Airport Perimeter	CE	310a	
Rehabilitate portions of Hangar Rd.	Airport Perimeter	CE	310a	
Parking Lot Improvements	Mid-field and South GA Expansion Area	CE	310w	
Airfield Pavement Improvements	Mid-field and South GA Expansion Area	CE	310e	
Taxiway E	Central Airfield	EA	N/A	The FAA Eastern Region Short EA format would likely be appropriate.

Notes : (1) CE - Categorical Exclusion, PCE - Potential Categorical Exclusion, EA - Environmental Assessment
(2) Reference to paragraph in FAA Order 1050.1E

Sources: HNTB Analysis and FAA Order 1050.1E

4.5.2 Environmental Impact Categories

Air Quality
The Clean Air Act of 1970 (CAA) was enacted to protect the nation's air quality, as well as the public health. Amendments in 1970, 1977, and 1990 established Federal standards to control air pollution emission and to delegate the implementation of such standards to the states.

The FAA's Air Quality Procedures for Civilian Airports and Air Force Bases (April 1997) provides guidance for air quality analysis requirements. The handbook is consistent with all current Federal air quality laws and regulations affecting aviation including the National Environmental Policy Act, Council on Environmental Quality Regulations, Clear Air Act, and other related statutes, regulations, directives, and orders. According to the handbook, air quality analysis is only required if the level of annual enplanements exceeds 1,300,000, the level of general aviation and air taxi activity exceed 180,000 operations per year, or a combination thereof.

The US Environmental Protection Agency (EPA) has designated Campbell County, Virginia as in attainment for all criteria pollutants and the Master Plan forecast shows approximately 182,000 total passengers and approximately 100,000 general aviation operations for 2026. Therefore, using the equation provided in Section 2.3.4 of the air quality handbook it is not expected that a more detailed analysis will be necessary to determine air quality impacts.

Noise
The developments in the North GA Area, particularly the flight school, as well as the addition of hangars in the Midfield and South GA Areas, will likely result in an increase in general aviation operations at Lynchburg Regional Airport. Because the noise contours are driven by operations, a more detailed analysis will be required to determine future noise impacts.

Compatible Land Use
Impacts to existing or planned land uses are usually associated with the extent of noise impacts related to the airport. Based on the outcome of the future noise analysis, examination of the land use surrounding the airport may be necessary to determine whether the change in noise would impact compatible land uses.

Land uses surrounding the airport are mainly a mixture of industrial, community facilities, and general business uses. Further to the northwest, the land use consists of residential, single family and dispersed rural residential dwellings.

Construction Impacts
Airport construction may cause various environmental effects primarily due to dust, heavy equipment emissions, stormwater runoff containing sediment and/or spilled or leaking petroleum products, and noise. The long-term impacts of the development are usually greater

than the construction impacts, although improper implementation of best management practices (BMP) for construction may cause significant short-term impacts.

Generally speaking, the building of new airport facilities may cause temporary impacts to water and air quality, ambient noise levels, historic resources, and local traffic patterns. Typical airport actions causing construction impacts include: airside activities (e.g., new or expanded terminal and hangar facilities, new airports or extended runways and taxiways, navigational aides, etc.) and landside activities (e.g., new or relocated access roadways and remote parking facilities and rental car lots).

Impacts from the construction of the proposed airport development will be short in nature, typically not lasting more than a few months at a time during varying construction stages. With the implementation of BMPs and the appropriate Virginia Pollution Discharge Elimination System (VPDES) permit, it is not anticipated that detailed analysis will be necessary to determine future construction impacts.

Fish, Wildlife, and Plants

A geographic search completed using the Fish and Wildlife Information Service for threatened and endangered species within three miles of Lynchburg Regional Airport was published in the 2005 Environmental Assessment for the Runway 4 Extension. According to these results, there are no federally threatened or endangered species in the vicinity of the airport. However, there are several state threatened species within the vicinity of the airport: Upland Sandpiper (*Barramia longicauda)*, Loggerhead Shrike (*Lanius ludovicianus)*, Henslow's Sparrow (*Ammodramus henslowii)*, Carolina Darter (*Etheostoma collis)*, and Migrant Loggerhead Shrike (*Lanius ludovicianus migrans)*. Therefore, it is recommended that coordination be conducted with the Fish and Wildlife Service and the Virginia Department of Game and Inland Fisheries prior to constructing the proposed projects to determine potential impacts to biotic species and state threatened species.

Historical, Architectural, Archeological, and Cultural Resources

A review of the National Register of Historic Places indicated that there were no historic buildings currently listed within the vicinity of the proposed development. Some of the development areas have not been previously disturbed and may require analysis to ensure that there are no historical, architectural, archeological, and cultural resources in the vicinity of the development areas.

Light Emissions and Visual Effects

The construction of the Medium Intensity Approach Lighting System (MALS) would not likely include Runway Alignment Indicator Lights (RAILS) which use more intrusive strobe lights. Additionally, there do not appear to be any light-sensitive sites such as homes, parks or recreational areas located near the proposed location of the IALS. Therefore, it is not expected that a detailed analysis will be necessary to determine light emission or visual impacts.

Natural Resources and Energy Supply

Airport development actions have the potential to change energy requirements or use consumable natural resources. When reviewing the environmental effects of a development, the energy requirements, energy conservation, and the use of natural or consumable resources should be assessed. Typical actions that could cause such impacts include airside/landside expansion (new or expanded terminal and hangar facilities, new or extended runways and taxiways, airfield lighting, navigational aides, etc.); land acquisition for aviation-related use, new or moved access roadways, remote parking facilities, and rental car lots; significant changes in air traffic and airfield operations; and significant construction activity.

The proposed developments in this Master Plan include some of the typical actions noted previously. Therefore it is recommended that prior to construction further analysis be completed to determine potential environmental impacts.

Socioeconomic Environmental Justice and Children's Health and Safety Risks

Socioeconomic Environmental Justice and Children's Health and Safety Risk impacts are determined by analyzing if the proposed developments would disproportionately impact minority and/or other low-income households, or pose a disproportionate risk to the health and safety risks of children. Because noise is the most common potential off-airport impact, further examination of this category will be necessary based on the outcome of a future noise analysis.

Hazardous Materials and Solid Waste

Regulatory laws affecting airports include the Resource Conservation and Recovery Act of 1976 (RCRA). Through this legislation, the US Congress directed the EPA to develop and implement programs meant to protect human health and welfare, as well as the environment from improper hazardous waste management practices. Hazardous wastes are those materials that can cause injury or death, or that can damage or pollute the air, land, and water. Other pertinent legislation regarding this matter includes legislation that was a national campaign aimed at toxic waste cleanup efforts which included The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), a.k.a. Superfund Act, as well as the Superfund Amendments and Reauthorization Act of 1986 (SARA).

The developments in the the South GA Development Area include projects (expansion of the current maintenance building, and the installation of a new fuel storage tank) which will require further environmental analysis prior to construction to determine whether hazardous materials are present. See Table 4-4 for a summary of projects and their recommended environmental documentation.

Construction, renovation, or demolition of most airside project produces debris (e.g., dirt, concrete, asphalt) that must be properly disposed of. In addition, terminal, cargo, or maintenance facilities may involve construction, renovation, or demolition that produced other types of solid waste (bricks, steel, wood, gypsum, glass). Provided that Federal, state, and local regulations are followed when addressing the disposal of solid waste and there is sufficient

capacity at appropriate accessible waste disposal sites, it is not anticipated that further analysis will be necessary prior to construction. The nearest landfill to LYH, approximately 6.5 miles from the end of Runway 22 is the City of Lynchburg Solid Waste Management facility on 2525 Concord Turnpike, Cumberland VA, 24504.

Water Quality

Section 402 of the Clean Water Act (CWA) established the National Pollutant Discharge Elimination System (NPDES) to limit pollutant discharges into streams, rivers and bays. In the Commonwealth of Virginia, the Virginia Department of Environmental Quality (VDEQ) administers programs such as these. The current permits that the airport is operating under will need to be updated to include the construction and changes in development. Assuming that all developments, particularly the wash rack, would be compliant with the applicable water quality regulations, no further analysis will be necessary.

Floodplains

The Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) for the airport vicinity was reviewed. The FIRM indicates that the airport is located within "Zone C", which is defined as an area of minimal flooding. Therefore, it is not anticipated that a 100-year floodplain analysis will be necessary.

Wetlands

An initial review of the U.S. Fish and Wildlife Service online Wetlands Mapper[1] indicated that there were no wetlands within the vicinity of the proposed development. However, prior to construction, it may be necessary to conduct a wetland determination for the areas to be disturbed to confirm that there are no wetlands, as defined by the U.S. Army Corps of Engineers (USACE).

Department of Transportation Section 4(f)

Section 4(f) of the Department of Transportation Act provides that no publicly owned park, recreation area, wildlife or waterfowl refuge, or land of a historic site that is of national, state, or local significance will be used, acquired, or affected by programs or projects requiring Federal assistance for implementation. Most of the proposed projects have impacts that are limited to the boundaries of the airport property. However, because of the potential for impact to archaeological and historic sites, as well as the potential off-airport impact from noise, it is recommended that a more detailed analysis be completed before construction.

Farmlands

All of the proposed developments occur solely on airport property, which is currently zoned as "Medium to High Density Commercial" and some "Industrial." No additional land would need

[1] U.S. Fish and Wildlife Service. Online Wetland Mapper: http://wetlandsfws.er.usgs.gov/wtlnds/launch.html accessed: 09/08/2008

to be acquired; therefore, no additional analysis would be required to determine impacts to farmlands.

Wild and Scenic Rivers
The closest "Wild and Scenic River" is the James River which is located approximately six miles from Lynchburg Regional Airport.

Coastal Barriers/Coastal Zones
Lynchburg Regional Airport is not located within a coastal area as defined by the Federal government.

Chapter Five Airport Plans

5.1 AIRPORT LAYOUT PLAN SET

The Airport Layout Plan (ALP) set shows the layout of existing and proposed Airport facilities. An airport is required to have a current ALP approved by the FAA to participate in the Federal Airport Improvement Program (AIP). The ALP was updated as part of the Master Plan Update effort to reflect the recommended development projects as described in Section 4.4, the Recommended Development Plan in Chapter 4.

The ALP drawing was updated in cooperation with the Lynchburg Regional Airport management, the Virginia Department of Aviation (DOAV), and followed the standards outlined in FAA AC 150/5070-6B, Airport Master Plans, and AC 150/5300-13, Change 12, Airport Design. The sheets updated are as follows:

Sheet 1 – Cover Sheet

Sheet 2 – Airport Layout Plan

Sheet 3 – Runway 22 Inner Approach Surface

Sheet 4 – Airport Property Map

Sheet 5 – Airport Property Map Data Tables

Appendix D provides half-size drawings of the aforementioned sheets. It should be noted that the half-size ALP set included in this report precedes the approved FAA plan set. The approved set is subject to change as requested by the FAA.

5.1.1 Cover Sheet

The title sheet shows the Airport Name, a location map, vicinity map, and an ALP Sheet Index.

5.1.2 Airport Layout Plan

The updated ALP overlays the recommended future projects that were identified in the Master Plan Update over the existing airport base map. With the exception of rehabilitation projects this drawing shows all major projects pertaining to the airfield, buildings, aprons, and roadway/parking system. This sheet also displays project phasing information and updated data tables.

5.1.3 Runway 22 Inner Approach Surface

The Runway 22 Inner Approach Surface Sheet provides a detailed plan and profile view of the Runway 22 inner portion of the approach. The sheet highlights any objects penetrating Part 77 approach surfaces and Threshold Sighting Surfaces (TSS). The drawing illustrates any documented obstructions by object type and location as well as recommended actions for mitigation or removal of the obstructions.

Also, it should be noted that the Runway 04 approach drawing is not part of the ALP set, but is included for reference in **Appendix D1**.

5.1.4 Airport Property Map

The Airport Property Map (also known as an Exhibit A) shows land parcels owned by the Lynchburg Regional Airport and avigation easements on adjacent parcels. This has been updated to depict any recent any changes in the airport property.

5.1.5 Airport Property Map Data Tables

The Airport Property Map Data Tables Sheet shows the history of each parcel, including parcel number, grantor, instrument of title, acquisition date, and acreage.

Chapter Six
Airport Finance

6.1 INTRODUCTION

The purpose of this chapter is to demonstrate the Airport's probability and strategy in funding and financing the projects in the Master Plan. Much of the emphasis is placed on the first phase of the program, where realistic projections can provide the most meaningful and reliable planning analysis. This emphasis is not intended to determine the feasibility of bond issuance or other forms of debt financing, which would require a more extensive due diligence process. Rather, it is intended to show whether there are sufficient sources of capital (e.g. Federal and/or State grants, local funds, etc.) available to fund the projects recommended during the planning period. Capital projects were prioritized based on necessity and the urgency to resolve specific operational, safety/security and customer service issues. Then funding availability was assessed for each proposed project. The projects contained within this Master Plan have been thoroughly examined and planned based on a combination of operational and financial factors that fit with the Airport's strategic goals and objectives.

This chapter is divided into the following sections:

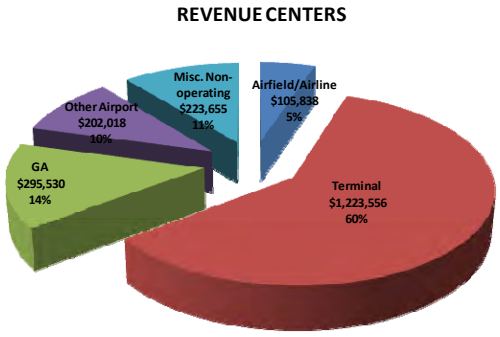
- Existing Airport Financial Structure
- Recommended Capital Program
- Available Funding Sources
- Proposed Capital Program and Funding/Financing
- Financial Analysis
- Conclusions

6.2 EXISTING AIRPORT FINANCIAL STRUCTURE

The Lynchburg Regional Airport is a department of the City of Lynchburg, which owns and operates the Airport. LYH has an airport advisory commission (the Lynchburg Regional Airport Commission), which consist of nine members. These commissioners are appointed by Lynchburg City Council, with the stipulation that three of the commissioners must be residents of three of the four adjacent/surrounding counties to the City of Lynchburg. Day-to-day management is executed by the Airport Director and a staff of approximately 24 employees. The Airport functions with 30-day airline lease agreements.

Recently, total operating revenues at the Airport have grown along with passenger activity to historical highs, reaching an estimated $2.1 million in FY 2008. The following components constitute Airport operating revenues based on the FY 2008 budget:

- Airfield/Airline 5%
- General Aviation 14%
- Terminal 60%
- Other Airport 10%
- Miscellaneous 11%



Airport expenses consist primarily of Operating and Maintenance (O&M) expenses and debt repayment to the City for debt service on a portion of bond proceeds employed for the airline terminal, state police hangar, t-hangar complex, and other facilities. In FY 2008, O&M expenses were $2.1 million, excluding depreciation. It is anticipated that within the next three years a significant portion of the existing debt will be retired. However, some additional new debt/borrowing is likely to be necessary to implement many deferred/delayed maintenance and capital infrastructure projects in the near term.

6.3 RECOMMENDED CAPITAL PROGRAM

In determining project financial feasibility, the critical elements to analyze are project costs, project priority, funding sources, and the ability of the Airport to leverage funding sources. These elements manifest themselves in the year-by-year phasing of construction expenditures. Delaying a project can provide time to accumulate sufficient funding capacity and allow the Airport to exploit additional funding in future years. However, project costs tend to increase with delays, and delaying infrastructure improvements may constrain an airport from generating the revenue levels required to finance the improvements. Delays may also adversely affect the safety and capacity of the Airport.

The phasing of the projects contained herein has been determined by need and demand. In some cases, however, the phasing of some projects has been delayed because of financial constraints. If additional funds, such as Federal or State discretionary funds became available at levels greater than anticipated, the timing of these projects could be advanced.

Table 6-1 presents the recommended capital program from 2009 through 2026 in inflated dollars using a construction cost escalation factor of 3.5%. The Capital Improvement Plan (CIP) is divided into three phases:

Phase I : 2009 – 2013	Phase II : 2014 – 2018	Phase III : 2019 – 2026

Table 6.1

Capital Improvement Program
Estimated Funding Sources

				Funding Sources				
				Federal/FAA				
Phase	Project #	Expected Year	Project Decription	PFC	AIP	State Entitlements	Self Funded	Total Cost (1)
I	1	2009	Construct New ARFF facility	$ -	$ 1,362,651	$ 71,718	$ -	$ 1,434,370
I	-	2009	Environmental Documentation (Includes Liberty University Related Projects)	$ -	$ -	$ 82,800	$ 20,700	$ 103,500
I	2	2010	T-Hangar Site Work	$ -	$ 54,089	$ 2,847	$ 0	$ 56,940
I	3	2010	Escalator Replacement	$ -	$ 366,359	$ 19,282	$ -	$ 385,650
I	-	2011	Environmental Documentation (Includes ATCT and remaining projects for 2011-1015)	$ -	$ 105,328	$ 5,544	$ 0	$ 110,880
I	4	2011	Demo Unoccupied Homes (2 homes on Airport Rd)	$ -	$ 49,258	$ 2,593	$ -	$ 51,860
I	5	2011	Rehabilitate Hangar Road (3)	$ -	$ -	$ 221,109	$ 55,277	$ 276,390
I	6	2011	Rehabilitate GA Access Road (3)	$ -	$ -	$ 52,216	$ 13,054	$ 65,280
I	7	2011	Rehabilitate FBO Parking Lots (Fallwell and Virginia Aviation) (3)	$ -	$ -	$ 82,888	$ 20,722	$ 103,610
I	-	2011	ATCT Siting Study (Includes SRMD as required in Order 6480.4A)		$ 126,394	$ 6,652		$ 133,050
I	8	2011	Replace Air Traffic Control Tower (50' Height) - Phase 1	$ -	$ 919,809	$ 48,411	$ -	$ 968,230
I	9	2011	Terminal Security System Upgrades	$ 332,615	$ -	$ -	$ -	$ 332,620
I	9	2011	Terminal Sustainability Improvements (Energy Savings Projects - Appendix A)	$ 127,503	$ -	$ -	$ -	$ 127,510
I	10	2011	Rehabilitate Taxiway C in GA Area	$ -	$ 94,737	$ 4,986	$ 0	$ 99,730
I	11	2011	Replace Baggage Claim Plates and Baggage Conveyor Feed Belts	$ -	$ 74,783	$ 3,936	$ -	$ 78,720
I	12	2011	Rehabilitate Terminal Road	$ -	$ 300,000	$ 77,896	$ 15,527	$ 393,430
I	13	2011	Replace Terminal HVAC System (2)	$ -	$ 421,313	$ 22,174	$ 0	$ 443,490
I	2	2011	T-Hangar Construction (7 units)	$ -	$ -	$ -	$ 348,082	$ 348,090
I	14	2012	North GA Development Area - Phase 1	$ -	$ 1,695,000	$ 727,384	$ 159,543	$ 2,581,930
I	15	2012	Construct North GA Development Connector Taxiway to Runway 17	$ -	$ 308,828	$ 16,254	$ -	$ 325,090
I	8	2012	Replace Air Traffic Control Tower (50' Height) - Phase 2	$ 602,108	$ 380,000	$ 20,000	$ -	$ 1,002,110
I	16	2012	Rehabilitate Taxiway G (Includes DEMO of Twy J, C/E fillet, and D fillet)	$ -	$ 246,373	$ 12,967	$ -	$ 259,350
I	9	2012	Terminal Cosmetic Improvements (Lighting, Ticket Counters etc.)	$ -	$ 109,015	$ 5,738	$ -	$ 114,760
I	17	2012	Rehabilitate Public Apron and Taxilane in T-Hangar Area	$ -	$ 402,455	$ 21,182	$ -	$ 423,640
I	-	2013	Environmental Documentation (Includes projects for 2016-2021)	$ -	$ 225,660	$ 11,877	$ -	$ 237,540
I	18	2013	North GA Development Area - Phase 2A	$ -	$ 431,576	$ 22,715	$ -	$ 454,300
I	19	2013	GA Wash Rack	$ -	$ -	$ 190,030	$ 47,507	$ 237,540
I	8	2013	Replace Air Traffic Control Tower (50' Height) - Phase 3	$ 1,037,182	$ -	$ -	$ -	$ 1,037,190
I	20	2013	Rehabilitate Terminal Apron - Phase 1	$ -	$ 1,100,063	$ 97,787	$ 9,972	$ 1,207,830
I	21	2013	Construct GA Area Conventional Hangar (20,000 SF)	$ -	$ -	$ -	$ -	$ 3,040,960
		Subtotal		**$ 2,099,407**	**$ 8,773,690**	**$ 1,830,985**	**$ 690,385**	**$ 16,435,590**
II	20	2014	Rehabilitate Airline Terminal Apron - Phase 2	$ 320,000	$ 710,000	$ 183,551	$ 36,546	$ 1,250,100
II	-	2014	DEMO Existing ARFF Facility	$ -	$ -	$ 74,739	$ 18,685	$ 93,430
II	22	2015	Expand Baggage Claim (dependent on demand)	$ 200,000	$ -	$ 145,347	$ 36,337	$ 381,690
II	18	2015	North GA Development Area - Phase 2B	$ -	$ 2,257,182	$ 118,799	$ 0	$ 2,375,990
II	23	2015	Expand GA Apron	$ -	$ 573,028	$ 30,159	$ -	$ 603,190
II	24	2016	South Mid-Field Apron Earthwork	$ -	$ 926,000	$ 65,880	$ 4,286	$ 996,170
II	25	2017	Rwy 22 RPZ Property Acquisition (Required with improved minimums w MALS)	$ -	$ 647,376	$ 34,072	$ -	$ 681,450
II	26	2017	South Mid-Field Apron, Access Taxilane, and Access Road	$ -	$ 842,042	$ 44,318	$ -	$ 886,370
II	27	2017	Rehabilitate Terminal Parking Lot - Phase 1	$ -	$ -	$ -	$ 541,155	$ 541,160
II	28	2017	Air Cargo Facility	$ -	$ -	$ -	$ -	$ 1,840,320
II	29	2017	North GA Conventional Hangar - 30,000 SF	$ -	$ -	$ -	$ -	$ 5,206,550
II	30	2017	Rehabilitate Terminal Area Taxiways A and C	$ 465,566	$ -	$ -	$ -	$ 465,570
II	31	2017	Lower Level Inline Bag Screening Option	$ 204,435	$ -	$ -	$ -	$ 204,440
II	32	2018	Rehabilitate Mid-Field GA Apron	$ -	$ 553,422	$ 29,127	$ -	$ 582,550
II	27	2018	Rehabilitate Terminal Parking Lot - Phase 2	$ -	$ -	$ -	$ 560,096	$ 560,100
II	33	2018	North Mid-Field Small Conventional Hangar - 5,500 SF	$ -	$ -	$ -	$ -	$ 1,064,010
II	34	2018	Install MALS Approach Lighting System on Runway 22	$ 1,388,029	$ -	$ -	$ -	$ 1,388,030
II	35	2018	Central Mid-Field Expansion Area Earthwork - Phase 1	$ -	$ 3,041,286	$ 160,068	$ -	$ 3,201,360
II	36	2018	Expand Snow/Maintenance Building to Accommodate Equipment from Building 14	$ -	$ 701,526	$ 36,922	$ -	$ 738,450
		Subtotal		**$ 2,578,030**	**$ 10,251,863**	**$ 922,983**	**$ 1,197,104**	**$ 23,060,930**
III	37	2019	Expand GA Terminal - Phase I	$ -	$ -	$ 697,866	$ 174,466	$ 872,340
III	38	2019	Reconstruct Hangars 1, 2, 3 & 4	$ -	$ -	$ -	$ 6,064,510	$ 6,064,510
III	39	2019	Expand Deplaning Passenger Corridor and Administrative Suite	$ -	$ 988,910	$ 52,048	$ -	$ 1,040,960
III	35	2020	Central Mid-Field Expansion Area Earthwork - Phase 2	$ -	$ 3,200,000	$ 217,180	$ 12,190	$ 3,429,380
III	40	2021	South Mid-Field Conventional Hangar - 30,000 SF	$ -	$ -	$ -	$ -	$ 5,974,630
III	41	2021	Passenger Boarding Bridges (x2)	$ 1,563,956	$ -	$ -	$ -	$ 1,563,960
III	35	2021	Central Mid-Field Apron, Taxilane, and GA Access Road	$ -	$ 1,078,452	$ 56,761	$ -	$ 1,135,220
III	37	2022	Expand GA Terminal - Phase II	$ -	$ -	$ 773,736	$ 193,434	$ 967,170
III	42	2022	South GA Development Area Earthwork and Apron - Phase 1	$ -	$ 2,767,968	$ 145,683	$ 0	$ 2,913,660
III	43	2023	Reconstruct Hangar 5	$ -	$ -	$ -	$ 2,481,108	$ 2,481,110
III	44	2024	Reconstruct Hangar 6	$ -	$ -	$ -	$ 3,069,051	$ 3,069,060
III	42	2024	South GA Development Area Earthwork and Apron - Phase 2	$ -	$ 2,965,116	$ 156,059	$ 0	$ 3,121,180
III	45	2024	South GA Development Hangars - Five 13,000 SF Conventional Hangars	$ -	$ -	$ -	$ -	$ 14,269,150
III	46	2024	Parking Space Reallocation from Economy to Close-In	$ -	$ -	$ 34,680	$ 8,670	$ 43,350
III	47	2024	Rental Car Ready Return Improvements	$ -	$ -	$ -	$ 265,048	$ 265,050
III	48	2024	Install 15,000 Gallon Jet A Fuel Tank	$ -	$ -	$ 208,078	$ 52,020	$ 260,100
III	49	2025	Runway 4 Hold Apron	$ -	$ 289,840	$ 15,255	$ -	$ 305,100
III	50	2025	Rwy 04 Approach Easements (Parcels 133, 135, 140, and 141)	$ -	$ 426,235	$ 22,433	$ -	$ 448,670
III	51	2025	Rwy 17-35 Long-Term RPZ Easements (Required to develop Non-Prec Approaches)	$ -	$ 20,459	$ 1,077	$ -	$ 21,540
III	52	2025	Construct Twy E to extend to Twy B (simplify intersections of Twy C and E)	$ -	$ 545,581	$ 28,715	$ -	$ 574,300
		Subtotal		**$ 1,563,956**	**$ 12,282,563**	**$ 2,409,570**	**$ 12,320,497**	**$ 48,820,440**
			Total (2008-2026)	**$ 6,241,393**	**$ 31,308,116**	**$ 5,163,538**	**$ 14,207,986**	**$ 88,316,960**

Notes: (1) All cost estimates were developed using 2008 dollars and inflated 3.5% annum. Estimates include 20% contingency.

(2) Cost includes equipment removal, equipment installation, roof repair and electrical modifications/connections and is based on Contractor's expected cost plus 25% overhead

(3) Road and Lot Rehab projects should be combined to save on Engineering/Design, Biding Costs, Mobilization etc. As such all such costs are included in Project 7.

The tables present projects fully-loaded with contingencies and fees for architecture, engineering, and planning. It is important to note that this table presents the expected capital requirements in the years required if projects are phased according to when they should be implemented in order to meet demand and maximize Federal and State grant funds as they are anticipated. Should funding not be available as assumed at historic levels experienced by LYH, some of the lower priority projects would be deferred until funding materializes.

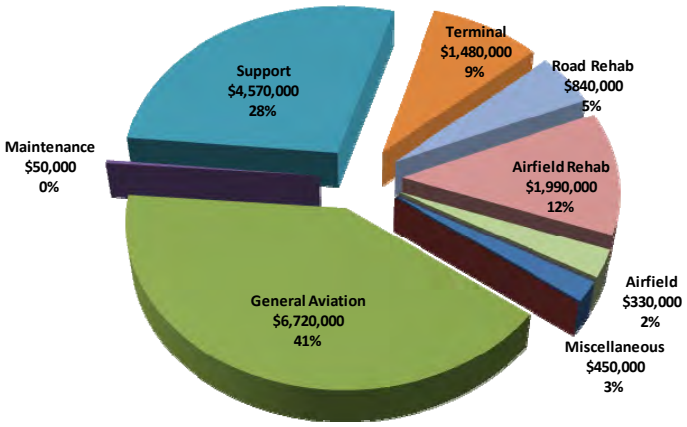
The cost estimates presented in this Study are for planning purposes only; implementation of the recommended capital projects will involve refinement of designs and costs through architectural and engineering analyses. For this reason, the costs shown are "order-of-magnitude" estimates and should be considered "best estimates," sufficient for the planning of projects. Actual costs will vary at the time of construction. When possible it is recommended that related projects be combined as much as possible to reduce associated costs (mobilization, security, engineering, bidding costs etc.).

The total capital cost for the recommended capital development plan is approximately $88.3 million, including design, engineering/inspection, and construction contingency. **Figure 6-1** the CIP Project Key, shows the locations of the major capital projects.

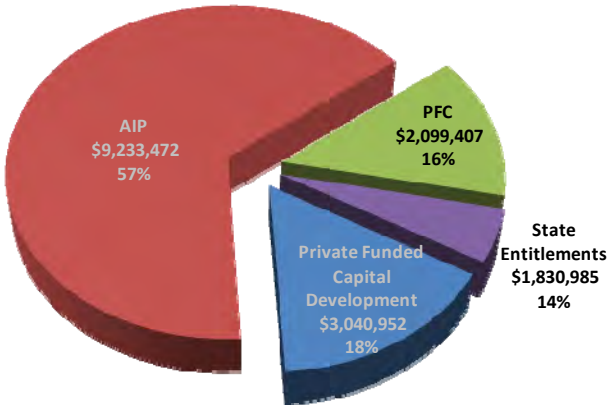
6.3.1 Phase I (2009-2013)

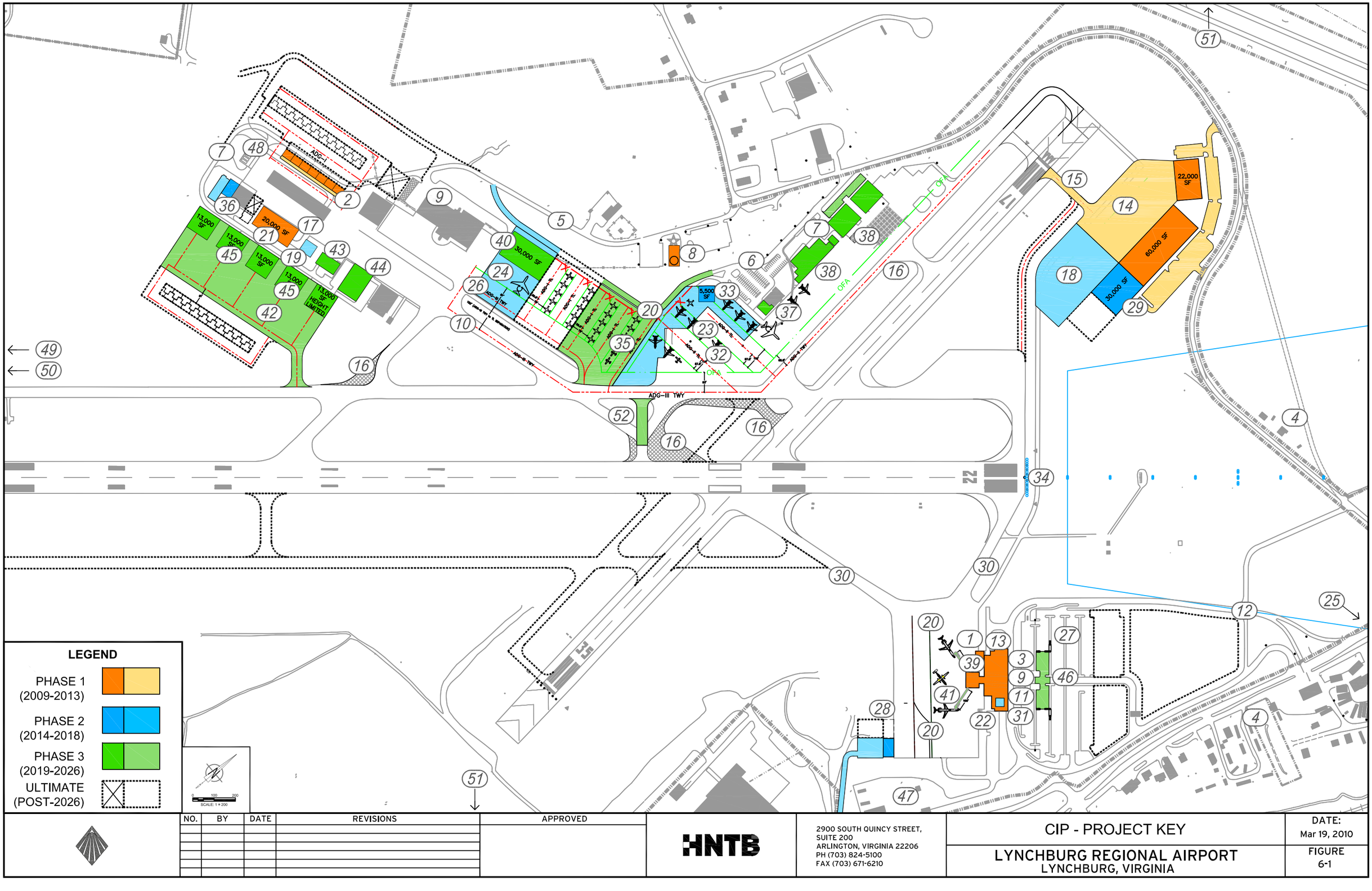
Phase I is estimated to cost $14.2 million in 2008 dollars or $16.4 million in escalated costs. In Phase I, the largest expenditures are in the areas of Airport Support and General Aviation representing 41% and 28% of the Phase I costs respectively. Terminal development represents approximately 9% of the estimated Phase I cost. Airfield improvements and rehabilitation combined represent 19%.

Phase I
Types of Projects (Total Escalated Share$)



Phase - I
Funding Sources





NO.	BY	DATE	REVISIONS	APPROVED

HNTB

2900 SOUTH QUINCY STREET,
SUITE 200
ARLINGTON, VIRGINIA 22206
PH (703) 824-5100
FAX (703) 671-6210

CIP - PROJECT KEY

LYNCHBURG REGIONAL AIRPORT
LYNCHBURG, VIRGINIA

DATE: Mar 19, 2010

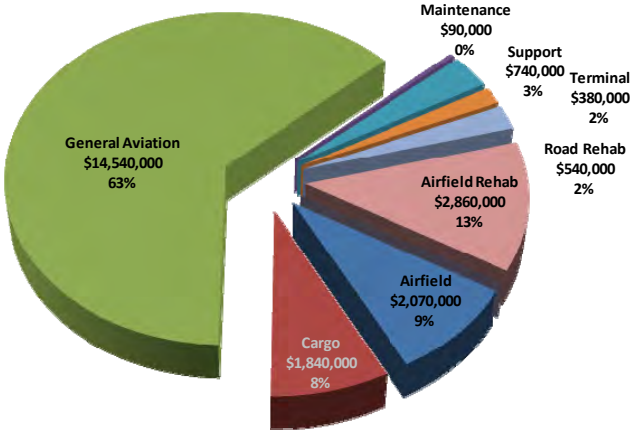
FIGURE 6-1

P:_Projects\42464-lynchburg\CAD\Chapter 4 Figures\LYH PHASING_REV3.dwg CIP Key Mar 19, 2010 - 10:16am

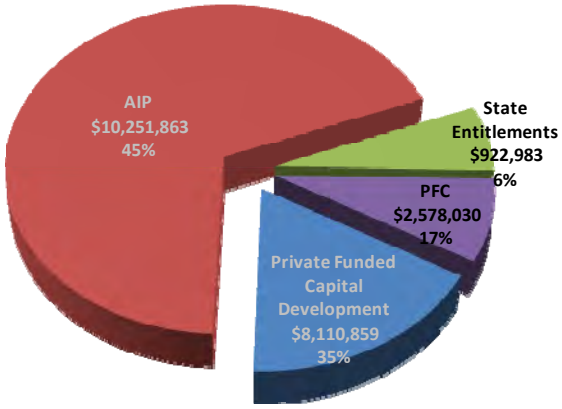
6.3.2 Phase II (2014-2018)

Phase II is estimated to cost $17.0 million in 2008 dollars or $23.1 million in escalated costs. As the planning phases project further into the future the differential between the base year [2008] costs and the escalated amounts is due to the compounding of the applied 3.0% escalation factor. In Phase II the focus is primarily on accommodating additional GA demand. This includes phase 2 of the North GA Development Area, additional apron, earthwork, a taxilane and roadway access on the south mid-field apron, and two additional corporate hangars.

Phase II
Types of Projects (Total Escalated Share$)



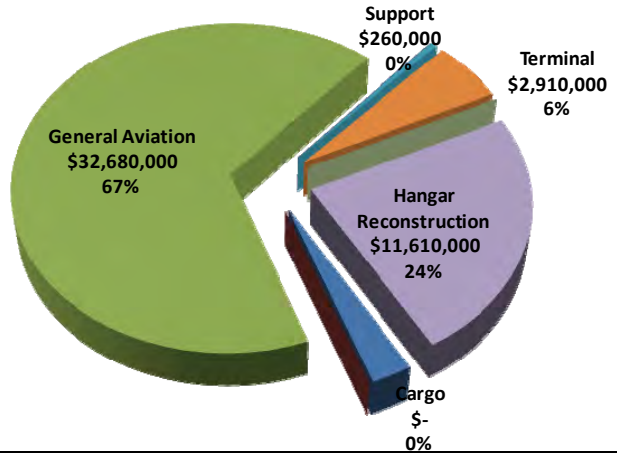
Phase - II
Funding Sources



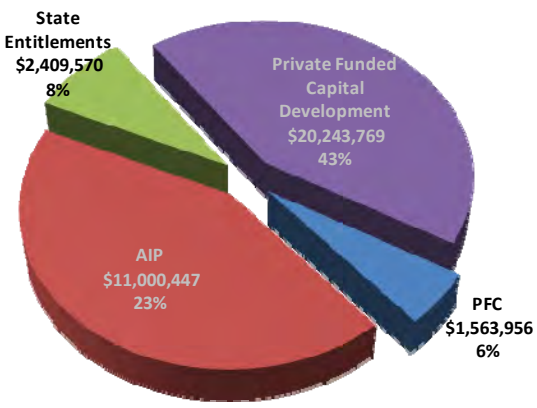
6.3.3 Phase III (2019-2024)

Phase III is projected to cost $30.0 million in current [2008] year dollars or $48.8 million in escalated costs. In Phase III, the majority of capital projects are general aviation or hangar construction with some limited terminal and support projects.

Phase III
Types of Projects (Total Escalated Share$)



Phase - III
Funding Sources



6.3.4 Funding Sources

The recommended development plan was subjected to an assessment of likely or desired funding sources in order to provide a guide for the Airport as it pursues the implementation of these projects. The Airport has five potential sources of funding for capital projects at this time:

- FAA Passenger Facility Charge (PFC)
- FAA Airport Improvement Program (AIP)
- Virginia Department of Aviation
- Private Capital
- Retained earning

6.3.5 FAA AIP Funds

Funding is provided to airports through the AIP as awarded by the FAA. AIP funds are divided into two categories: discretionary funds and entitlement funds. Discretionary funds are awarded at the discretion of the FAA based on certain eligibility criteria, while entitlement funds are distributed to airports on a per enplanement basis, subject to an annual minimum. As a primary airport, LYH is entitled to a share of annual AIP entitlement funding.

Entitlement funds are distributed to airports on a per enplanement basis using the formula below:

- $7.80/enplanement for the first 50,000
- $5.20/enplanement for the next 50,000
- $2.60/enplanement for the next 400,000
- $0.65/enplanement for the next 500,000
- $0.50/enplanement thereafter

In 2003, in accordance with federal law, the figure resulting from this formula has been doubled in any year where the total national AIP appropriation has been at least $3.2 billion. The total appropriation has been at least this large since 2003, and it is expected to be in the future. The same authorization provided that, the Airport share of the primary airport apportionments is increased to the greater of the formula calculation or $1 million. It is assumed that AIP will be funded at a level equal to or greater than the $3.2 billion threshold and that the above described formula will remain in effect to determine AIP entitlement distributions. Available AIP

entitlement funds are expected to total nearly $19.4 million through FY 2026. The three Phases of the CIP presented in this analysis assumes utilization of $15.6 million in AIP Entitlement funds.

The Airport has received discretionary funding in the past, and it expects to obtain similar levels in the future. Over the past 10 years, LYH has obtained an average discretionary funding amount of approximately $1.9 million annually.

The Airport has received significant discretionary funding in the past. However, to maintain a conservative and implementable CIP, it was assumed that LYH would likely only receive 40% of the average annual AIP discretionary historic amounts (as mentioned above) throughout the planning period.

This analysis assumes a total of approximately $17.3 million in discretionary funding between 2009 and 2026. However, to remain conservative the LYH CIP assumes employment of $15.7 million in AIP Discretionary funds.

6.3.6 Passenger Facility Charges

The most desirable source of capital funding for airports is the PFC. The FAA currently authorizes the collection of $4.50 per passenger enplanement to fund certain approved projects for a defined collection period. Based on current/proposed in-conference reauthorization language, it is expected that the federal government will increase the PFC cap from $4.50 to $7.50 in the near future. This analysis assumes that LYH will be able to begin collecting PFCs at the $7.50 level in 2010.

Eligible projects for PFC use include those projects which preserve or enhance safety, security, or capacity; reduce or mitigate noise; and/or enhance competition among air carriers. For this master plan it was assumed that 95% of enplanements are subject to PFC collection. Further it was assumed that the portion of PFC necessary to compensate carriers for the administrative burden or remittance will remain at the current $0.11 per PFC collected.

It is projected that LYH will collect over $9.3 million in PFCs between FY 2010, when the current PFC application is projected to expire, and FY 2026 to assist in paying for project costs. Collections will range from $405,000 to $622,100 annually based on projected passenger enplanements during this time period.

6.3.7 Private Funding Sources

Private third-party sources, such as tenant-funded projects, were factored into the funding source plan for hangars and other third-party operated revenue producing projects. It is projected that tenants will directly finance approximately $31.4 million or 23% of the Master Plan projects between 2009 and 2026.

6.3.8 Virginia Department of Aviation - State Funding

Funds are available from the Commonwealth to cover the Airport's project costs. The Commonwealth will match all or part of the local share of AIP-funded projects depending upon the type (entitlement or discretionary) of state grant funds used. If a project is funded with federal money, the Airport may use Commonwealth entitlement funds to cover 100 percent of the non-federal portion. There are two categories of State funding, State entitlement funds and discretionary funds that the State contributes.

Annual State entitlement funds are uncertain and vary between years depending on State budgetary revenues. Due to the uncertainty, LYH's past 10-year entitlement history was adjusted for inflation and analyzed. In order to remain conservative the Master Plan assumes that LYH will generate approximately 90% of the average annual historic collection amounts. Over the past 10 years LYH collected an inflation-adjusted annual entitlement funding amount of $423,410. Although it is entirely possible that the State may not provide the assumed 90% average amount, the CIP funding remained a conservative estimate due to a conscious decision to omit any reliance on State discretionary funding.

In the event that the Airport's entitlement funds are completely obligated, state discretionary funding may be available, though this analysis does not assume the presence of any State discretionary funding during the planning period. Over the same 10-year historic analysis period, LYH received an average of $69,000 annually in discretionary funding. Since variances in annual State discretionary funding tended to swing significantly higher than for State entitlements, it was assumed that although LYH is likely to receive some State discretionary funding, a slightly higher State entitlement average annual funding level (90% instead of 75% or 80% as modeled in previous CIP funding scenarios in conjunction with some annual State discretionary funding) would account for any additional State discretionary funding LYH may receive.

Based on the Master Plan projections, the Commonwealth is targeted to contribute approximately $5.2 million in project costs through FY 2026.

6.3.9 Airport Revenues/Retained Earnings

After exhausting all present sources of external funding, it is assumed that LYH would use Airport revenues to fund the remaining project costs. This creates some funding challenges for LYH, as it strives to keep airline rates as low as possible while providing superior customer service, enhancing facilities, and complying with Department of Homeland Security (DHS) requirements.

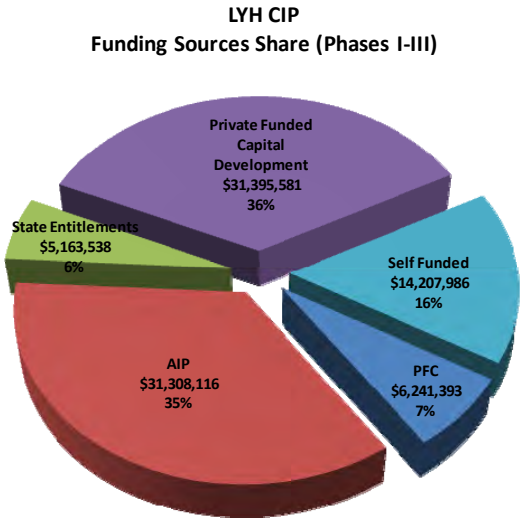
LYH will ultimately be responsible for approximately $14.2 million of capital improvements if the federal, Commonwealth, PFC, and private funding assumptions described previously come to pass.

6.3.10 Estimated CIP Funding Sources

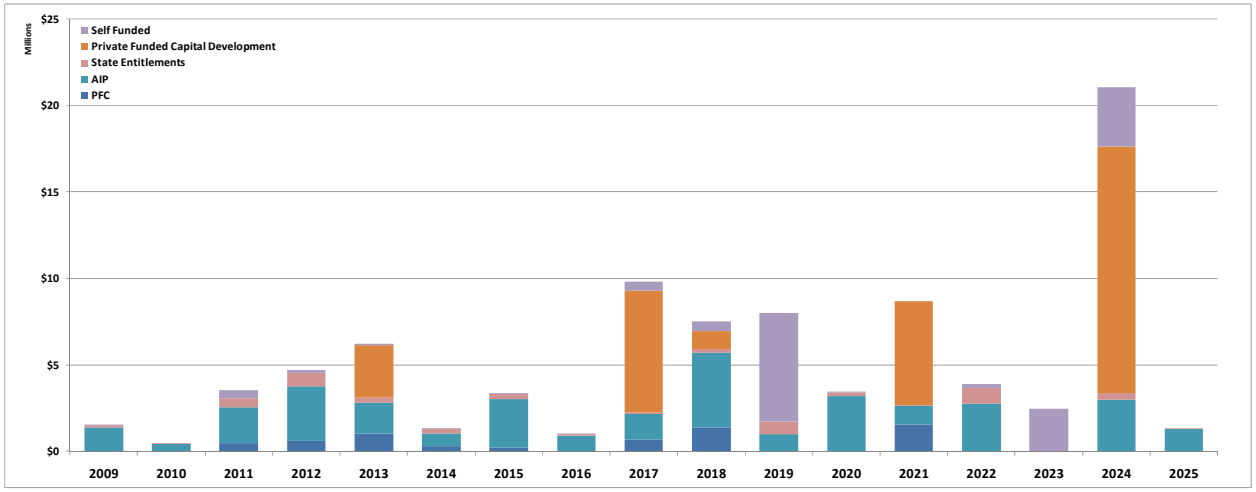
The various funding sources were analyzed for their applicability for each CIP project. Federal funds and PFCs were employed first when possible and further supplemented by State and other local funds. In the earlier section that describes each Phase, a diagram of the funding distribution by source is presented for each CIP phase. The entire CIP is estimated to cost $61.5 million in 2008 dollars or $88.3 million in escalated costs. The graphs below depict the distribution of total CIP funding (based on escalated costs) and annual funding distribution.

A sizeable portion, 36% or $31.4 million, of the CIP is planned to be funded through private funding sources reflecting the robust general aviation demand growth at LYH. With plans for a university aviation facility, and numerous local organizations requiring access to GA facilities such as hangars and shared infrastructure, LYH anticipates experiencing significant demand for additional facilities. Although many GA infrastructure improvements on the airfield and for common use/shared facilities are funded through Federal and State sources, hangars and exclusive use facilities cannot be funded with public sources and will require the stakeholders that utilize these facilities to finance their development with their own capital. As is visible from the annual funding distribution chart, private funds are anticipated to be required in significant amounts in select years when demand for these additional GA facilities materializes. Since private funding is based on economic need and the specific development of various exclusively leased or revenue generating GA projects, it tends to be significantly "lumpier" than other funding sources that provide annual capital infusion for CIP projects.

The next two largest funding sources for the CIP are AIP funds and Self Funding contributing 35% or $31.3 million, and 16% or $14.2 million, respectively. PFCs and State Entitlements are projected to contribute 7% or $6.2 million, and 6% or $5.2 million, respectively.



Annual CIP Funding Sources



6.4 FINANCIAL ANALYSIS

The estimated Airport cash flow analysis during the planning period is contained in **Appendix E**. The analysis includes projections of project funding, revenue bond issues, Airport revenues, operating, maintenance, capital costs, airline rates and charges, and net Airport revenue. The analysis follows the Airport's accounting and rates and charges procedures to the extent practical.

6.4.1 Escalation/Growth Factors

To project specific revenue and expense items, this analysis identifies the relevant airport activity driver, if such a variable relationship exists, and projects revenues and expenses based on activity statistics and forecast. In addition to activity drivers, many revenue and expense items are also expected to escalate/grow at rates that vary from general inflation (CPI-U). Energy costs are likely to outpace broad inflation. Therefore energy expenses are projected to increase both by utilization, variable to activity, and by an escalation factor of 3.0% instead of the slower broad inflationary price increases of 2.5% applied to general expenses and revenues. The primary Airport activity statistics used to project revenues and expenses in this analysis are passenger enplanements, and commercial and GA aircraft operations. Below is a chart that depicts the inflationary and escalation factor used for projections in this analysis.

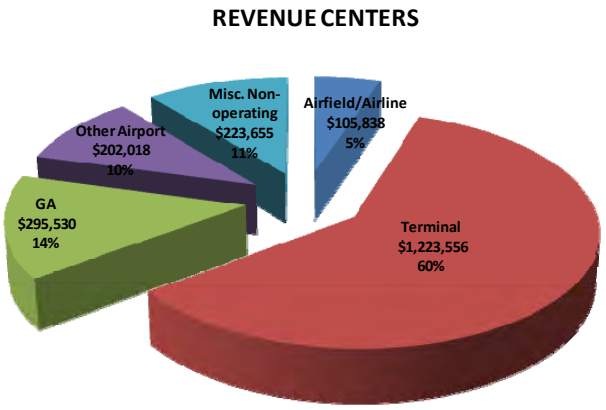
ESCALATION	Rate
Inflation (CPI-U)	**2.50%**
Interest	**4.00%**
Construction Escalation	**3.00%**
Real Estate Growth	**3.00%**
Energy Escalation	**3.00%**
Real Wage Growth	**4.00%**

Inflationary pressures are assumed to be constant in the long-term. Maintaining a healthy operating budget will likely mandate that the Airport increase their rates and charges at inflationary levels to recover such increases in operating costs. Inflation was assumed at 2.5% and is applied to all revenue and expense projections where no specific adjustment/escalation factor was available. The balanced treatment of both revenues and expenses at the same inflationary factors suggests that if inflation varies significantly from the assumed long-term rate, it is highly unlikely to have a significant impact on the financing of the Airport and development of the CIP.

6.4.2 Operating Revenue Projections

[2]In fiscal year 2008, total revenues were budgeted at approximately $2.4 million. Operating revenues were budgeted at approximately $1.8 million. The dominant categories of revenue were projected based on the relevant activity projection and an escalation factor such as inflation, interest rate, construction escalation, real estate appreciation/growth, energy cost escalation and real wage growth.

The following revenue categories are described below and the methodology used to project the revenue category are described below:



FY2008

- Airfield/Airline – The Airfield (Airline) revenue center is primarily the landing fees paid by commercial carriers to LYH. Airfield (Airline) revenues were assumed to be driven by commercial air carrier operations.

- Terminal – The terminal revenue center includes all commercial activities targeting LYH's commercial passengers such as Airline and tenant rentals/leases in the terminal, terminal concessions including food and beverage, retail, and advertising, and ground transportation concessions such as the limousine concession, parking, and rental car revenues. Terminal revenues are assumed to be driven by commercial passenger enplanements.

- General Aviation (GA) – The GA revenue center is comprised primarily of GA related revenue producing activity such as; fuel flowage fees, hangar/facilities leases, landing fees, aircraft parking fees and thru-put fees. GA revenues are assumed to be primarily driven by GA operations.

- Other – The Other revenue center represents the more unique non-GA property leases and rents to such organizations as the Police, FAA, DHS, fire department, and non-aeronautical tenants.

[2] Source: LYH 2008 Approved Budget

- Miscellaneous Non-Operating – The miscellaneous non-operating revenue center reflects revenues from sources other than airport operations. This includes interest earned, charges for services to the City, Federal and State security reimbursement assistance.

- Land Use Revenue (New) – The chart that depicts the revenue distribution by revenue center for 2008 does not contain this revenue category. LYH has some sizable land areas that would be ideal for non-aviation commercial business development and could be leased for such uses as retail, food/beverage, hospitality, industrial development and other revenue generating lease structures. At the time of data collection for this Master Plan, LYH had identified approximately 36 acres of developable land for non-aviation commercial uses. Below are the four parcels and the year in which demand is assumed to induce development. These parcels can be seen on Sheet 4, the Airport Property Map.

    - .92 Acres - across Rt. 29 (2009) (parcel 98)
    - 5 Acres - Future Parking (2012) (portions of parcels in this area include; 76, 81, 95, 46, 41, 89, 84, 88, 82, 79, 90)
    - 15 Acres - Industrial area West (2017) (portion of parcel 63)
    - 15 Acres – Between the Rwy 22 and 17 RPZs (2021) (portion of parcel 7)

  These properties were determined to be comprised of four distinct parcels in separate locations. To project the revenue potential from leveraging these underutilized assets, local real estate specialists were interviewed along with Airport management to determine viable assumptions to employ in the financial feasibility model. Parcels were assessed for desirability and when demand would likely necessitate development. Parcels that are larger and less desirable were projected to not be viable until demand outgrows supply and absorption rates of existing properties. These less attractive or more limited use properties were discounted by a vacancy factor. It was assumed that only the first two properties would be fully subscribed to and under lease once a land lease is negotiated and the facilities are developed. The two 15-acre industrial areas to the west and between the Rwy 22 and 17 RPZs are assumed to only be partially occupied/absorbed, at 60% and 40% respectively, by the end of the analysis period. Local real estate experts were consulted to determine the land values for each parcel. Lease rates were then derived based on an assumed real estate rate of return. The rate of return for real estate development was assumed to be 10%. The lease values derived from current land valuation prices were estimated and assumed to increase by the real estate appreciation factor of 3.0%. It should be noted that non-aviation commercial business developments should be reassessed at the time of development to ensure compatibility with aviation development. At the time of development, lease agreements should be coordinated with the FAA and Virginia Department of Aviation.

6.4.3 Operating Expense Projections

O&M expenses are allocated as Departmental and Non-Departmental expenses. Additionally, LYH also separates expenses among seven cost centers: Fire, Airfield, GA, Terminal, Safety, Administration, Snow Removal, and Other direct cost centers. Based on interviews and discussions with LYH management, it was assumed that the existing airport operation is maintained by the minimum number of staff and activities to ensure safe and efficient air transportation services. Due to this minimum threshold, it was assumed that LYH's operating expenses would not increase directly with activity, but rather grow through inflationary and escalation factors during the planning period.

6.4.4 Debt/Borrowing

Due to the governance structure at LYH, the Airport does not have direct authority to issue debt in the form of municipal bonds. Previously, when the Airport has needed to undertake leverage financing of capital developments, it has accessed the City's debt vehicles to employ a portion of City issued municipal bonds and provide annual debt service payments to the City in amounts necessary to retire the portion of proceeds borrowed. The Airport is ahead of schedule in the repayment of the last City debt financing for development projects. Although no significant debt is envisioned for LYH's CIP needs, it is likely that in the near-term, due to accumulating capital maintenance deferrals, LYH will require some borrowing assistance. This analysis assumes that LYH will be able to access debt capital when necessary directly through or from the City.

6.4.5 Total Revenues and Expenses

Based on the projections of operating revenue, O&M costs, and debt required, net revenue is projected to rise consistently throughout the planning period. Operating revenues are projected to be positive during the entire planning period. However, while still repaying existing debt outstanding to the City and given the near-term capital spending requirements, short-term net operating revenues will be marginal for the next two to three years. Further out, projections anticipate increased commercial development revenue and a healthy, growing activity base which should allow LYH to be fully self-sufficient and provide adequate liquidity and reserves.

6.5 CONCLUSIONS

The analyses presented in this chapter highlight the financial challenges faced by LYH and most other U.S. airports in these times of new, greater Security requirements and difficult economic realities. The findings of these analyses are summarized as follows:

- Generally, the development program is financially feasible. The most critical projects can be implemented when required for safe and efficient operations.
- The feasibility of the program depends on the availability of federal and Commonwealth

grant funding; however, this feasibility exists while assuming that, on average, the Airport receives less discretionary funding during the planning period than it has recently. Still, should discretionary funding become more difficult to obtain, LYH may need to re-phase or postpone projects in the future.

- The Airport will need to source some limited debt from the City in the short-term to cover capital need. LYH should retire all debt to the City and continue to function as a fully self-sufficient enterprise.

- PFCs were assumed to fund a substantial portion of the program. It was assumed that the federal cap on PFCs would be increased to $7.50 and that LYH would collect at that level in 2010 with the filing and approval of a new PFC application. If the cap is not raised, the program would only be feasible if some projects were cancelled and/or postponed.

- It was assumed that the Airport would lease commercially viable lands on the Airport to generate increased revenues. It will take a significant amount of time for demand to materialize and fully absorb more of the properties/parcels.

- The assumed broad inflation rate (CPI-U) is assumed to be 2.5 percent per year for the duration of the planning period.

- Should funding within the planning period fall short, projects that are not safety related or critical to the continued operation of the airport could be postponed until funds are available. This would include projects such as: Terminal Cosmetic Improvements, Terminal Sustainability Improvements, GA Wash Rack etc. Also, demand driven projects like Hangars, Transient Aprons, Bag Claim Expansion etc. can be postponed as needed until demand materializes.